Front Coil-Over Conversion, QuickSet 1
1993-2003 Camaro/Firebird
Installation and Tuning Guide

VAS 8612F-834 Parts List

Part Number	Qty.	Description
833-012-201	1	Spanner Wrench for 2.80 Diameter Spring Seat
899-020-211	1	Upper Coil-Over Shock Mount, ‘93-03 Camaro/Firebird (pair)
VAS 1612F-834*	1	Coil-Over Shock Kit, QuickSet 1, ‘93-03 Camaro/Firebird (pair)
VAS 21-12XXX	1	VariSprings 12” Long (pair)

*VAS 1612F-834 Parts List

Part Number	Qty.	Description
879J834-BB0A	2	Coil-Over Shock with Threaded Body
899-012-HEX7/64	1	Ball Driver 7/64 Hex Screw Driver Style
899-020-203	1	Spring Seat Set for 2-1/2” ID Spring (pair)
899-020-212	1	Spring Bearings for 2/1/2” ID Coil Springs (pair)
899-061-302	1	Crossbar (C) Hardware Bag (set)
899-061-502	1	Urethane Bushing Hardware (set), 5/8” bore bushings, 1/2” bore x 1-1/4” sleeve

Valving

- **QuickSet 1 (single-adjustable) -** Features single adjustment knob that controls both bump (compression) and rebound (extension) stiffness simultaneously.

Mounting Eyes

- **Polyurethane Bushing** - *5/8” bore bushings with 1/2” bore sleeve x 1-1/4” wide pressed-in sleeve*
  Poly eye coil-overs are generally used in street applications for reduced vibration and noise. Replacement bushings are available separately.
  - **Upper Eye** - The upper shock eye uses a press-in sleeve and mounts to the bolt-in upper mount with a 1/2” bolt.
  - **Lower Eye** - The lower shock eye uses a crossbar assembly and mounts at the factory location.

Shock Specifications

Part Number	Total Travel	Compressed Length[1]	Extended Length[1]	Minimum[2] Ride Height	Maximum[3] Ride Height	Spring Length	Usage
VAS 1612F-834	4.25	14.04	18.29	15.50	17.00	12	Front
Footnotes:							
1	Length of shock is the measured distance between centers of mounting eyes.						
2	Minimum Ride Height: 40% of travel available for compression (bump), 60% of travel available for extension (rebound)						
3	Maximum Ride Height: 60% of travel available for compression (bump), 40% of travel available for extension (rebound)						

Spring Rate Selection

The chart recommended spring rates are based on preloading the spring 1 to 2 inches. This allows you to run a lighter spring for more stored energy which helps the car hook. Do not preload the spring more than 2” or you may run out of spring travel.

Baseline Spring Rate (FRONT ONLY)

Front Vehicle Weight (lbs)	Rate (lb/in)	Part Number
1400-1550	350	VAS 21-12350
1550-1700	400	VAS 21-12400
1700-1850	450	VAS 21-12450

Springs are a tuning item, therefore VariShock does not accept exchanges. If you are unsure of the correct spring rate, check with your chassis builder or component supplier for a recommendation. Mathematical formulas are also available to find an accurate baseline rate from which to start. All formulas will require individual weights for the front and rear of the vehicle. As an aid to help you select the correct spring rate, VariShock offers a discount on a second set of springs if purchased with the shocks.

Installation

Read these instructions in their entirety before begin installation.

Removing the Factory Shock Assembly

1. Raise front of vehicle off ground and place jack stands under chassis so front suspension hangs freely.

2. Remove wheels and then disconnect sway bar from lower A-arm. This allows the shock assembly to fully extend so it can be removed.

3. First, disconnect the two lower-shock-mounting bolts. Push the upper and lower A-arm spindle assembly down as far as you can.

4. The master cylinder needs to be removed from the booster as shown on the right below.

Here you can see the OEM mounting bolts & studs. Move the master cylinder toward the engine to make removing the rear bolts easier.

