Harris AUTO RACING

1998 and Earlier Chassis

Technical Information Available at 515-432-6972:
8:30am-5:00pm Monday thru Thursday
8:30am-4:00pm Friday

www.harrisautoracing.com

<u>WE WANT YOU TO OBTAIN THE BEST PERFORMANCE POSSIBLE!</u>

So please help us to help you! By following this guideline, we feel that you will get the maximum performance from you Harris built car! Proper maintenance is the key to winning races and the following information will help you reach that goal!

As a service to every Harris customer, your initial scale and align charge will be waived when you purchase a new chassis from us. We ask that you follow our "starting point list" which can be found on the following page before bringing your car to us to scale and align.

Cars that are brought here for set up that do not meet that criteria will be charged the hourly shop rate for how ever long it takes to prepare the car for set up. So please come here prepared!!

Our technical lines are very busy, and we ask that you please read this information before calling us with questions. The majority of the questions we answer on our technical lines are <u>LOCATED IN THIS SET UP MANUAL, so PLEASE READ IT</u>! If you do not understand something you read in the manual, call us, we will be happy to help you to understand it.

Harris
AUTO RACING

GENERAL CHASSIS RECOMMENDATIONS

When setting up your chassis, we recommend that you follow the same procedures every time in order to get the most consistent results. The following is a starting point list, and if you are bringing your car to us to scale, please complete the list before bringing it here:

- **20 gallons of fuel in cell.**
- **Install "scale tires." You should try to use the same set for consistency purposes.**
- **1" stagger on the front. 2" stagger on the rear.**
- **Correct wheel offsets: See Below.**
- **Check ball joints to make sure that they are not bent. Check shocks, upper and lower "A" frames, center links, tie rod assemblies as well to make sure they are not bent. All of these will cause scaling problems, not to mention car-handling problems.**
- **Set ride height & front end alignment. Front end needs to be close to having the correct camber.**
- **Everything must be complete to insure an accurate set up.**
- **Cars brought here for set up that do not meet the above criteria will be charged the hourly shop rate for how ever long it takes to prepare the car for set up: so please come prepared.**
- **Before calling here with scaling questions or problems, please complete the above list.**

The following is a weekly list that you should follow in order to maximize the performance and consistency of your chassis:

1) **Install Scale Tires With Proper Wheel Offsets**

2) **Check Fuel Level (should be 20 gallons)**

3) **Unhook Shocks and take Preload out of 5th Spring (torque arm car)**

4) **Set Ride Heights**

5) **Front End Alignment**

6) **Set Pinion Angle**

7) **Check Total Weight and Balance**

8) **Add Weight, if Needed**

9) **Reset Ride Heights**

10) **Set Correct Percentages**

11) **Reset Front End Alignment**

12) **Set Preload on 5th Coil Spring (torque arm car) & Reset Pinion Angle**

13) **Hook up Shocks**

14) **Check Car Completely**

1) **Install scale tires, with proper wheel offsets. You should have a set of tires and wheels (with the correct offsets) that you use for scaling purposes. This will eliminate one variable and make it simpler. You should also have 16 pounds of air pressure in your right rear and right front tire. You should have 11 pounds of air in the left front and 12 pounds in the left rear. Standard wheel offsets depending on which spindles that you use, are as follows:**

LF: 3" offset	**RF: 2" offset**
LR: 3" offset	**RR: 3" offset**

2) **Check fuel level. You should always have the same amount of fuel in your cell when you set up your car. We recommend 20 gallons, as normally that would be what your car will have in it during normal race conditions. If your track turns dry slick, having a larger fuel cell, like a 30 or 32 gallon, will enable you to add more fuel and get a higher rear weight percentage.**

3) **Unhook your shocks, and take the preload out of the 5th coil. Unhook all shocks except for the shock on the 5th coil (not necessary). Also take all the preload out of the 5th coil spring at this time. Keep in mind, the 5th coil we are talking about is the torque ARM not the torque link. We do not consider the spring on the torque link to be a "5th coil spring."**

4) **Set you proper ride heights. <u>These must be as close as possible to keep the roll center at the proper height</u>. Front measurements are taken between the top of the lower A-frame and the bottom of the key stock welded to the frame rail. Rear measurements are taken between the bottom of the axle housing and the top of the frame rail, as follows:**

Left Front:	**3 1/8" ***	**Right Front:**	**3 5/8" ***
Left Rear:	**2 ½" (at 9" housing) Or 2 ¾" (at axle tube)**	**Right Rear:**	**2 ¾" (at axle tube)**

***At this point your upper "A" frame angles should be 15° to 15 1/2° on the left and 16° to 16 1/2° on the right. This should be read from the backside of the upper "A" frame.**

5) **Set front end alignment. The following settings apply to set your front end alignment when <u>using power sheering</u>:**

	Caster:	**Camber:**
Left Front:	**2 ½ (+)**	**1 ¼ (+)**
Right Front:	**4 ½ to 6 (+) ***	**2 ½ (-)**
Toe Out:	**1/8"**	
Left Tie Rod:	**18 ¼"**	

***When setting right front caster, you may choose to vary this due to driver preference.**

- **Tie in is set off of the right tie rod. The left tie rod is preset to 18 ¼". To set your toe, have someone spin the tire and another person spray paints a line in the center of the tire as the wheel is spinning. Then scribe a straight line through the center of the paint as the wheel is spinning again. Now, repeat this process with the other front tire. Now you are ready to take the toe measurement. With one person on each side of the front of the car, slip a tape measure in between the tires, at the highest point possible on each side of the tire. It is important that both the front and back side measurements are taken at the same place on each side of the tire. For example, if you can only get your tape measure to clear 2/3 of the way up the back side of the tire, then you should use 2/3 of the way up the front side of the tire as well. The difference between your front and rear measurement is your toe out or toe in. For example, if the front measurement is 78" and your rear measurement is 77 7/8", then you have 1/8" of toe out.**

NOTE: If you are certain that you drew the line on the tire straight, but when you look at the drawn line on the tread of the tire, it does not look straight and wanders from the left to the right, that means either you have a bent wheel, or possibly a broken bead on your tire. You should check this problem further at this point.

