

READ ALL INSTRUCTIONS COMPLETELY AND THOROUGHLY UNDERSTAND THEM BEFORE DOING ANYTHING.
CALL VARISHOCK TECH SUPPORT (916) 388-0288 IF YOU NEED ASSISTANCE.



4" Travel VariStrut with Integral Spindle Installation and Tuning Guide



**VAS 9012124
Stem-Mount Strut**



**VAS 9012224
Eye-Mount Strut**

Description: Drag-race strut with integral spindle and 4" of travel. Available in two mounting styles; "Stem" with optional urethane bushings or spherical bearing, or "Eye" with billet aluminum eye mount. Brake options include spindle mount or hub mount systems.



PARTS LIST EYE-MOUNT STRUT

VAS 9012224 – Eye Mount 4” Travel VariStrut

Part Number	Qty	Description
899-020-210	1 pr.	Eye-mounted VariStrut assembly with integrated spindle, 4” travel
VAS 21-09XXX	1	VariSpring 2-1/2” ID, 9” length (pair)
6191	1	Control-arm set, VariStrut
6192 or 6193 (optional)	1	Rod-end kit for control arms, 6192 7/16” bore, 6193 1/2” bore

899-020-210 – Eye Mount 4” Travel VariStrut

Part Number	Qty	Description
883G400-CC0G	2	VariStrut 4” travel assembly
VAS 502-100	1	Strut stud base and steering arm set
VAS 506-100	1	Eye mount and spring seat set

VAS 502-100 – Strut Stud Base and Steering Arm

Part Number	Qty	Description
2019	2	Spindle washer 1-1/2” x 3/4”
3108-038H-S	4	Lock washer 3/8” high-collar
3122-038C1.00B	4	12-point flange bolt 3/8-16 x 1”
3145.156-1.00C	4	Cotter pin 5/32 x 1” long
3630	2	Castle nut 3/4-20 steel
3174-250-0.75S	6	Dowel pin .25 diameter x .75 long
899-052-200	2	Base extension for integral spindle strut
899-052-201	2	Steering arm for integral spindle strut, 3/8-24
899-052-203	2	Strut control arm pivot stud
899-052-204	2	Pivot spacer lower strut pivot
899-057-625-18	2	Castle nut 5/8-18 steel

VAS 506-100 – Eye Mounts and Spring Seats

Part Number	Qty	Description
3106-19CC0.63B	4	Set screw 10-24 x 5/8” cone point
3106-31CK0.25SP	4	Set screw 5/16-18 x 1/4” cup point
899-002-200	2	Lower spring seat for 2-1/2”-ID coil springs
899-002-202	2	Upper spring seat for 2-1/2”-ID coil springs
899-010-203	2	Top strut eye, COM-8 bearing
899-013-203	2	Piston bump stop 7/8 “ID x 2” OD x 5/8” tall, urethane
899-017-2431-22	4	Detent spring
899-018-250	4	Stainless steel ball .250 diameter
899-029-50-1.00	2	Spherical bearing 1” OD x 1/2” bore, Teflon® lined
899-030-1.000	2	Retaining ring 1.00” bore, internal
899-053NTA-1625	2	Thrust bearing 1” bore x 1-1/2” OD
899-053TRA-1625	4	Thrust washer 1” bore x 1-1/2” OD



PARTS LIST

STEM-MOUNT STRUT

VAS 9012124 – Stem Mount 4” Travel VariStrut

Part Number	Qty	Description
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VAS 21-09XXX	1	VariSpring 2-1/2” ID, 9” Length (pair)
6191	1	Control-arm set, VariStrut
6192 or 6193 (optional)	1	Rod-end kit for control arms, 6192 7/16” bore, 6193 1/2” bore
VAS 505-100 or VAS 505-101	1	Chassis mount urethane bushing or spherical bearing

899-020-209 – Stem Mount 4” Travel VariStrut

Part Number	Qty	Description
883H400-CC0G	2	VariStrut 4” travel assembly
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VAS 506-101	1	Stem mount and spring seat set

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899-052-201	2	Steering arm for integral spindle strut, 3/8-24
899-052-203	2	Strut control arm pivot stud
899-052-204	2	Pivot spacer lower strut pivot
899-057-625-18	2	Castle nut 5/8-18 steel

VAS 506-101 – Stem Mounts and Spring Seats

Part Number	Qty	Description
3106-31CK0.25SP	4	Set screw 5/16-18 x 1/4” cup point
3132-063-18B	2	Flanged locknut 5/8-18
899-002-200	2	Lower spring seat for 2-1/2”-ID coil springs
899-002-202	2	Upper spring seat for 2-1/2”-ID coil springs
899-013-203	2	Piston bump stop 7/8 “ID x 2” OD x 5/8” tall, urethane
899-013-68-1.75	4	Top mount bushing .688 bore x 1.75 diameter, urethane
899-017-2431-22	4	Detent spring
899-018-250	4	Stainless steel ball .250 diameter
899-053NTA-1625	2	Thrust bearing 1” bore x 1-1/2” OD
899-053TRA-1625	4	Thrust washer 1” bore x 1-1/2” OD
899-059-201	4	Top bushing mount backup washer, aluminum



**PARTS LIST
STEM-MOUNT STRUT**

CHASSIS MOUNT OPTIONS:

VAS 505-100 – Chassis Mount, Urethane Bushing

Part Number	Qty	Description
2065	4	Chassis mount gusset 1/8" thick, 4130
2066	2	Chassis mounting plate 1/8" thick, 4130

VAS 505-101 – Chassis Mount, Spherical Bearing

Part Number	Qty	Description
1166	2	Spherical-bearing housing
1268	2	Safety nut 5/8-18
1328	2	Thrust stand .340" offset, billet aluminum
2064	2	Chassis mounting plate 1/8" thick, 4130
2065	4	Chassis mount gusset 1/8" thick, 4130
3117-063-18C	2	Locknut 5/8-18 half height, nylon insert
3395	2	Spherical bearing 1-3/8" OD x 3/4" bore, Teflon® lined
3679	2	Spirolox retaining ring 1.442 OD