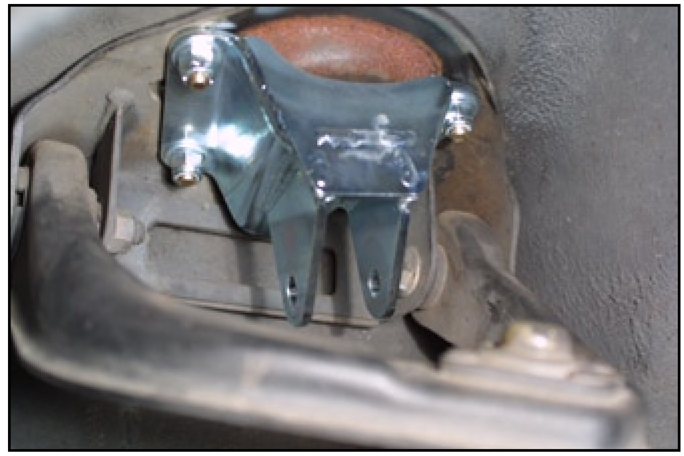
5. Remove the bolts at the rear and the nuts from the studs at the front of the OEM upper shock mount.

6. Once the upper mount is loose; the shock, spring and OEM upper mount can be removed. Slide the bottom of the shock toward the rear of the car until it clears the lower A-arm.

Here the master cylinder has been moved and the new bolts are installed to secure the new upper coil-over mounting bracket.

Shock Installation

1. Using the four 3/8-24x1-1/4” hex bolts, flat washers, and locknuts attach the upper coil-over mounting bracket using the holes in the OEM shock tower. (The driver side mount is stamped with a “D” and the passenger side is stamped with a “P”.) Slide a flat washer over the bolt. Insert bolt through the shock tower and OEM upper A-arm mount. Then from inside the shock tower, place the upper coil-over mount over the bolt. A second flat washer goes on next, followed by the locknut. Once in place, tighten all bolts and torque to 35 lb-ft.


Upper shock mount is bolted into position.

2. Press the urethane bushing into the upper shock eye. Press the steel sleeve into the urethane using a vise (as shown in photo on page 4).

3. Screw the 1/2 x 1” stud into one of the crossbars and place the crush-washer on the stud. Slide the crossbar into the urethane bushings. Slide the other crossbar into the eye and thread the crossbars together. A little grease on the crossbars will help them screw together. Put one end of the crossbar in a vise and adjust a crescent wrench to the width of the flats. Use it to tighten the crossbars so they are flat in relation to each other. Do not rotate over 1/2 turn or the crush-washer will be smashed too much. See photo below.


Installing upper urethane bushings and steel sleeve.

4. Apply anti-seize to the threads on the inside of the lower spring seat and the threads on the reservoir. Then, screw the spring seat onto the shock body. The notches in the lower spring seat are for the spanner wrench and they go toward the base of the shock (the end opposite where the shaft comes out). As you screw the lower spring seat on, you will be able to feel the ball locks in the spring seat snapping into the reservoir grooves. If you have trouble screwing the seat on, make sure that the setscrews that secure the ball lock are not too tight. Unscrew the setscrews so one thread shows. Screw the seat on as far as it will go without hitting the adjustment knob(s). After the coil-over is final installed and adjusted, tighten the setscrews to lock the lower spring seat in place. Never adjust the lower coil spring seat without first jacking up the car to remove the vehicle weight from the spring. Also, make sure the threads on the reservoir body are clean of any dirt before adjusting the spring seat. It is mandatory that you install the spring bearings (part no. 899-020-212) on the lower spring seat. The roller bearings must be lightly greased before use. The use of a light front spring will require significant preload in the coil spring. It is easier to tighten the spring with the bearings in the spring seat.


Installing lower crossbar and urethane bushings.


Grease the roller bearings and then, install the coil spring bearing on the lower spring seat as shown.

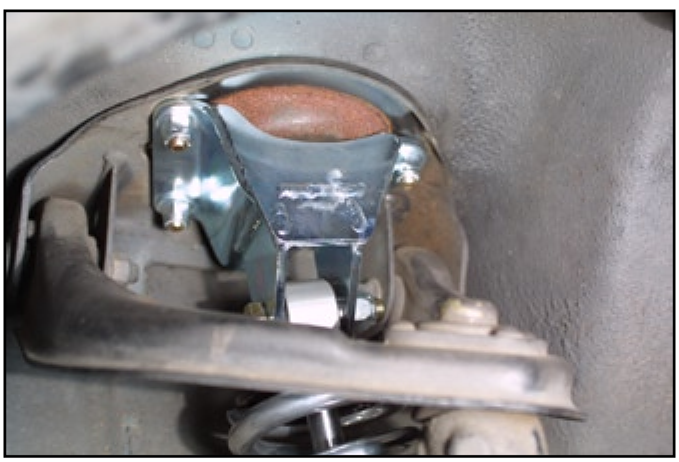
5. Place the spring over the coil-over. In most cases, you will have to compress the spring a little to slide the top seat between the spring and top eye. Remember, the 1-3/4” diameter counter bore in the upper spring seat goes against the top eye. The 2-1/2” diameter ledge goes into the spring. In some cases you will need to put the bottom eye in a vise. Use soft jaws to prevent marring the shock. Make sure both lower coil-over spring seats are screwed on the same amount or you will preload the chassis.