6) **A: Set the pinion angle – Torque Arm Car. Set the pinion angle by adjusting the lower rod end on the back of the torque arm. Pinion angle should be set at 5° negative. (If you are using old style safety chain and not the new 6th spring assembly, the chain length needs to be 18 ½". This should give you the correct pinion angle of 5°negative.) Please reference the rear end diagram towards the end of the manual for more information.**

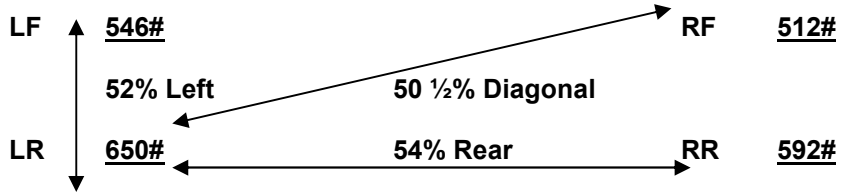
6) **B: Set the pinion angle – Harris Torque Link Car. Put a jack under the pinion; set the proper pinion angle of 7 1/2° down. Use the adjuster on the 90/10 shock to preload rubber bushings. This will control pinion angle. Measure the center to center on the rod ends of the 90/10 shock. Make sure that there is at least 1" to 1 ¼" of compression on the shock. If there is not that much available, you must then cut down the #2824-ADJ adjuster sleeve so that it is the correct length to get this amount of compression. If you need to shorten this adjuster sleeve, make sure that you shorten the end OPPOSITE of the nut that is welded on. This will help keep the quick adjuster from bottoming out while you are applying the brakes. Please reference the new pages towards the end of the set-up manual that illustrate the proper parts needed as well as their proper installation.**

Measure the free height of the spring on the torque link, and then compress the spring 1/8" using the adjuster tube. Making sure in doing so that there is at least ¾" between the plate and the rubber bushing on the torque link. This will make sure that there is no bind in the torque link under braking. Again, reference the torque link diagrams for more specific information.

7) **Check your weight balance (front to rear, left to right and diagonal RF/LR). If you need to add weight to make your car legal at your track it should be added now. Add weight to arrive at the proper balance for left and rear percentage. No weight should be added to achieve the proper diagonal percentage. Diagonal percentage can be added through the suspension. After adding weight, the ride heights will need to be reset. Your proper rear percentage setting will vary depending on track conditions. The following page is the recommended weight percentages.**

LEFT SIDE: 51 ½% to 52 ½% **REAR: 54% to 60%** **DIAGONAL: 50 ½% to 51%**

Example for figuring weight percentages, with a total car weight of 2,300#:



- **To figure left side percentage: add left front weight to left rear weight, divide by total car weight. In this example, 546 + 650 = 1,196 ÷ 2,300 = 52%**
- **To figure rear percentage: add left rear weight to right rear weight, divide by total car weight. In this example, 650 + 592 = 1,242 ÷ 2,300 = 54%**
- **To figure diagonal percentage: add left rear weight to right front weight, divide by total car weight. In this example, 650 + 512 = 1,162 ÷ 2,300 = 50 ½%**

The previous weight percentage diagram is made with the assumption that you have an average driver weight of approximately 200 pounds. You should achieve these approximate <u>percentages without the driver in the car</u>. The weights on the previous diagram are also approximate. Depending on what type of components you use, and which type of chassis you purchased; your wheel weights will vary from the example.

- **If your driver is more than 200 pounds, then you may want to have a slightly lower left side percentage; depending on how much over 200 pounds the driver is.**

- **If your driver is less than 200 pounds, then you may want to have a slightly higher left side percentage, depending on how much under 200 pounds the driver is.**

8) Add weight if needed. Some tracks have a minimum weight rule, if that is the case you will probably have to add weight to your car. Most tracks include the driver in the total car weight, so keep that important point in mind when figuring the amount you will need to add. Adding weight to the chassis is an important key in the quest for additional froward bite. Remember that you are only dealing with an 8" tire! On extreme dry-slick conditions, you may want to have up to 60% rear weight percentage. Before you add weight on the car at the track, you need to make sure that you know how it will affect your weight balance on the car. In other words, you need to scale your car before you get to the track with the additional weights on the car in their proper positions. Adding weight without knowing how it will affect your percentages will probably cause more problems than it will help you. <u>The optimum goal here is to add rear percentage while not changing diagonal percentage or left side percentage.</u>

<u>If you normally run a 4" offset wheel on the right rear when it gets dry, put that on your car with the stagger you normally run (when you scale the car in this scenario). Fill the car with fuel. See where your percentages are at this point. Now you can add weight as needed to obtain desired rear percentages.</u>

For example, if you normally burn 15 gallons of fuel during a feature race, you should put 100# on to offset this. (Alcohol weighs 6.58#/gallon x 15 gallons = 98.7#.) If you put 40# on the right rear rail, you may only need to put 25# on the left rear rail to keep the diagonal and left side percentage the same. (Or as close to 50 ½% as you can get.) The other 35# you may want to put on the 1 ½" round tubing in front of the fuel cell or on the 2" x 2" behind the fuel cell. Keep in mind that weight transfers better the higher it is placed.