**PARTS LIST
EYE- AND STEM-MOUNT STRUT**

BRAKE OPTIONS:

Spindle-Mount-Wheel Brake Kit (8364)

Part Number	Qty	Description
3915	1	Brackets single-piston caliper set
3918	1	Light-duty slotted rotor, 10-1/4" diameter (pair)
3919	1	Hat set for 10-1/4" diameter rotor (pair)
3988	1	Billet single-piston Dynalite caliper & pads (pair)

Light-Duty Brake Kit (8365)

Part Number	Qty	Description
3905 or 3906	1	10" rotor set, 3905 solid, 3906 slotted (pair)
3914	1	Light-duty billet hubs & bearings (pair)
3916	1	Brackets two-piston caliper set
3996	1	Billet two-piston Dynalite calipers & pads (pair)

Medium-Duty Brake Kit (8366)

Part Number	Qty	Description
3903 or 3904	1	11-3/4" rotor set, 3903 solid, 3904 slotted (pair)
3910	1	Medium-duty billet hubs & bearings (pair)
3917	1	Brackets four-piston caliper set
3989 or 3990	1	Forged four-piston Dynalite calipers & pads, 3989 black, 3990 polished (pair)

INSTRUCTIONS

I. CHASSIS MOUNT INSTALLATION

Note: To maintain proper front end geometry, the enclosed drawing (899-031-202-A) shows the location of all suspension mounting points in reference to the ground line. The view of the drawing is from the front of the chassis. The ride height of the strut is shown with a 12" rolling radius tire. If you have a larger or smaller tire, adjust the dimensions to match your tires installed rolling radius.

A. Installing Upper Strut Mounts on Chassis Forward Struts

1. Before you can install the upper strut mounts, you must determine what strut mount width you need for your tires to clear your fenders. Due to the many different front wheel and tire combinations, you should do the following calculations for your vehicle even if it is listed in the chart on your chassis instructions.

Step 1: Determining the outside front tire width. Measure the width between the front fenders. You will need 4 to 5 inches of clearance from the outside sidewall of the tire to the inner front fender lip. If you choose 4" of clearance, subtract 8" from the inner fender width. If you need 5" of clearance, subtract 10" from the inner fender width. This will equal the outside front tire width.

Step 2: To determine the hub width, you need to know how much wider the outside of the tire is than the front hub. Put a yardstick across the outside sidewall of the tire and measure through the center to the side of the wheel that bolts to the hub. This is the amount that the wheel, when bolted on, is wider than the hub. Multiply this amount by 2 and then subtract that amount from the outside tire width you calculated in step one. This will be the required hub width (A) on the drawing.

Step 3: Subtract 11-1/2" from the hub width obtained in Step 2 to find the top strut mount width. Write your top mount width (B) on the drawing.

2. The front spindle centerline will be used to locate all the strut mounting points. Using your chassis assembly drawing, mark the axle centerline on the driver and passenger front frame rails.

3. Install the forward struts using the upper strut mount to position them.

Stud Mount: Measured from the chassis centerline, install the stud mount strut with the bottom of the cup or plate 21-1/2" above the ground line, 10 degrees angle toward the rear of the chassis, or 1-7/8" behind the spindle centerline and 1/2 the "B" dimension calculated above. The cup also tilts out at the bottom as viewed from the front.

Stem Mount: Measured from the chassis centerline, install the eye mount strut with the center of the mounting brackets 22-1/2" above the ground line, 10 degrees angle toward the rear of the chassis, or 1-7/8" behind the spindle centerline and 1/2 the "B" dimension calculated above.

B. Installing Control Arms

1. The drawing shows the location of the control arm pivot points in relation to the spindle centerline and the ground line. These dimensions do not change with the upper strut mounts. The rod end mounting points for the control arms are 24-1/2" wide and 6-1/8" off the ground line. The front and rear rod end centers are in the same plane. The control arm kit (part no. 6191) will have instructions on completing the installation of the control arms.

C. Installing Rack-and-Pinion Mounts

1. Shown on the drawing are the rack-and-pinion bracket mounting positions for the Pinto rack and pinion, our (part no. 6119) and the billet rack clamp (part no. 6124). These dimensions do not change with the upper strut mounts. The rack-and-pinion mount is offset from the chassis centerline 1-3/4" to the driver side of the chassis and 6-3/4" above the ground line. The mounting should be level front to rear and right to left. After the rack is mounted, install the tie rod tubes (part no. 6194).

2. Checking bump steer is an important part of this installation. Bump steer can only be corrected by shimming the tie rod ends or the rack-&-pinion. Do not move the control arm mounts. It is best to follow the procedures in the tie rod tube (Part No. 6194) instructions to check this.

II. STRUT ASSEMBLY

A. Assembling Strut Base and Steering Arm

1. You will need to assemble the strut base extension and steering arm. Insert the three dowel pins into the holes on the bottom of the strut.
2. Slide the base extension block over the three dowel pins. Use a rubber hammer to set the base extension tight against the strut base. Be sure to start the block over all three dowel pins evenly, keeping the extension block and the strut base perfectly square until the extension base is fully seated.
3. Set the steering arm on the extension block. Slide the 3/8" lockwasher over the 3/8-16x1" 12-point bolts and put a drop of 277 Red Loctite™ on each screw. Insert the bolts through the steering arm and into the extension block. To begin, screw the bolts half of the way into the extension blocks. Make sure you assemble the steering arms to make a right and left side.
4. Put three drops of 277 Red Loctite™ on the threads of the control arm pivot stud. Be sure you do this on the end that does not have the cotter pin cross hole in it. Slide the pivot stud through the steering arm and base extension and thread it into the base of the strut.
5. Tighten the two 12-point bolts to 30 lb-ft., of torque. Tighten the pivot stud to 80 lb-ft., of torque. Repeat this for the second strut. Remember to align the steering arms so they are both forward when the strut assemblies are installed creating a right and left side.

