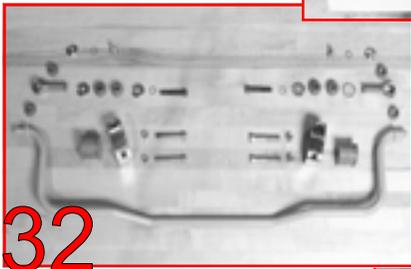
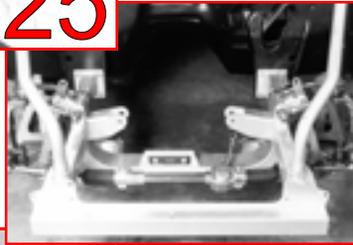


# INSTALLATION GUIDE

## CHASSISWORKS Street Machine A-Arms



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Torque Specifications*

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A-arms, and Spindles*

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8661 Younger Creek Drive, Sacramento, CA 95828 Telephone (916) 388-0288

#91A-ARM

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# CONGRATULATIONS

You have purchased the finest front suspension crossmember available. We hope you are as excited about installing it as we were about designing it.

This assembly booklet should guide you through a seamless installation. However, if you have any questions please give our tech line a call at (916) 388-0288. Monday through Friday 7:00 a.m. to 5:00 p.m., Saturday 8:00 a.m. to 1:00 p.m. PST.

Every effort has been made to insure that each component has been boxed correctly. However, we urge you to open each box and verify it's contents against the enclosed parts list.

We also suggest that you read this entire assembly booklet before you begin. This will help you become familiar with the project.

Please remember that when you modify a vehicle, you assume all risks. You are changing the structural integrity manufactured into the original vehicle. As such, you need to be cognizant of potential failures. Initially you must conduct a series of short tests in a safe location. Test for handling, steering, and braking at slightly increasing speeds.

Once you are confident the vehicle handles and stops properly, take a series of drives with slightly increasing speeds stopping to check all components. Gradually increase the distance of your drives. Once you have confirmed your installation is road-worthy, you must develop a maintenance program. You must check all components for looseness, and wear and tear on a regular schedule. Your schedule must be more intense and frequent than a regular OEM vehicle.

Chris Alston's Chassisworks would appreciate any feedback regarding your experience during installation and use of this frame.

That said, let's install!

## Recommended Equipment List

This list will give you a good idea of the necessary tools required to complete this installation. There will be additional items needed.

### Hand Tools

- ◆ Adjustable wrench
- ◆ Allen wrench set
- ◆ Anti-seize compound
- ◆ Brakeline wrench
- ◆ Center punch
- ◆ Combination wrenches 3/8 to 3/4"
- ◆ Drill bit size #21(.159)
- ◆ Level
- ◆ Loctite #242 thread lock
- ◆ Socket set 3/8 to 3/4" with 3/8 drive
- ◆ Steel & plastic head hammers
- ◆ Straight blade screwdriver
- ◆ Tape measure
- ◆ Tap handle small and medium
- ◆ Tap sizes: 10-32, 3/8-16, 1/2-13, 5/8-18

### Shop Equipment

- ◆ Digital level
- ◆ 3/8" electric drill

## Torque Specification Chart

<i>DESCRIPTION</i>	<i>TORQUE</i>	<i>DESCRIPTION</i>	<i>TORQUE</i>
A-arm pivot studs	60 lb-ft	Motor mount spuds	20 lb-ft
Antiroll bar clamp socket head allens 3/8-16 x 2 1/2"	20 lb-ft	Rack clamp socket head allens 1/2-13 x 2"	45 lb-ft
Antiroll bar link eyebolt button head allen 3/8-16 x 3/4"	20 lb-ft	Rack clamp caps socket head allens 5/16-18 x 1"	15 lb-ft
Antiroll bar link eyebolt socket head allen 3/8-16 x 2 1/4"	20 lb-ft	Shock spuds	20 lb-ft
Balljoints	150 lb-ft	Shock bolts 1/2-20 x 2 1/2"	45 lb-ft
Balljoint studs	105 lb-ft	Tie rod stud	60 lb-ft
Caliper socket head allens 3/8-16 x 1 3/8"	30 lb-ft	Wheel studs 1/2-20 x 2 1/4" 12 point	40 lb-ft
		We recommend applying a small amount of Loctite™ on all fasteners except the balljoint studs, and the tie rod studs.	

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**This installation guide shows the front suspension being installed on our Chevy II Bolt-On Clip. The installation procedure is the same for the Street Machine Crossmember you purchased. If you have not purchased the Crossmember go to page 55, for help selecting the correct one for your application.**

### ***Installing Suspension***

In this section you will install all of the front suspension components and align the front end geometry.

If you purchased plain steel A-arms, have them painted or powder coated before you assemble them. Do not get paint in the balljoint housing thread bore or in the pivot bushing bores. The balljoint bores are precision machined. Consequently, you can not install and remove the balljoints multiple times. The self-locking threads on the balljoint will destroy the balljoint housing if it is removed and installed several times. Have your A-arms painted before the balljoint is assembled to minimize this potential problem.

Do not plate or chrome the A-arms. The plating solution can leak into the tubes and cause them to rust from the inside out. If you drill drain holes in the tubes, the A-arm will crack from the holes. If you want a highly polished look, purchase our stainless A-arms.

The mild steel lower A-arms are shipped without their pivot bushings installed to make painting or powder coating easier. Use an arbor press to install the bushings.



### ***Installing Lower & Upper A-arms, and Spindles***

The first parts installed will be the upper and lower A-arms. The stainless steel lower A-arm comes with all of the bushings installed. You will be installing the bushings and rod ends in the upper A-arms later.