<u>Remember that with more weight on the tail at this point, you will want to make sure that you keep the car as tight as possible going into the corner. This will allow you to come off the corner faster. You may need to slow down upon corner entry to achieve this – sometimes SLOWER is FASTER!</u>

9) Reset ride heights. Go back to step (4) and reset your ride heights.

10) Set correct percentages. Go back to step (7) and make sure that your car has the proper weight percentages.

11) Reset front-end alignment. Go back to step (5) and make sure that your car has the proper alignment settings.

12) A: Set preload on 5th coil spring and reset pinion angle. To set the preload, adjust the slider until it is up against the spring. From that point, add two turns to it. If you are using AFCO sliders, only turn one turn of preload. Now you will have two turns of preload on the spring. Follow step 6A to reset your pinion angle.

12) B: If you are running a torque link, you have already completed this step, but do check the pinion angle to make sure that it has not changed. If it has, refer back to step (6)B.

13) **Hook up the shocks. Before hooking the shocks back up, check them to insure that they are in good working condition. Compress and decompress them a few times. Check for any binds, air spots or dents. If you discover any of these problems, you will need to replace the shock. Worn shocks will cause inconsistencies in your car's performance. Now go ahead and hook the shocks back up.**

14) **Check car completely. Races are won with proper maintenance! The above list is a good starting point for weekly maintenance on your car. Also keep in mind that the more you race the more maintenance your car will nee. You may find that you need to complete this list twice weekly, for example.**

Notes:

ADDITIONAL CHASSIS SETTINGS & RECOMMENDATIONS:

- **Coil Rear Suspension: These measurements are taken from center to center on the rod end.**

• Left Lower Arm:	**20 ¼”**	**• Right Lower Arm:**	**20”**
• Left Brake Floater:	**19”**	**• Right Brake Floater:**	**19”**
• Center of Rear End*:	**17”**		

  ***Measured between the center bottom bolt of rear end third member and inside of right rear 2” x 2” frame rail.**

- **Panhard Bar:**

  - **Should be located in the second from the bottom hole on the frame (on a 1995 or older car – 1996 or newer should be the center hold), and the third from the bottom on the rear end mount. Lowering the panhard bar on the rear end mount can increase side bite.**
  - **For 1996 chassis and newer: Panhard bar angle should be between 0° and negative 10°of angle depending on how much you need to give you side bite.**

- **Control Arm Location:**

  - **Both control arms should be located in the center holes of the frame. Raising the left control arm to the top hole on the frame can increase forward bite. On a real dry slick track it is recommended that the right control arm be lowered to the bottom hole on the frame. By putting more lead in the rear end, it will assist your car in coming off of the corner straighter. Do this by lengthening the left rear lower control arm between 3/8” to ¾”. If your left front is coming off the ground, raise your right lower control arm.**

- **Brake Floater Control Arm Location:**

  - **The left brake floater needs to be located at the bottom hole on the frame, and the top hole of the floater. The right brake floater should be located in the center hole on the frame, and the top hole of the floater. The right side can be adjusted up to the top hole on the frame to increase side bite on corner entry. Some drivers, depending on smoothness while on the brakes, will see increased performance from using brake floaters.**

- **Torque Arm Recommendations:**

  (<u>Harris torque link information is located two pages after this one</u>)

	<u>Torque Arm Mount:</u>	<u>Spring:</u>	<u>Shock:</u>
• Heavy Short Tracks	**Back Hole**	**250#, 11”**	**73**
• Heavy Long Tracks	**Middle Hole**	**225#, 11”**	**73**
• Dry Short Tracks	**Middle Hole**	**225#, 11”**	**73**
• Heavy Long Tracks	**Front Hole**	**225#, 11”**	**73**
• Dry, Flat Long Tracks	**Front Hole**	**200#, 11”**	**73**

  Note: If using staggered springs (Right Rear behind the rear end housing, Left Rear ahead of the rear end housing), increase the rate of the spring by 25# on all above recommendations.

  - **Your chassis is equipped with an adjustable torque arm that can be moved from left to right. We have seen significant performance increases by moving the torque arm to the right one to two**

inches. The more you move it to the right, the more it tends to take body roll out of the car. The standard setting is 3 ¼" to the right from the right side of torque link mount on the chassis to the center of the 1 ½" square torque arm mount.

- **Wheel Offsets:**

  If the track turns dry slick, you may want to change your wheel offsets.
  The following are the recommendations, depending on which spindles you use:

LF: 3" offset	**RF: 3" offset**
LR: 3" offset	**RR: 4" offset**

- **Spring & Shock Rates:**

	Springs	Shocks
Left Front:	**650#, 5" x 9 ½"**	**75**
Right Front:	**750#, 5" x 9 ½"**	**76**
Left Rear:	**200#, 5" x 13"**	**94**
Right Rear:	**200#, 5" x 13"**	**94**
5th Coil:	**225#, 5" x 11"**	**73**
Dampner Shock:		**79-10**

  - **These are base point recommendations for your car. Variables, such as track condition, length, banking and speed will make changes necessary to obtain higher performance and response from your car. If you need to tighten car on corner entry, run a 700# spring on your left front. For a good "lesson" on shocks, refer to the back section of the AFCO catalog. They do a good job explaining details on shock function and use. The following is a list of shock possibilities for your car, and their more common uses.**

75 Left Front, for almost any track conditions
76-4 Right front, Tracks with slow corners, dry slick (3 Link Car)
79-1 Axle Dampner, 90/10
93 Some Right Rear, Tracks with dry and smooth corners
96-3 Left Rear, also known as, works well in conjunction with split valve right front shocks on a dry slick track
94 Left Rear, Use for a tacky track
95 Right Rear, Use on a heavy track
RT AFCO "Rough Track" shocks now available for rear. If you running on a track that can get rough, these will stabilize the rear of your car and help get you through the ruts much more effectively.