B. Assembling Strut Top Mount

1. **Stem Mount Struts** require an upper mount plate with an 11/16" hole in it. This plate must be installed in the chassis so it is exactly perpendicular to the strut at ride height. Failure to meet this requirement will damage the strut. Look at the assembly drawing to determine the location of each component in the upper mount. DO NOT forget to grease the thrust bearing. Tighten the top nut to 50 lb-ft., (it is self-locking).
2. **Eye Mount Struts** require two 1/2" hole brackets per side of the chassis. They must be 1-1/8" apart inside. The pivot in the upper eye must be perpendicular to the strut at ride height. Failure to meet this requirement will damage the strut. Eye mounts are easier to build and attach to the chassis than stem mounts. Also, they have more misalignment than stem mounts. Look at the assembly drawing to determine the location of each component in the upper mount. The thrust bearing needs to be greased.

The final/correct spring rate must be calculated after installing the baseline-rate spring which was shipped with your strut. The eye mount may have to be removed after initial installation to change to a different rate spring. Refer to your VariSpring Installation and Tuning Guide for specific instructions on calculating the correct spring rate.

Eye Mount Initial Assembly

Thread the lower spring seat onto the strut body until it is at the bottom of the available threads. Fully extend the strut piston rod. Place the spring over the piston rod followed by the bump stop, upper spring seat, and thrust bearing. Hold the piston rod in an aluminum vise jaw and tighten the top eye to 20-25 lb-ft. Do not scratch the piston rod. Follow the procedures for measuring the spring and calculating the correct spring rate as described in the VariSpring Installation and Tuning Guide. If the calculated spring rate differs from the installed spring, the eye mount will have to be removed to install the correct rate spring.

Eye Mount Final Assembly

Grease the thrust bearing during when reassembling the strut with the correct rate spring. Hold the piston rod in an aluminum vise jaw and tighten the top eye to 45-50 lb-ft. Do not scratch the piston rod. Use a #21 bit (.159") to drill shallow (1/16" deep) set screw landings through each of the eye-mount's 10-24 set screw holes. The landings prevent the set screws from distorting the piston threads when tightened. Clear the holes of debris before applying #242 Blue Loctite™ onto the set screws and installing them into the eye.

NOTE: Removal of the eye mount after final assembly may require heating the mount to break the Loctite™ bond.

3. After the strut is installed on the chassis, check for binding at full compression and extension and, at full lock of the steering in each direction. This must be done without the spring installed. You must correct any binding that occurs in any part of the front suspension or damage will result.

C. Installing Coil Spring

1. Apply anti-seize to the threads on the inside of the lower spring seat and then screw the spring seat onto the shock body. The spanner wrench notches in the lower spring seat go toward the base of the strut (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 set screws that secure the ball lock are not too tight. Unscrew the set screws so one thread shows. Screw the seat on as far as it will go.
2. Place the spring over the strut. 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.
3. Make sure both lower spring seats are screwed on the same amount or you will preload the chassis. With the correct spring rate, the spring seat will normally be approximately 1" up from the bottom of the adjustment. Check the ride height using the upper strut mount location off the ground line.
4. After the strut is final installed and adjusted, tighten the set screws 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.

III. INSTALLING THE BRAKES

Refer to the installation guide included with your brake kit for specific instructions.

Spindle Mount Brakes (Part No. 8364) are for light vehicles and must always be used with a parachute. These brakes provide very little braking and are designed to be extremely light. ONLY FOR USE WITH Weld Racing Wheels - Alumastar 2.0 (788-15001) and Magnum Pro (786-15001 or 786P-15001) and American Racing Wheels - Torq Thrust® Pro (48553S) and TrakStar (48053SBC or 48053S).

Light Duty Brakes (Part No. 8365) are also for use on light cars. They provide a braking power similar to that of the spindle mount brakes. It is a little heavier because it is designed for a bolt-on wheel. It will have a little better rotor and pad life than the spindle mount brake. It also must be used with a parachute.

Medium Duty Brakes (Part No. 8366) provide much more stopping power and are recommended by Chassisworks for use whenever possible. This kit will provide better pad and rotor life. A parachute is recommended but many lightweight cars have had good pad and rotor life without one. It is your responsibility to determine the safest way to operate your vehicle.

VariStrut Adjustment and Tuning Guide - QuickSet 2

This guide covers adjustment features and tuning procedures for VariStrut QuickSet 2, double-adjustable strut. 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

Struts 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 struts. The installed compression bumper protects the strut 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 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 strut body. Any strut will be damaged if the car is dropped from a wheel stand.

Ride Height

When a strut is at ride height a certain amount of travel is available in either direction. 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 strut will drastically affect how the car works. The VariStrut drag race strut has 4" of travel. At baseline ride height, the strut and spring should collapse 2.56" from their installed heights. This results in 2.56" of available extension travel and 1.44" 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 the launch. 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 front end weight of the car and baseline strut ride height. Put scales under the front tires to determine the actual weight, and then refer to the baseline spring rate chart. The recommended rate assumes that the strut travel is at the designed ride height with the strut collapsed 2.56".

9" Spring Rate Baseline

Front Vehicle Weight (lbs)	Rate (lb/in)	Spring Travel (in)	Maximum Preload (in)	Part Number
900-975	185	5.70	1.58	VAS 21-09185
975-1125	210	5.64	1.52	VAS 21-09210
1125-1275	240	5.57	1.45	VAS 21-09240
1275-1475	275	5.46	1.34	VAS 21-09275
1475-1650	310	5.57	1.45	VAS 21-09310
1650-1800	350	5.17	1.05	VAS 21-09350

Spring Preload

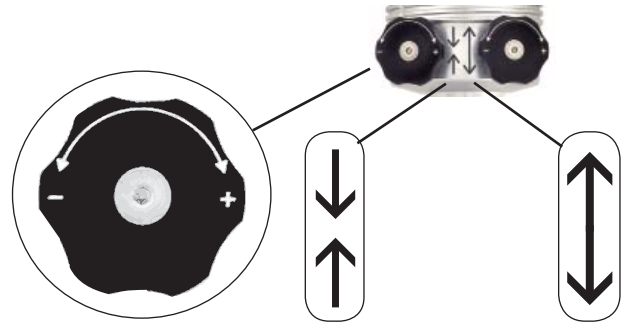
The threaded lower spring seat is used to adjust spring preload. Compressing the coil spring to any length shorter than its free height, with the strut fully extended, is considered preloading the spring. If you adjust the spring seat to change the vehicle's ground clearance, be aware that you will be adding or subtracting travel in the front strut. 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 strut is fully collapsed. (Refer to the Spring Rate Baseline chart.)