6. As shown in the left photo below, slide the coil-over assembly behind the spindle from the rear side of the lower A-arm. It then goes through the upper A-arm and into the new upper mount we previously bolted on. Use the 1/2-20x2-1/2” hex bolts and locknuts supplied with your kit to attach the upper shock eye to the mount. See photo below. Use the OEM lower shock mounting bolts to attach the crossbar to the lower A-arm. As shown in the photo below on the right, the adjustment knobs are placed toward the inside of the lower A-arm. This makes adjusting the shock easy. Use the 7/64” hex ball driver or your fingers to rotate the knobs.

7. Repeat this procedure for the other side. Once you have both coil-overs mounted, you can reattach the sway bar to the lower A-arm.

Coil-over and spring assembly ready to install.

Installing the coil-over assembly.



Upper mount with coil-over assembly bolted in.

Lower cross bar mounted and adjustment knob positioned.

VariShock Adjustment and Tuning Guide - QuickSet 1

This guide covers adjustment features and tuning procedures for VariShock QuickSet 1, single-adjustable, shock absorbers. The information contained has been greatly simplified and is only intended to get you started in the right direction. Suspension tuning involves multiple variables such as: spring rates, antiroll bar rates, vehicle weight distribution, tire sizes, tire pressures, suspension geometry, and track conditions. We highly recommend thoroughly researching suspension tuning and vehicle dynamics, or consulting an experienced professional.

Travel Limiters

Shocks are not to be used as travel limiters. An extension travel limiter, such as a strap or cable, should be used to prevent topping out and damaging the shocks. The installed compression bumper protects the shock if bottomed out during normal use. If the bumper shows signs of wear or damage it must be replaced immediately. Never operate a vehicle with a missing or damaged bumper. Vehicles that consistently bottom out shocks or land harshly from wheel stands should use a higher rate spring along with some form of suspension stop to limit compression travel without directly impacting the shock body. Any shock will be damaged if the car is dropped from a wheel stand.

Ride Height

When a shock is at ride height a certain amount of travel is available in either direction. Depending upon performance application, shock travel will be reserved in different percentages for compression or extension.

Street Baseline: 60-percent Bump, 40-percent Rebound

Street vehicles require more available compression (bump) travel for improved ride quality and unexpected road hazards. At baseline ride height, the shock and spring should collapse 40-percent from their installed heights. This results in 40-percent of travel available for extension and 60-percent for compression travel.

Handling Baseline: 50-percent Bump, 50-percent Rebound

Handling performance applications are usually limited to smooth prepared road-course- or autocross-tracks, therefore less compression travel is required. Suspension geometry or track conditions may require the travel percentages to be shifted to prevent topping- or bottoming-out the shock.

Drag Race Baseline: 40-percent Bump, 60-percent Rebound

Drag race vehicles generally require more extension (rebound) travel to help weight transfer, and because the drag strip is very flat, less compression travel is needed. The amount of extension travel available in the shock will drastically affect how the car works. At baseline ride height, the shock and spring should collapse 60-percent from their installed heights. This results in 60-percent of travel available for extension and 40-percent of compression travel.

Baseline Spring Rate Selection

Spring rate affects ride quality, ride height, stored energy, weight transfer and how effectively the front suspension handles downward movement after drag race launches. Differences in vehicles such as specific performance application, weight reduction and chassis stiffening should be taken into consideration. Additional springs can be purchased for tuning purposes. The recommended spring rates are based on the combination of weight of the car and baseline ride height.