Track Size & Condition Variations:

- **Heavy, Flat Tracks: Use standard springs. Reduce your stagger in the front and increase your stagger in the rear. Move both trailing arms to the middle holes on the frame. If your car is too tight at this point, decrease the rear percentage. Only make one change at a time!!**

- **Heavy, Hi-Banked Tracks: We recommend that you use a 76 right front shock to slow down the roll on corner entry. Use your standard springs. Reduce the stagger in the front and increase the stagger in the rear. Move both trailing arms to the middle set of holes on the frame. You may try moving the panhard bar on the rear end up one hole as well.**

- **Smooth Dry Slick, Flat Tracks: We recommend that you use one of four split valve shocks on the right front wheel. Use a 76-4 for dry conditions. Again, be careful when using split valve shocks on a rough track, the split valving could tend to upset the handling of the car. A 94**

shock on the right rear can help the car coming off of the corner if the corner exit speed is too slow (very dry slick only). Again use standard springs. Increase your stagger in the front, and reduce it in the rear. You may want to move the panhard bar down on the rear end, to increase side bite. Another change that can be made is to move the rear end housing to the left ¼" to ½". This will change your weights and balances, and you must rescale your car after making this change. By moving the right side spring behind the rear end housing, you may see increased forward bite coming off of the corner. However, this could cause your car to have a mid-corner push as well. Moving the left lower trailing arm up, and lowering the right side arm will increase forward bite coming off of the corner as well. When you do this, they do not need to be adjusted as the mounts are drilled in a radius. On very dry slick conditions, increased forward bite off of the corners can be obtained by lengthening the left lower trailing arm between 3/8" to ¾". Sometimes it is necessary to increase rear percentage by adding weight to the car. This is usually to compensate for fuel loss in long races. Sometimes we recommend an extra weight on the right rear to promote body roll and side bit. Again, remember to only make one change at a time!

Notes:

- ## Harris Torque Link Recommendations:

We have compiled this information from Harris drivers across the country. A torque link is no a "magical solution" to solving a forward bite problem. Always remember that if something helps you in one area of the track, it will probably hurt you in another area. Some types of driving styles will also influence the effectiveness of the use of this device. If you are using the Harris torque link, we highly recommend that you take the time to read and understand the following information. Also please reference the torque link and rear end diagrams that we have added to the end of this manual.

You may experience additional right rear shock travel as compared to a Harris torque arm assembly. This is caused by not having the torque arm spring, which helped to hold up the right side of the car. Here are some tips that will reduce right rear shock travel: Do not drop the right rear trailing arm (as you would with a torque arm) when the track turns dry slick. You may also consider a stiffer right rear spring. You can also try raising the panhard bar to increase left side travel as well.

Moving the right rear spring behind the rear end housing will increase forward bite in the chassis, but can make the car extremely loose upon corner entry. It can then develop a push in the middle of the corner because the right rear is stuck too tight. Drivers who are very smooth with the throttle and brake can benefit from this set-up. If you try this and you feel that the car is not comfortable, you may want to change it back, as this optional set-up will not work for all driving styles.

By having both springs mounted in front of the housing, this is a more "neutral" set-up. To increase forward bit move the left front trailing arm to the top hole. This will increase the amount of bite on the left rear tire. With both springs located in the front.

Moving the torque link to the left will increase forward bite as well. In turn, this may make your car tight in the middle of the corner. You have to be careful here, as if you have a car that is tight getting into the corner and in the middle of the corner, it can cause the car to be loose coming off of the corner (because you will have to pinch the car in the middle of the corner to make it turn).

If the car is too tight through the middle of the corner when you are on the throttle, there are a multitude of possible solutions, here are some of them: increase tire stagger, you should remove split valve shocks, less rear end lead, less rear percentage, move your trailing arm down on the left or up on the right, not going in to the corner deep enough, not enough gear, engine doesn't generate enough horsepower or if there is a stumble in your carburetor.

With the increased body roll, you may want to run a little less panhard bar angle than what you ran with your torque arm. This will help keep the car from getting tight through the middle of the corner.

If you feel that your car is quite loose coming off the corner and down the straightaways, you can increase the lead in the car by lengthening the left rear trailing arm. This will tighten up the car.

Using split valve shocks can assist with forward bite as well. Please flip back to that section for more specific information.

By positioning the torque link on the top hole of the rear end bracket (#20406) and the top hole on the extension brackets (#2824-EXT), you can also achieve more forward bit. This seems to be working quite will. They only disadvantage seems to be that it may upset the car when you go into the corner (or when you get off the gas).

More torque link angle (upwards of 20°) promotes quicker bite, but may not stay hooked up very long. More angle will also help with forward bite on short "stop and go" tracks. You must run brake floaters; or else you could experience wheel hop on corner entry. Less angle (around 15°seems to work better on longer high speed tracks with momentum corners.

The recommended torque link travel is between 2 ¼" and 2 ½". We normally recommend that you start out with the 800# spring, check your travel and the conditions, then go from there. We offer a wide variety of spring rates (500 to 1200#), and you may want to have some options if your travel doesn't fall under the guidelines.

You should run the 90/10 shock assembly with your torque link (see diagram towards the end of the manual). You use the shock to set the pinion angle in the car.

A). With your car setting on the scales, adjust the washer on the #2824-ADJ (shock quick adjuster) up against the rubber bushings.