Tuning with Spring Rate

A drag race car should run the lightest front spring rate possible, without letting the struts 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 strut rebound 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 strut 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 strut 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 2 valve system features dual adjustment knobs that independently control bump- and rebound-damping stiffness of the strut. Dual-arrow symbols engraved into the strut body demonstrate the function of each knob. Arrows pointing toward each other designate bump (compression) adjustment; the strut collapsing. Arrows pointing away from each other represent rebound (extension) adjustment; the strut extending. Knobs are clearly etched indicating the correct direction of rotation to decrease (-), or increase (+) damping stiffness. There are 16 specific adjustment positions for each knob, with a total of 256 unique combinations possible.



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 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.

Symbol	Direction	Effect
+	Clockwise	Increase Stiffness
-	Counter-Clockwise	Decrease Stiffness
↓ ↑	Bump (compression) Adjustment	
↕	Rebound (extension) Adjustment	

Note: VariStruts have a substantial range of adjustment with very little bypass or internal bleed. Due to our minimal-bleed design, struts will feel extremely stiff at some settings when operated by hand, whereas other struts with excessive bleed will move more freely. Manual comparison should not be performed. A person cannot manually operate the strut at a rate anywhere near real life conditions and any results found in this manner will be meaningless. Prior to shipping, every VariStrut 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 struts 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 VariStrut actually has a broader range of adjustable force with the added benefit of a more manageable number of adjustments to try.

Tuning Procedures - QuickSet 2

VariStrut's broad range of adjustment is suitable for the unique vehicle dynamic requirements of drag racing. A properly tuned drag race suspension effectively controls weight transfer and maintains traction throughout launch and each gear shift. 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 Drag Racing - QuickSet 2

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 struts and 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 struts adjusted to the number 3 position for bump and rebound.

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 strut 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.

Use of a double-adjustable QuickSet 2 will allow the following procedure.

When a vehicle launches slightly toward the right, rebound (shock extension) stiffness is added to the driver side and bump (shock compression) stiffness is added to 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 for either bump or rebound. Rear shock adjustments are only applicable to correcting the launch and will have little to no effect 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 Strut 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.

Front Rebound (Extension) Adjustment Overview

Too light of a rebound (extension) 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 the rebound setting 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 Rebound Stiffness	Violent chassis separation and may result in jerking the front wheels off the ground. Increase strut rebound stiffness by one, then test again.
Rear Tires Hook Then Lose Traction	Increase Rebound 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 struts from topping out too quickly and increases the duration of time that the rear tires benefit from the weight transfer. Increase strut rebound stiffness by one, then test again.
No Front End Rise	Decrease Rebound Stiffness	Too firm of a damper setting limits the amount of weight transferred to the rear tires, resulting in poor traction. Decrease strut rebound stiffness by one, then test again.

Front Bump (Compression) Adjustment Overview

After the launch or during a gear change, a firm bump setting will cause the chassis to bounce off the front tire as the chassis settles down. Too light of a bump setting allows the strut to bottom out and bounce off the stop travel bumper. Adjust bump 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 Bump 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 strut bump stiffness by one, then test again. If increasing bump 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 Bump Stiffness	If the tires cause the front end to bounce upon landing, the struts are too stiff. The front end should settle in a single, smooth motion. Decrease strut bump 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 (Double Adjustable)