Spring Preload

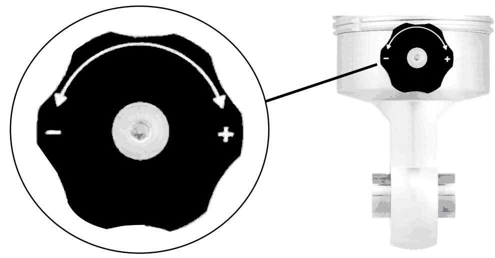
The threaded lower spring seat is used to adjust spring preload. Compressing the coil spring to any length shorter than it’s free height, with the shock fully extended, is considered preloading the spring. If you adjust the spring seat to change the vehicle’s ground clearance, be aware that you will be adding or subtracting travel in the shock. Usually when lighter-than-baseline spring rates are used it is necessary to add preload to achieve the correct balance of travel and ride height. If preload has been added make sure there is adequate spring travel remaining to prevent coil bind before the shock is fully collapsed.

Tuning Front Suspension with Spring Rate (Drag Race)

A drag race car should run the lightest front spring rate possible, without letting the shocks bottom out when making a pass. As a general guideline, lighter springs allow the car to easily transfer weight, and settle faster down track. Changing spring rate affects ride height and the rate at which weight is transferred to the rear tires. A softer rate makes the front easier to raise during acceleration. A stiffer rate makes the front harder to raise during acceleration. If you are having trouble getting the front end to rise, you can soften shock valving or change to a softer spring. When using lighter rate springs preload must be added by screwing the lower spring seat upward, compressing the spring to achieve proper ride height. In general terms, the worse a car hooks the more shock extension travel it will need. If you need more extension travel, preload can be removed to lower ride height. Using this method will cause the car to have less ground clearance and reduce the amount of compression travel. If you are going to operate the shock at a ride height shorter than recommended, the upper chassis mounts must be relocated to correct any major vehicle ride height issues. It may take some work with spring rates and upper mount relocation to get the correct combination of vehicle ride height and front suspension travel for your application.

Adjustment Features

The QuickSet 1 valve system features a single adjustment knob that controls overall damping stiffness of the shock. Knobs are clearly etched indicating the correct direction of rotation to decrease (-), or increase (+) damping stiffness. There are a total of 16 specific adjustment positions.



Symbol	Direction	Effect
+	Clockwise	Increase Stiffness
-	Counter-Clockwise	Decrease Stiffness
Note:	Adjusts overall damping stiffness for Bump and Rebound simultaneously.	

Position 1, the softest setting, is found by turning the knob in the counter-clockwise direction until the positive stop is located. Rotating the knob in the clockwise direction increases damping stiffness. Each of the 16 settings is indicated by a detent that can be felt when turning the knob, and an audible click as the knob gently locks into position. Only very light force is necessary to rotate the knob past each detent. If access to the adjustment knobs is limited, a 5/64 or 7/64 (depending upon model) ball-drive Allen wrench can be used to adjust the knob. Do not force the knob beyond its intended stop, doing so will damage the valve mechanism.

Note: VariShocks have a substantial range of adjustment with very little bypass or internal bleed. Due to our minimal-bleed design, shocks will feel extremely stiff at some settings when operated by hand, whereas other shocks with excessive bleed will move more freely. Manual comparison should not be performed. A person cannot manually operate the shock at a rate anywhere near real life conditions and any results found in this manner will be meaningless. Prior to shipping, every VariShock is dynamometer (dyno) tested and calibrated throughout an accurate range of shaft speeds and cylinder pressures found in real-world operation.

The Truth About 16- vs. 24-Clicks

Don't be fooled by shocks offering more adjustment clicks. They are actually 1/2-click adjustments. The manufacturer merely added more detents to the mechanism without increasing the range of adjustment. This practice gives more clicks, but the adjustment is so slight that your vehicle will not respond to the change. A 16-position VariShock actually has a broader range of adjustable force with the added benefit of a more manageable number of adjustments to try.

Tuning Procedures - QuickSet 1

VariShock shock absorber's broad range of adjustment is suitable to the three categories of suspension tuning: ride quality, handling performance, and drag racing. All three tuning categories have the common goal of controlled weight transfer, but have greatly differing vehicle-dynamic requirements. Each will be discussed in the following text. Before proceeding verify that all suspension components, such as control arms, balljoints, and bushings are in acceptable condition and that tire pressures are correctly set.

Tuning for Ride Quality - QuickSet 1

Tuning for ride quality generally involves lighter spring rates matched with softer shock settings to achieve a smooth and comfortable ride. Testing and adjustment is required to attain desirable results. When properly adjusted the vehicle should feel settled without continued bouncing (too soft), excessive harshness (too stiff), or fore/aft pitching.