B). By screwing the washer in towards the shock, it will take out pinion angle. The opposite applies as well. We recommend that you have 7 ½" of pinion angle.

C). After you have set the pinion angle, you can now set the preload on the torque link spring. To do this, measure the free height of the spring which in most cases is 6 7/8" from the outside to the outside of the spring plates (that house the spring). After you have that measurement, adjust the strut tube on the end of the torque link by turning it; making sure that you hold the bolt that runs through the middle of the torque link (so it does not turn). This will compress the spring. We recommend 1/8" of preload, so your final measurement should be at 6 5/8". Remember that the rubber bushing on the torque link assembly must remain ¾" from the spring plate so that it does not bind under braking. The bushing is there as a safety measure, in case something was to happen to the 90/10 shock, it would keep the rear end from rotating too much.

D). At this point, manually bounce the back of the car up and down to make sure there are no binds in the chassis. If the car does not want to easily bounce up or down, there is a bind somewhere, and it must be corrected before racing.

Swing Arm Recommendations:

Set the center to center to be the same measurement as the standard 2-link. That is, 20 ¼" left, and 20" right.

The trailing arm location is the same principle as the standard 2-link as well:

ON HEAVY TRACKS:

Left side: use the middle hole. Right side: use the top hole.

ON DRY TRACKS:

Left side: use the top hole. Right side: use the top or middle hole.

When the track gets slick, moving the right trailing arm from the top hole to the middle hole will help drive the car in tighter. There is less loose roll steer.

When you move from hole to hole on the trailing arm, remember the spring is on the trailing arm. So, it will have an affect on ride heights. When you raise an arm, you will need to take out about 2 turns from the sliders. If you lower them, do just the opposite, add 2 turns. You will want to do this at home first, to be sure of the exact turns on your sliders. Different sliders have different threading.

Your rear springs need to be at 250# to start (as compared to 200# with our standard 2-link). If you are running on either a heavy or rough track, you will need to increase this rate up to 275# or even 300#.

To help promote forward bite, you may choose to run split spring rates on the rear. For example, a 275# on the LEFT rear and a 250# on the RIGHT rear; or a 250# on the LEFT rear and a 225# on the RIGHT rear. Remember: the stiffer spring gets the weight in weight transfer.

CROSS WEIGHT (Wedge): Start out at 50 ½% or approximately 60#. Try increasing your wedge, up to 100#, to see if this helps get you off the corner better. This may also loosen the car getting into the corner, so you might have to adjust corner entry side bite to assist with this condition.

SWING ARM LOCATION: Put the slider in the back hole of the swing arm and mount in new hole on the chassis (swing arm mount). The AFCO swing arms are a little long, so you may have to cut off up to 3/8" to get the correct center to center.

On a really slick racetrack, we have found by moving the right rear spring BEHIND the axle, it can help tighten the car coming off the corner. Put a 225# or 200# spring on the right rear and rescale the car to the same percentages. Be careful, as this can make the car have a push in the center of the corner when you pick up the throttle. To assist with this condition, you can:

- **Increase rear stagger or take out some lead (position of rear end) or move a trailing arm.**

The swing arm suspension is very good on rough tracks. It helps take the spring wrap off the housing, so it helps free up the car. The combination of the Harris torque link, swing arms, and AFCO rough track shocks on the rear of the car is a dynamite combination on a rough track.

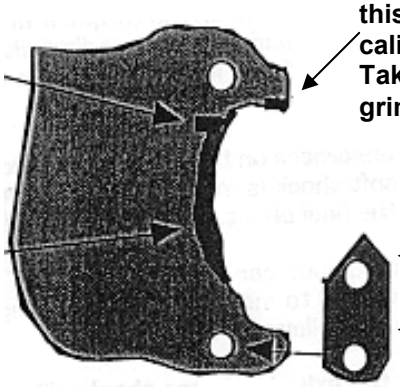
BRAKE FLOATERS & SWING ARMS: With a swing arm suspension, you must lock up your brake floaters, or install clamp on caliper mounts. The right rear brake floater arm will hit the spring if you don't. With the spring behind the axle on the right rear, you can run brake floaters.

Installing Metric Caliper Adapters.

By installing metric calipers, you can reduce unneeded weight from your car. This illustration shows you how to install our metric caliper adapters (#40122L & R). Also make sure that the caliper moves freely on the caliper pins, without brake pads in, after installation, this will make sure that there is no bind in the caliper set up. Now put the brake pads in.

The piece that sticks out towards the chassis needs to be ground off flush.

Grind this area to make it more of a round radius.



View of backside of spindle (from chassis to tire) Not To Scale.

NOTE: You do not have to grind any on the lower part of spindle or the caliper adapter.

ADDITIONAL NOTES:

Troubleshooting handling problems must be done in an orderly manner beginning at the flagman, though corner entry, apex, exit and straight chute. Don't try to fix problems out of this order, because many times the cause of a later problem is related to an earlier one. A corner entry problem can help contribute to a corner exit problem. Fixing the corner entry problem will normally help fix the exit. A car that is too tight getting into the corner has the tenancy of being too loose coming off of the corner.

It's very important that spring split be kept within a balanced range. As a general rule, front spring split should be kept between 0# to 100#, with a maximum difference of 100#. Rear springs should be 25# to 50# (usually heavier on the left side) in difference. Some track conditions may require for no split, or as mush as 75#.

Weight transfer, front to rear, is critical to forward bite and a soft front end tends to help. There is a trend to run softer springs and shocks. Springs in the 500# to 750# range, in conjunction with 76 series shocks on the front seem to help lap times by promoting weight transfer.