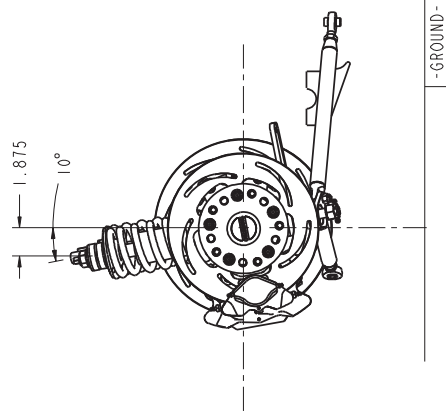
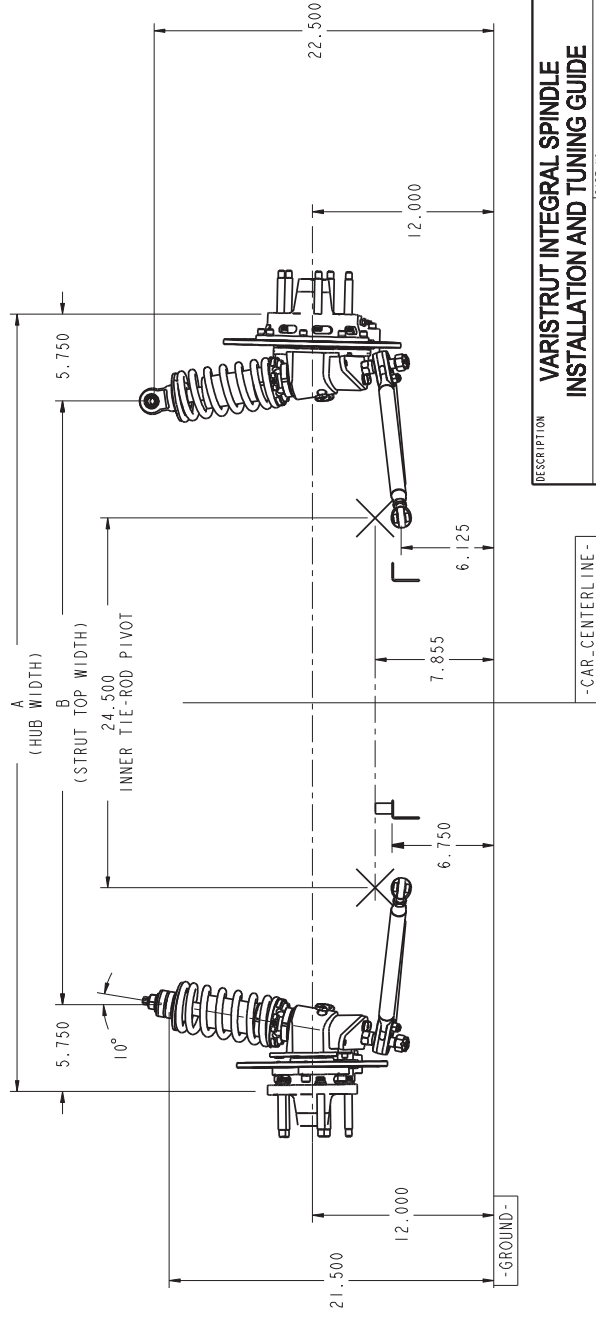
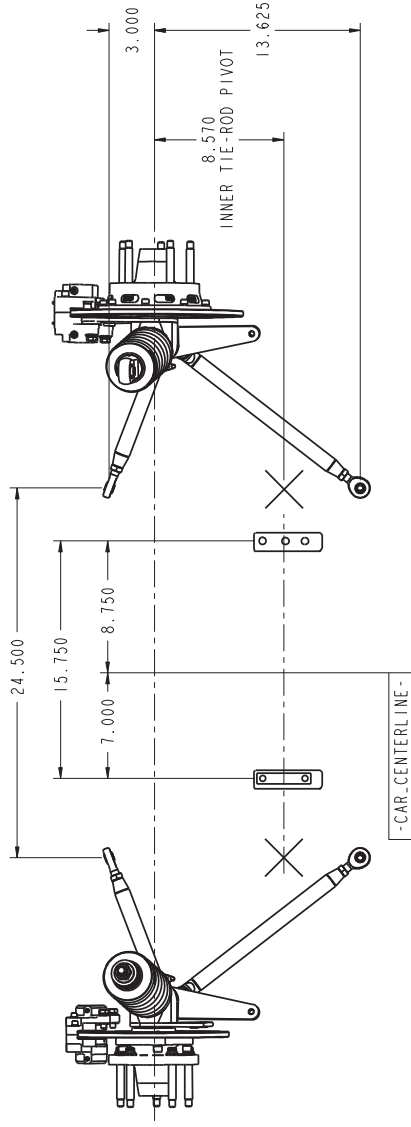
Maintain traction by controlling the rate at which torque and weight is transferred to the rear tires. Ideally the rear suspension should be as firm as possible before a loss of traction occurs. Changes to the vehicle such as ride height, tire size, weight distribution, or suspension link adjustments 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 Bump Stiffness	Some vehicles will squat during launches instead of pushing the vehicle forward. To assist in planting the tires, increase shock bump stiffness by one, then test again.
Vehicle Separates from Rear End	Increase Rebound 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 rebound stiffness by one, then test again.
Loss of Traction with Minimal Chassis Movement	Decrease Bump/ Rebound 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. Minimal chassis movement makes it very difficult to visually tell if the bump or rebound needs to be decreased. We suggest adjusting bump first and watch for a gain or loss in the ET. If ET does not improve, return to previous setting, then adjust rebound instead and test again.