Prior to Testing

Begin with the shocks adjusted to the number 3 position. The first two settings are generally too soft for street use and are normally used in drag racing applications.

Find Harshness Threshold

Noticable ride harshness is generally rapid upward movement of the suspension as the tire travels over rough or bumpy surfaces. Increase shock stiffness by one, then test again. Continue increasing stiffness and testing until the vehicle begins to feel harsh over bumps. From this setting, decrease shock stiffness by two. The harshness threshold setting may differ from front to rear.

Excessive Chassis Movement	Increase Stiffness	If vehicle exhibits rapid weight shifts or continues to oscillate more than one suspension cycle before settling, increase shock stiffness by one, then test again. As stiffness is increased, road noise and vibration will also increase. Note: Stiffening the shock does not reduce the amount of lean or dive in a sustained turn or braking maneuver, but does slow the rate of weight transfer to minimize unexpected changes in the cars handling.
Harshness and Vibration	Decrease Stiffness	If excessive road noise, vibration, or harshness is experienced decrease shock stiffness by one, then test again.
Fore/Aft Pitching (constant speed 50-70 mph)	Alter Front-to-Rear Stiffness Difference	If vehicle exhibits fore/aft pitching at highway speeds, the rear shocks should be stiffened or conversely the front shocks softened. Ideally the rear suspension should oscillate at a slightly quicker rate than the front to minimize pitching.

Tuning for Handling Performance - QuickSet 1

Heavier spring rates matched with stiffer shock settings generally contribute to improved handling performance by reducing chassis movement. Stiffer tuned suspension increases vibration transferred to the vehicle and passengers, but is usually tolerated for performance gains. When properly adjusted the vehicle should feel responsive, exhibit balanced cornering grip, and maintain traction over irregular surface conditions. Extensive testing and adjustment is critically important when operating your vehicle at or near its performance limits. Testing must be done in a safe and controlled environment, such as a dedicated motorsports facility.

Prior to Testing

Begin with the shocks adjusted to the number 5 position. The first four settings are generally too soft for performance applications and are normally used in drag racing or street applications.

Find Harshness Threshold

Harshness is vibration transferred to the chassis by rapid upward movement of the suspension as the tire travels over rough or bumpy surfaces. Increase shock stiffness by one, then test again. Continue increasing stiffness and testing until the vehicle begins to feel harsh over bumps, or a reduction of traction, cornering, braking or acceleration ability is experienced. From this setting, decrease shock stiffness by one. The harshness threshold setting may differ from front to rear.

Excessive Chassis Movement	Increase Stiffness	If vehicle exhibits rapid weight shifts, increase shock stiffness by one, then test again. Note: Stiffening the shock does not reduce the amount of lean or dive in a sustained turn or braking maneuver, but does slow the rate of weight transfer to minimize unexpected changes in the cars handling.
Reduced Traction or Skipping	Decrease Stiffness	If a reduction in traction during acceleration, braking, or cornering is experienced decrease shock stiffness by one, then test again. This will be most noticeable on rough track surfaces.

Shocks Bottoming Out **(body roll, brake dive or squatting)**	Increase Stiffness	If chassis movement during cornering or braking allows shocks to bottom out, increase shock stiffness by one, then test again. The urethane bump stop can be used to gauge shock bump travel by sliding it down the piston rod, against the shock body, then checking its position after testing. If increasing bump stiffness cannot extend weight transfer duration long enough a higher rate spring should be installed.
Understeer Condition **(Neutral throttle)** **Car turns less than expected; commonly referred to as push, plow, or tight.**	Change Stiffness Bias Toward Rear	If vehicle exhibits understeer when cornering at neutral throttle, rear shock should be stiffened or conversely, front shock softened. A slight amount of understeer is considered safe and reduces the chances of spinning.
Oversteer Condition **(Neutral throttle)** **Car turns more than expected; commonly referred to as tail-happy or loose.**	Change Stiffness Bias Toward Front	If vehicle exhibits oversteer when cornering at neutral throttle, front shock should be stiffened or conversely, rear shock softened. Oversteer increases the vehicles tendency to spin when cornering and requires driver experience and skill to manage safely. This condition should be avoided by novice drivers.