In order to take advantage of good weight transfer there must be something at the rear tires to receive the weight. A soft front end will require a proportionately stiffer rear suspension. Springs in the 150# to 250# range, used with 94 and 95 series shocks, seem to work quite well.

On heavy stop and go racetracks having the torque arm set in the rear hole will provide the quickest response coming off of the corner. When traction is marginal, or on a sweeping turn track, the center or front hold of the torque arm setting will provide smoother acceleration and more bit. The torque arm set in the rear mount will require a stiffer spring (like a 250#), and a softer shock, like a 73. The torque arm set in the center or front location, will require a softer spring (200# or 225#). Controlling travel of the fifth coil should be done through increasing or decreasing the spring rate, not by excessive preload on the spring. It is recommended that preload not exceed ¼", since it can have and affect on the total spring rate of the rear suspension.

Safety chain hook-up and location on the torque arm can have an effect on rear suspension when decelerating. Ideally, the chain should be in line with the fifth coil. When mounted behind the chain tends to unload rear tires. Mounted in front, the tires remain loaded. Keep the chain as close as possible to the fifth coil.

The effects of shock absorbers on body movement are temporary. They will temporarily hold the car up or down. A soft shock is more temporary than a stiff shock. However, in all cases the springs will provide the final effect. Shocks can only control spring actions not create them.

After you have washed your car a few times, rust may form on the threads making it very difficult to get the rod end to move. Before installing rod ends, you should put some anti-seize lubricant on them to help alleviate this problem.

Raising the front of the axle dampner shock will provide for tighter corner entry. However dampners installed at angles greater than 10°forward, especially 90/10 type, can hinder the smooth movement of the rear suspension and cause a loose condition.

Sometimes you can have everything adjusted and tuned properly and still not be able to hook up. Don't forget the driver. Some adjustment is sometimes necessary here, too. Slowing the steering can promote smoothness as well as increasing the stroke on the gas pedal. Remember, smoother is nearly always quicker. Engine combinations also play a large part in forward bite. With an 8" tire you can only use so much horsepower!

Running the panhard at a downward angle to the right can tighten corner entry. More angle = More sidebite. Remember, when adjusting the panhard bar; always re-center the rear end.

It is very important to know what happens to the rear tires when suspension moves up and down. Rear end steer under body roll and weight transfer can be a valuable tuning area when working on corner entry and body roll problems.

More left side weight percentage can cause a loose condition on corner entry. More rear weight percentage can cause a push on corner entry and exit but it makes the rear hang out in the middle of the corner.

Excessive left rear bite can cause looseness getting in (the left rear gets more traction under braking and wants to turn the car) and looseness coming off the corner (the tire loading is so uneven that neither tire works properly). Keeping bite in the 30#-80# range will work in nearly all conditions. If you find yourself believing that a significant change in bite or rear percentage would help your car do what you want it to, you may be better off to make spring/shock changes to promote bite. Avoid any set up numbers on your car that show an out of balance condition.

Rear tire stagger affects handling more than just the time when the car is accelerating. Keep in mind that the larger tire has more contact patch and usually more bite so the same qualities that turn the car when on the gas can cause the car to have difficulty turning when on the brakes. Adjusting brake bias can overcome some problems created by large amounts of stagger.

Side bite is sometimes confused with forward bit. If the car tails out in the corner when on the gas, making changes to increase side bite won't help. You need to concentrate on forward bite. Remember, the quicker you can get on the gas and go forward the sooner the car stops going sideways.

Moving the right side tires relative to each other effects bite coming off corners. Putting the right rear outside the right front tends to loosen the car on corner exit. Putting the right rear inside the right front tends to tighten the car off the corner.

Brake pads should always be matched front to rear as far as compounds are concerned. Even when different sizes are used, compounds should be the same. Using mismatched pads can cause problems during early stages of the races when brake temperatures are not stabilized.

Similarly, you should only run either the big GM calipers OR the small GM Metric calipers – never run a mix of the two.

The smaller the master cylinder, the less volume and the more pressure it will make given a constant pedal force. Consequently, a smaller cylinder to the rear will give more rear brake while requiring some additional pedal stroke.

Proper balance in brake bias is extremely important in corner entry. If a car is too tight (or pushing) getting into the corner, by adjusting brake bias to the rear it will tend to loosen up the car. If a car is too loose getting into the corner, the opposite tends to apply.

The rubber seals and gaskets that are found in most racing type master cylinders are not compatible with silicone type brake fluid. Use a high temp Glycol based DOT 3 racing fluid for dependable performance.

The DOT designation on brake fluid indicates not only minimum boiling points but also other specifications such as compressibility, corrosiveness, moisture absorption, viscosity, chemical base and other. With all things considered, a high temp, DOT 3 Glycol Based Fluid, such as Wilwood Hi-Temp, is best suited for racing brake systems.

Due to the fact that the cars are now going faster, your brake system requires more frequent maintenance. Areas of concern are: brake fluid (due to overheating), cracks and bends in brake floaters, worn or loose rod ends. Additionally, you should look for these potential brake problems:

- **Excessively worn brake floaters. If you find that you are resetting your brake floater retaining rings, you need to change your brake floaters, as they are too loose from wear.**
- **Brake pads wearing at an angle. Due to the fact that the brake floaters are being run at an angle, it could cause your brake pads to wear at an angle. You need to also check them often.**
- **If your balance bar hits your bolt on the pedal assembly, this will cause inconsistency in bias and possible bind. To fix, wire tie to make sure that the balance bar is in center to so that the bar does not hit the bolt. Or you can tap and bolt from the bottom up with a 3/8" bolt.**

After reviewing this information, please contact us with any questions or problems that you have. We want to make sure that you understand this information so you achieve the best possible performance from your Harris car!