Completion of Testing

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

NOTES:
 1. FOR TOP STRUT MOUNT USE THE FOLLOWING
 CALCULATION:
 A - 11.5 = B

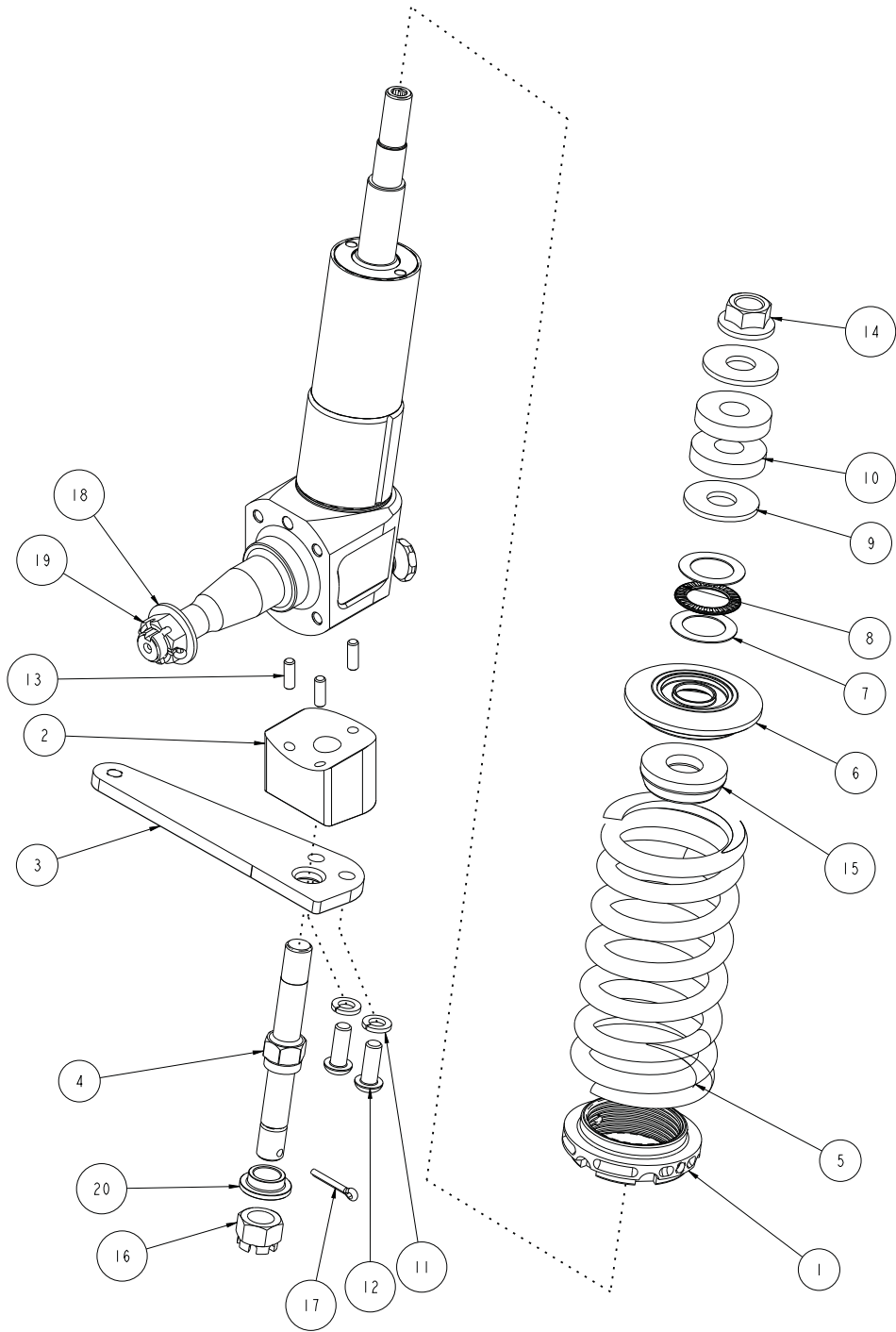


DESCRIPTION
**VARISTRUT INTEGRAL SPINDLE
 INSTALLATION AND TUNING GUIDE**

PART NO.
899-031-202-A

Chris Alton's CHASSISWORKS INC.
 8881 YOUNGER CREEK DRIVE
 SACRAMENTO, CA 95828
 (916) 388-0288 FAX: 388-0285

6/29/04 DWG: 899-031-202-A



ITEM	QTY	PART NO.	DESCRIPTION
1	1	899-002-200	LOWER COIL SPRING SEAT 2 1/2 ID SPRING, 2.225-8 STUB ACME
2	1	899-052-200	BASE EXTENSION INTEGRAL SPINDLE STRUT
3	1	899-052-201	STEERING ARM INTEGRAL SPINDLE STRUT
4	1	899-052-203	CONTROL ARM PIVOT STUD INTEGRAL SPINDLE STRUT
5	1	899-035-09-240	COIL SPRING, 2 1/2 ID, 6.5 INSTALLED HEIGHT
6	1	899-002-202	UPPER COIL SPRING SEAT, Ø2 1/2 ID SPRING, STRUT BEARING SEAT
7	2	899-053-TRA-1625	THRUST WASHER 1.0 SHAFT, TORRINGTON TRA-1625
8	1	899-053-NTA-1625	THRUST BEARING 1.0 SHAFT, TORRINGTON NTA-1625
9	2	899-059-201	BACKING WASHER, URETHANE PAD, STRUT
10	2	899-013-68-1.75	BUMPER PAD Ø1.75 OD x Ø.688 ID x .38 THICK
11	2	3108-038L-C	LOCKWASHER, 3/8 MEDIUM, PLATED
12	2	899-051-3816-08	SOCKET BUTTON HEAD CAP SCREW 3/8-16 x 1.0, 18-8 STAINLESS
13	3	3174-250-0.75S	DOWEL PIN, Ø.250 x .750, 18-8 STAINLESS STEEL
14	1	899-023-625-18F	5/8-18 FLANGED LOCK NUT RIGHT HAND, PLATED
15	1	899-013-203	TRAVEL STOP BUMPER .625 LONG, 7/8 SHAFT
16	1	899-057-625-18	CASTLE NUT, 5/8-18 THICK
17	2	3145.156-1.00	COTTER PIN, 5/32 x 1
18	1	2019	SPINDLE WASHER Ø1 1/2 x Ø3/4 .105 THICK, .180 x .110 KEY TANG
19	1	3630	SPINDLE NUT, 3/4-20 CASTLE STYLE
20	1	899-052-204	PIVOT SPACER LOWER STRUT PIVOT