Tuning for Drag Racing - QuickSet 1

Required settings for drag racing applications vary greatly depending upon, vehicle weight, weight distribution, suspension geometry and travel, horsepower, and available traction. A properly tuned drag race suspension enables the vehicle to launch straight while transferring weight to the rear tires in an efficient, controlled manner. Extensive testing and adjustment is critically important when operating your vehicle at or near its performance limits. Testing must be done in a safe and controlled environment, such as a dedicated motorsports facility. It is generally better to tune shocks according to improvements in ET's (Elapsed Times) rather than for specific occurrences such as the amount of wheel stand. Due to differences in weight distribution, wheel base, tire size, and horsepower, not all vehicles leave the starting line in the same manner once their suspension has been optimized. Watch your ET's and if your times start to get slower return to the prior adjustment. Once you have completed the following procedures, only fine adjustments may be needed to tune for specific track conditions.

Prior to Testing

Make certain that wheelie bars are raised as high as possible while maintaining control and eliminating their influence as much as possible on damper settings. Begin with shocks adjusted to the number 3 position.

Initial Testing

First verify that the vehicle tracks straight before aggressively launching from the line. Begin with light acceleration and low speeds. If the vehicle tracks and drives acceptably at this level, make incremental increases in acceleration and top speed until the vehicle is safe at higher speed. Vehicles not tracking straight at speed should verify all chassis settings including but not limited to alignment, bump steer, tire pressures, etc. Once the vehicle drives in a safe manner at speed, move on to test launching.

Test launches should consist of only the initial launch with no subsequent gear changes. Begin with low rpm launches and gradually increase rpm and severity if the car launches acceptably. At this time we are only determining that the car launches in a controlled manner to avoid damaging components or the vehicle. The vehicle should leave in a straight line without extreme wheel standing or harsh bounces. Sudden, uncontrollable front end lift should be corrected by making suspension instant center adjustments, if possible. More gradual front end lift can be corrected by adjusting the shock valving. If the car gradually wheel stands or bounces violently, adjust front suspension first, then rear. If there is rear tire shake, wheel hop or excessive body separation, adjust rear suspension first, then front. If your car is launching severely to the right or left, first check that the rear end is centered and there is no preload adjusted into the rear suspension. If the car still launches severely to the right or left, you will have to add preload to the rear suspension. If everything checks out okay and the car only minimally drives to the right or left, you can stagger the rear shock valving to correct this.

When a vehicle launches slightly toward the right, rear shock stiffness is increase on the driver side and shock stiffness is decreased on the passenger side. A vehicle launching slightly toward the left would make the opposite adjustments. It is not recommended to have more than two clicks difference side to side. Rear shock adjustments are only applicable to correcting the launch and will have little to no affect on down track performance.

After the car has been adjusted to launch straight, test launch and include the first gear change. Make any required adjustments and add the next gear change. Repeat until the car can be launched straight and driven at speed safely. The car is now ready for fine tuning to optimum results.

Front Shock Adjustment

Pay close attention to what is happening to the front end during launch. Your goal is to eliminate all jerking or bouncing movements during launch and gear shifts. Ideally the front end should rise in a controlled manner, just enough to keep the rear tires loaded, then continue the pass with smooth transitions at all times. Front end rise without any appreciable traction gain is wasted energy that should be used to propel the vehicle forward instead of up. While testing, document your ET's along with any changes made. If ET does not improve, return to previous settings.

Single-Adjustable Shock Limitations

The use of a single-adjustable shock will have limited tuning capability. When adjusting the shock to improve rebound (extension) travel issues you are also adjusting bump (compression) stiffness. This may worsen or create bump travel issues. As an example using a soft shock setting that improves front end rise and weight transfer, may be too soft to prevent the shocks from bottoming out as the front end lands. You must decide which correction will best improve component reliability, driveability, and ET. This performance trade-off relationship is unavoidable with a single-adjustable shock. To truly maximize tuning capability a double-adjustable shock should be used.

Front Rebound (Extension) Adjustment Overview

Too light of a shock setting allows excessive front end chassis separation and may result in the front wheels jerking violently off the ground during launch. Also, during gear change, too light a setting allows the car to bounce off its front rebound travel limiter and then bottom out in an oscillating manner. Too firm a setting will prevent the front end from rising sufficiently, limiting the amount of weight transferred to the rear tires. Adjust shock stiffness in one click increments to control the rate at which the front end rises at launch and during gear changes. While testing, document your ET's along with any changes made. If ET does not improve, return to previous settings.