We wish you the best of luck in racing!! We're pleased that you chose Harris Auto Racing, and we're confident that you will be pleased too!!

Collapsible Steering Column Installation Instructions

1: This Kit Includes the Following Pieces:

(1) ¾" O.D. Solid Shaft
(1) ¾" I.D. Hollow Shaft
(2) Collars

2: Insert round end of ¾" O.D. solid shaft into steering u-joint coming off quick steer (dirt) or u-joint (asphalt). Refer to diagram below for more information.

3: Insert ¾" I.D. hollow shaft (the oval ended side) over the ¾" O.D. solid shaft (until the holes line up).

4: Temporarily adjoin the two pieces with a cotter key (or similar) to hold in place.

5: Insert steering column (going through dash panel) into the open round end of ¾" I.D. shaft. Insert steering column about ¾". You will need to cut steering shaft to size.

6: Tack weld steering shaft into ¾" I.D. shaft.

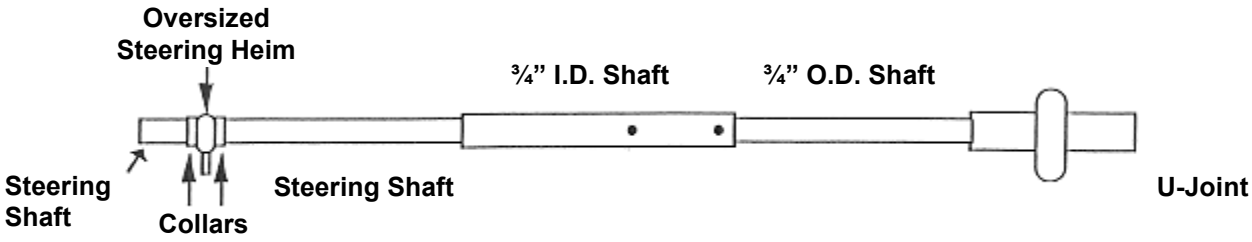
7: Turn shaft to make sure it is in straight. If it is, completely weld it in.

8: Put a collar on each side of the oversized steering heim (located in your dash area).

9: Remove the cotter key from Step 4.

10: This should give you between 3 and 4 additional inches of compression under a sever impact.

11: If you have any questions, don't hesitate to call us!



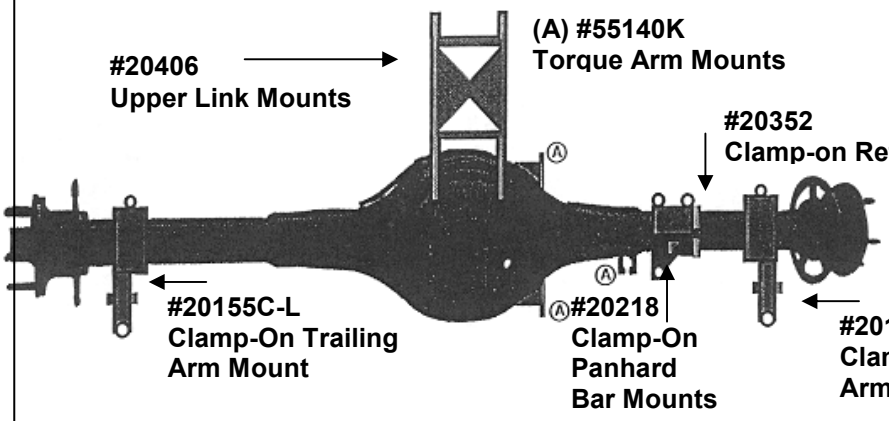
Notes:

Harris Dirt Modified Rear End Bracket Installation

NOTE: WE RECOMMEND THAT YOU HAVE US INSTALL THE BRACKETS TO ENSURE PROPER LOCATION. THIS ILLUSTRATION IS NOT TO SCALE.

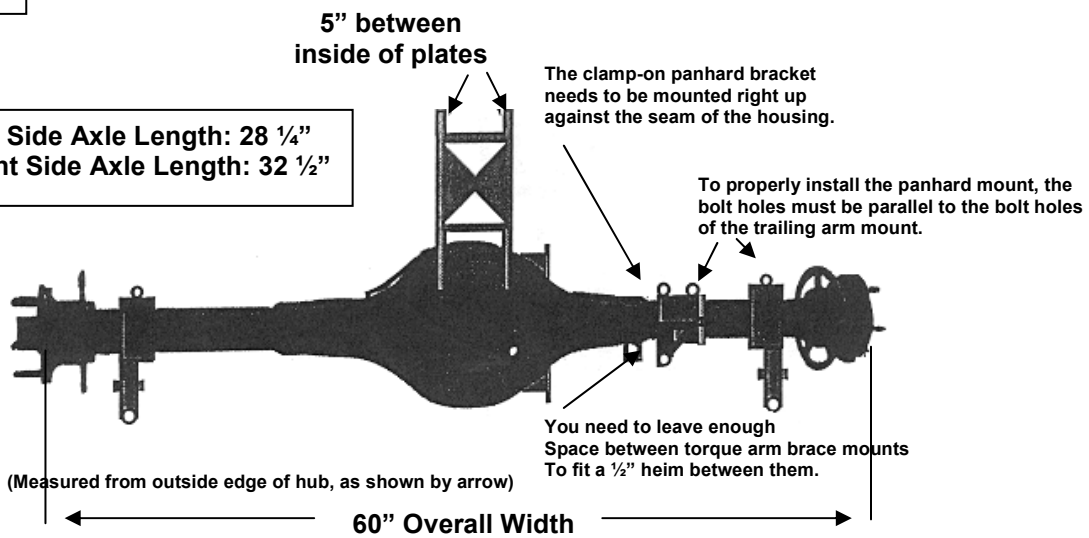
Rear View

NOTE: It's a good idea to use clamp on mounts as when you weld on a rear end housing it can war it and change your geometry! If you use weld-on brackets, you must have your housing straightened after installation.