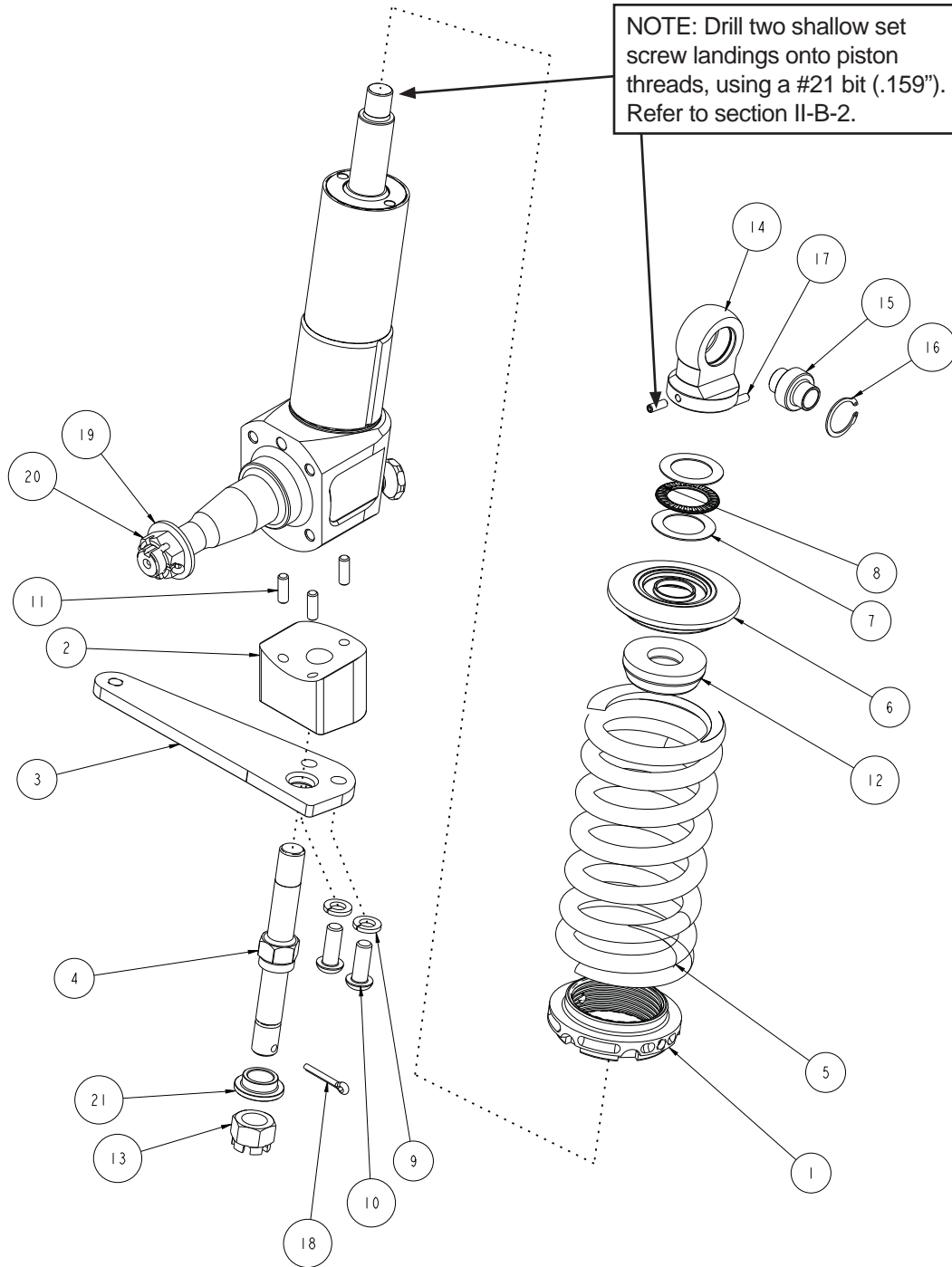
DESCRIPTION
**STRUT, INTEGRAL SPINDLE (GM)
 4.00 TRAVEL, STUD MOUNT, Q2**

Chris Moore's CHASSISWORKS INC.
 8881 YOUNGER CREEK DRIVE
 SACRAMENTO, CA 95828
 (916) 388-0288 FAX 388-0296

PART NO.
899-031-202-B

6/24/04 DWG: 899-031-202-B

NOTE: Drill two shallow set screw landings onto piston threads, using a #21 bit (.159"). Refer to section II-B-2.



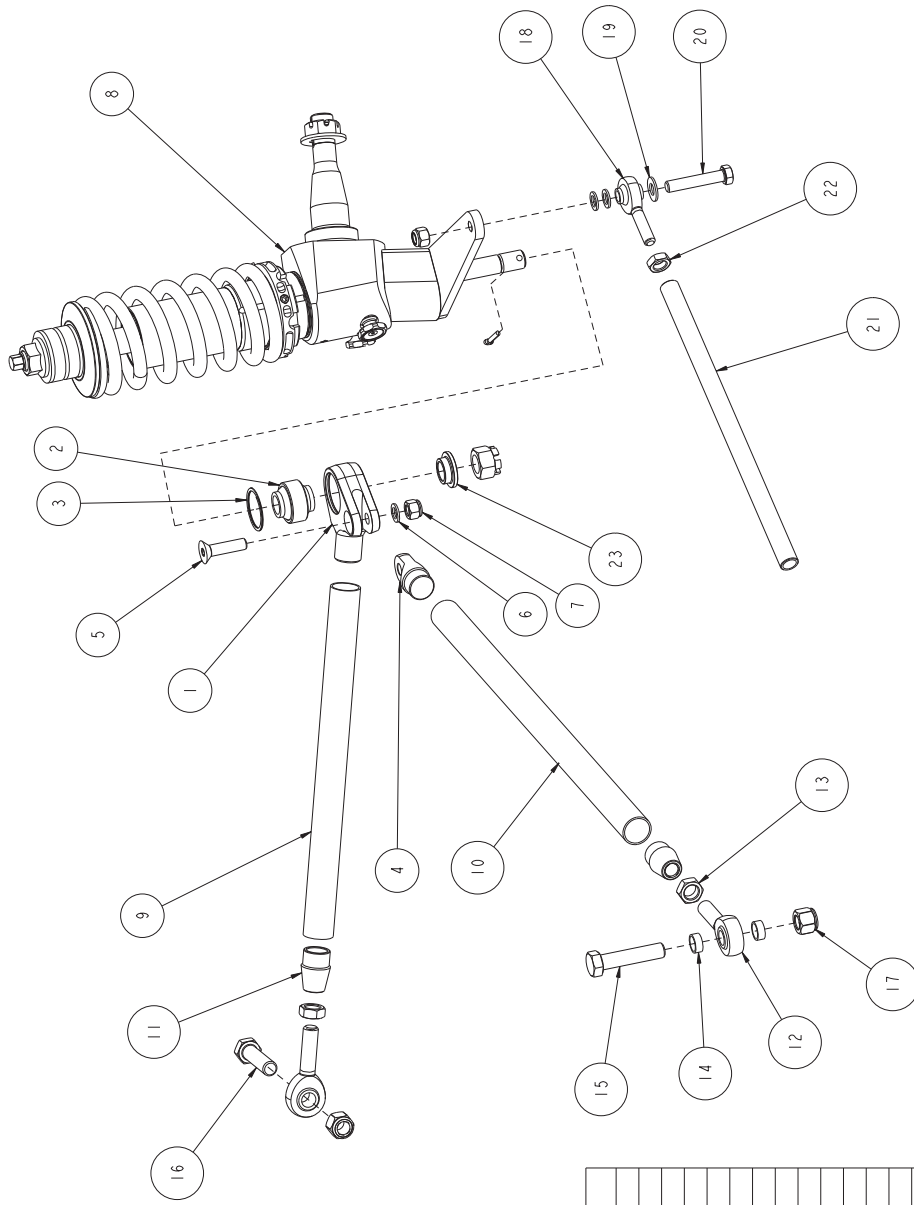
ITEM	QTY	PART NO.	DESCRIPTION
1	1	899-002-200	LOWER COIL SPRING SEAT 2 1/2 ID SPRING, 2.225-8 STUB ACME
2	1	899-052-200	BASE EXTENSION INTEGRAL SPINDLE STRUT
3	1	899-052-201	STEERING ARM INTEGRAL SPINDLE STRUT
4	1	899-052-203	CONTROL ARM PIVOT STUD INTEGRAL SPINDLE STRUT
5	1	899-035-09-240	COIL SPRING, 2 1/2 ID, 6.5 INSTALLED HEIGHT
6	1	899-002-202	UPPER COIL SPRING SEAT, Ø2 1/2 ID SPRING, STRUT BEARING SEAT
7	2	899-053-TRA-1625	THRUST WASHER 1.0 SHAFT, TORRINGTON TRA-1625
8	1	899-053-NTA-1625	THRUST BEARING 1.0 SHAFT, TORRINGTON NTA-1625
9	2	3108-038L-C	LOCKWASHER, 3/8 MEDIUM, PLATED
10	2	899-051-3816-08	SOCKET BUTTON HEAD CAP SCREW 3/8-16 x 1.0, 18-8 STAINLESS
11	3	3174-250-0.75S	DOWEL PIN, Ø.250 x .750, 18-8 STAINLESS STEEL
12	1	899-013-203	TRAVEL STOP BUMPER .625 LONG, 7/8 SHAFT
13	1	899-057-625-18	CASTLE NUT, 5/8-18 THICK
14	1	899-010-203	TOP LOOP, COM-8 BORE STRUT MOUNT, 5/8-18 THREAD
15	1	3175-08-C-18-T	SPHERICAL BEARING COM-8T-1.125, 1.00 OD x .500 BORE, 1.125 LENGTH
16	1	3113-1.000-P	INTERNAL SNAP RING, INVERTED LUG, 1.000 BORE, .042 WIDE
17	2	3106-19CC0.63B	SET SCREW, 10-24 x 5/8, CONE POINT, BLACK
18	2	3145.156-1.00	COTTER PIN, 5/32 x 1
19	1	2019	SPINDLE WASHER Ø1 1/2 x Ø3/4 .105 THICK, .180 x .110 KEY TANG
20	1	3630	SPINDLE NUT, 3/4-20 CASTLE STYLE
21	1	899-052-204	PIVOT SPACER LOWER STRUT PIVOT