Front Wheels Lose Contact with Ground	Increase Stiffness	Violent chassis separation and may result in jerking the front wheels off the ground. Increase shock stiffness by one, then test again.
Rear Tires Hook Then Lose Traction	Increase Stiffness	If weight transfer occurs too quickly the rear tires may hook then lose traction as the front end begins to travel downward. Slowing the rate at which the front end rises prevents the shocks from topping out too quickly and increases the duration of time that the rear tires benefit from the weight transfer. Increase shock stiffness by one, then test again. If ET does not improve, return to previous setting.
No Front End Rise	Decrease Stiffness	Too firm of a shock setting limits the amount of weight transferred to the rear tires, resulting in poor traction. Decrease shock stiffness by one, then test again. If ET does not improve, return to previous setting.

Front Bump (Compression) Adjustment Overview

After the launch or during a gear change, too firm of a setting will cause the chassis to bounce off the front tire as the chassis settles down. Too light of a setting allows the shock to bottom out and bounce off the stop travel bumper. Adjust shock stiffness in one click increments to control the amount and rate at which the front end settles during gear change. While testing, document your ET's along with any changes made. If ET does not improve, return to previous settings.

Front "Bottoms Out" After Launch	Increase Stiffness	If front suspension settles too fast after launch or gear change it may cause the front suspension to bottom out at the end of its downward travel. If the suspension bottoms out hard enough, rear traction may be lost. Increase shock stiffness by one, then test again. If increasing shock stiffness cannot extend weight transfer duration long enough, a higher rate spring should be installed.
Hard Front End Bounce (After Launch or Gear Change)	Decrease Stiffness	If the tires cause the front end to bounce upon landing, the shocks are too stiff. The front end should settle in a single, smooth motion. Decrease shock stiffness by one, then test again. This can be a very subtle problem. Watch the front tire sidewall as it contacts the ground.

Rear Shock Adjustment (Single Adjustable)

Maintain traction by controlling the rate at which torque and weight is transferred to the rear tires. Ideally the rear suspension should be as firm as possible before a loss of traction occurs. Changes to the vehicle such as ride height, tire size, weight distribution, or suspension link adjustments will alter the instant center location in relation to the vehicle's center of gravity. Any shift of either the instant center or center of gravity will usually require a shock setting adjustment to optimize traction. While testing, document your ET's along with any changes made. If ET does not improve, return to previous settings.

Rear End Squats	Increase Stiffness	Some vehicles will squat during launches instead of pushing the vehicle forward. To assist in planting the tires, increase shock stiffness by one, then test again. If ET does not improve, return to previous setting.
Vehicle Separates from Rear End	Increase Stiffness	Some suspension geometries plant the tires so forcefully that the rear end of the vehicle rises away from the housing too rapidly. The vehicle may hook initially, then spin the tires once the shocks are topped out. Slowing the rate at which the rear end rises increases the duration of time that the rear tires benefit from the improved traction. Increase shock stiffness by one, then test again. If ET does not improve, return to previous setting.
Loss of Traction with Minimal Chassis Movement	Decrease Stiffness	A suspension system that is too stiff can hit the tires too hard, causing a loss of traction. Softening the suspension slows the transfer of weight and reduces the initial tire shock. Decrease shock stiffness by one, then test again. If ET does not improve, return to previous setting.

Completion of Testing

When all adjustments have been completed, reset your wheelie bars as low as possible without affecting your ET.

Notes:

WARRANTY NOTICE:
There are NO WARRANTIES, either expressed or implied. Neither the seller nor manufacturer will be liable for any loss, damage or injury, direct or indirect, arising from the use or inability to determine the appropriate use of any products. Before any attempt at installation, all drawings and/or instruction sheets should be completely reviewed to determine the suitability of the product for its intended use. In this connection, the user assumes all responsibility and risk. We reserve the right to change specification without notice. Further, Chris Alston's Chassisworks, Inc., makes **NO GUARANTEE** in reference to any specific class legality of any component. **ALL PRODUCTS ARE INTENDED FOR RACING AND OFF-ROAD USE AND MAY NOT BE LEGALLY USED ON THE HIGHWAY**. The products offered for sale are true race-car components and, in all cases, require some fabrication skill. **NO PRODUCT OR SERVICE IS DESIGNED OR INTENDED TO PREVENT INJURY OR DEATH**.

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