Rear View

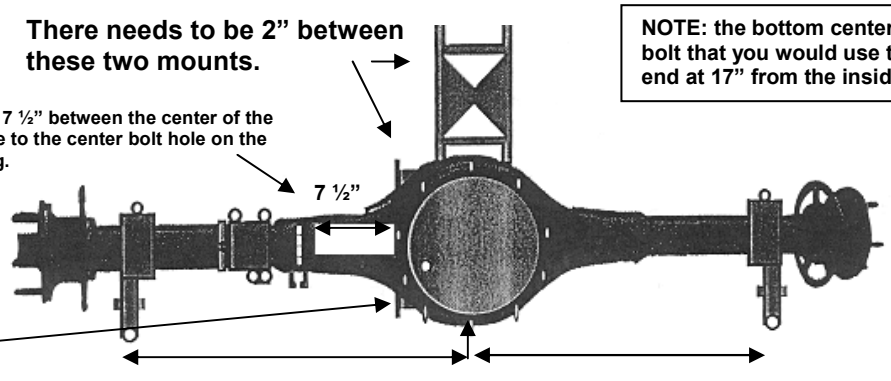
Left Side Axle Length: 28 ¼"
Right Side Axle Length: 32 ½"



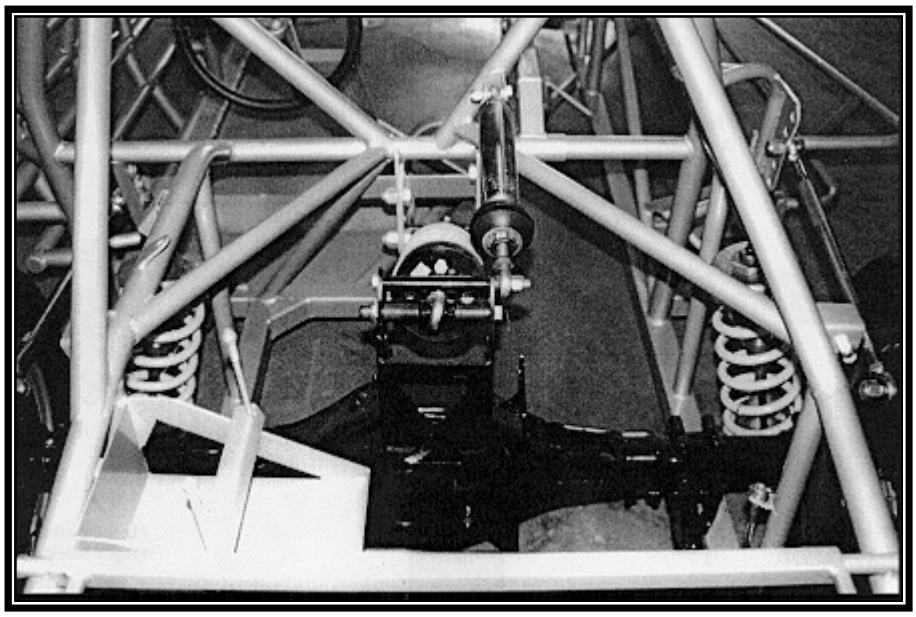
The trailing arms need to be set at 0° when the pinion is at 0°shown here as the bottom hole on mount. In addition, the slug side of mount needs to face the front of the rear end housing.

Front View

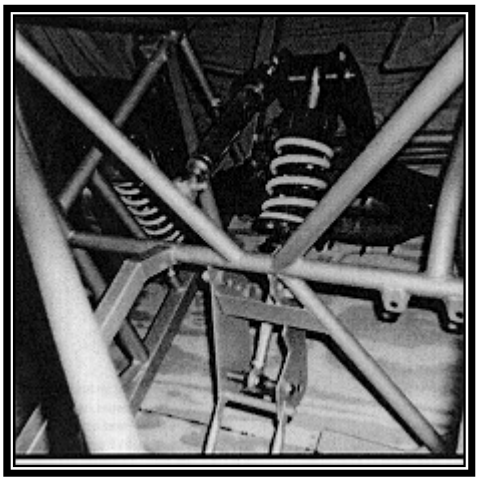
NOTE: the bottom center bolt is the same bolt that you would use to center your rear end at 17" from the inside right frame rail.



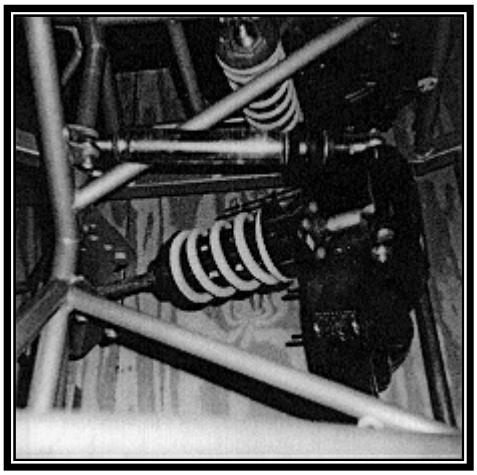
INSTALLED TORQUE LINK ASSEMBLY PICTURES



Above: Looking from the rear of the car to the front.



Above: Looking through the roll cage back to the rear of the car.



Above: Looking from the left rear to the right rear of the car.