DESCRIPTION
**STRUT, INTEGRAL SPINDLE (GM)
 4.00 TRAVEL, EYE MNT, Q2**

Chris Alston's CHASSISWORKS INC.
 8661 YOUNGER CREEK DRIVE
 SACRAMENTO, CA 95828
 (916) 388-0288 FAX 388-0285

PART NO.
899-031-202-C

6/24/04 DWG: 899-031-202-C



ITEM	QTY	PART NO.	DESCRIPTION
1	1	899-052-205	PIVOT HOUSING DRIVER, STRUT CONTROL ARM, INTEGRAL SPINDLE STRUT
2	1	899-029-63-1-20	SPHERICAL BEARING HINOT .856 OD x .625 BORE, 1.200 LENGTH
3	1	3679	RETAINING RING, DOUBLE TURN 1.442 OD x .043 THICK x .095 RADIAL WALL
4	1	1126	WELD EYE .880 TUBE ID x .375 WIDE x 3/8 HOLE
5	1	3471	FLAT HEAD SCREW 3/8-24 x 1-.500
6	3	3109-038-S-2-Y	AIRCRAFT WASHER, 3/8 x .062 THICK
7	2	3101-038-24C	LOCKNUT, 3/8-24, GRADE 8, NYLON INSERT, CLEAR ZINC
8	1	883H400-CC00	STRUT, INTEGRAL SPINDLE (GM) 4.00 TRAVEL, STUD MOUNT, .02
9	1	A16-058-012.000	TUBE Ø 1 x .058 4130 x 12
10	1	A16-058-018.000	TUBE Ø 1 x .058 4130 x 18
11	2	1125	TUBE ADAPTER .88 x 1/2-20 RIGHT
12	2	3330	ROD END 1/2 x 1/2 RT 4130 TEFLON JMW8T
13	2	3102-050-20RC	JAM NUT, 1/2-20 RIGHT, CLEAR ZINC
14	2	1000	MISALIGNMENT BUSHING Ø 1/2 BORE x .250
15	1	3100	HEX BOLT, 1/2-20 x 2 1/4 HEX CAP SCREW, GRADE 8, YELLOW ZINC
16	1	3102	HEX BOLT, 1/2-20 x 2, GRADE 8, YELLOW ZINC
17	2	3101-050-20C	LOCKNUT, 1/2-20, GRADE 8, NYLON INSERT, CLEAR ZINC
18	1	3366	ROD END 3/8 4340 RT MALE HRSWX6T
19	1	3253	WASHER, 3/8 STAINLESS, .812 OD x .406 ID x 1/16 THICK
20	1	3128	HEX BOLT, 3/8-24 x 2, GRADE 8, YELLOW ZINC
21	1	1001	TIE ROD TUBE PINTO BACK AND PINION
22	1	3102-044-20RC	JAM NUT, 7/16-20 RIGHT, CLEAR ZINC
23	1	899-052-204	PIVOT SPACER LOWER STRUT PIVOT

DESCRIPTION CONTROL ARM AND TIE ROD, VARI STRUT

PART NO. Chris Alston's CHASSISWORKS INC. 6191 & 6194
 8661 YOUNGER CREEK DRIVE SACRAMENTO, CA 95828
 (916) 386-0286 FAX 386-0295 6/28/04 DWG: 916191

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