For identification, the driver side A-arm assembly is embossed with a “D” on the balljoint housing. The passenger side is embossed with a “P” on the balljoint housing.



The balljoint rubber boot is installed in the balljoint housing first. Because the boot fits tight in the housing, installing it before the balljoint is easier. Drop the boot into the machined bore in the balljoint housing.



Work your way around the boot's edge, pushing it down into the bore with your fingers. You can also use a blunt tool to do this.



During the assembly process we are going to coat all of the threaded assemblies with an anti-seize compound to prevent the threads from being damaged and aid disassembly in the future.

Put a thin layer of anti-seize on the balljoint threads.



The balljoint is then screwed into the balljoint housing as far as possible by hand. Make absolutely sure that the thread starts straight. This is a little tricky. The threads on the balljoint are easy to cross thread.



Use the balljoint wrench included with your kit to tighten the balljoint. Tighten it until it is fully seated against the balljoint housing. The force required can be over 150 lb-ft of torque. Be careful not to scratch the A-arms. Repeat this for the passenger side lower A-arm.

One convenient method for holding the A-arm while installing the balljoint is to temporarily install the A-arm on the frame.



The upper A-arms will be assembled next. Although they are very similar, they are not identical. The letter “D” or “P” on the balljoint housing identifies which side of the car the A-arm installs in.



Use a 5/8-18 tap to chase the threads in the upper A-arm. Clear any debris left in the threads.



Use the same procedure to assemble the upper A-arm as the lower. First, install the balljoint boot into the balljoint housing.



Next, apply a layer of anti-seize to the balljoint threads.



Thread the balljoint in as far as possible by hand.



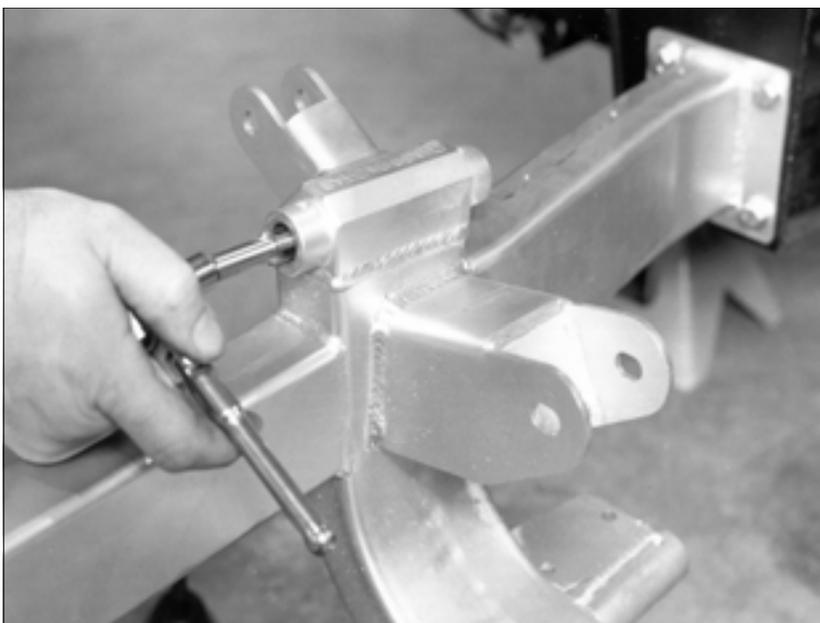
Finish tightening the balljoint with the balljoint wrench until it is seated tight against the balljoint housing. Repeat this for the passenger side upper A-arm.



Install the rod ends into the upper A-arms. To provide an initial alignment baseline, the jam nut should be threaded until there is 1-1/16 inches of thread remaining past the jam nut.



After the application of another dab of anti-seize, the rod ends are threaded into the A-arms, until the jam nuts are snug against the arm itself.



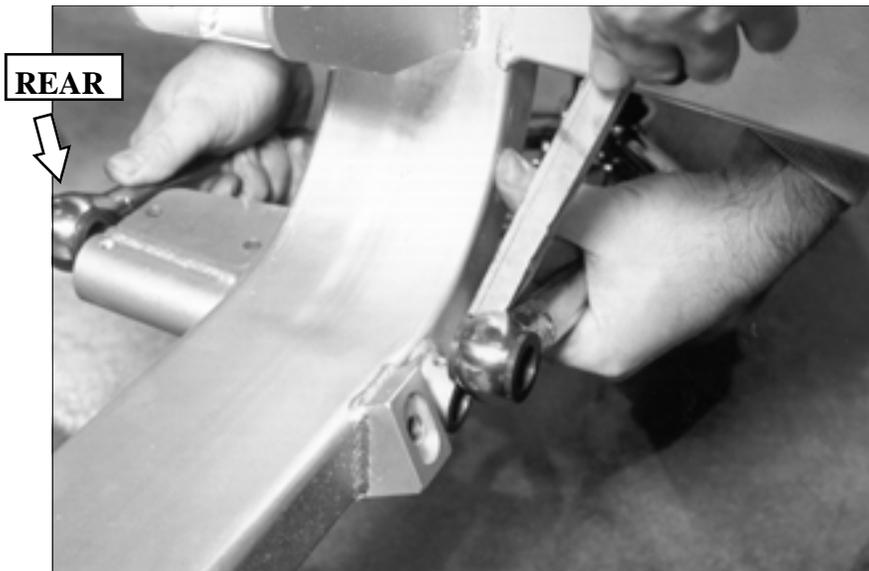
This step must be done carefully because the upper and lower A-arm mounts are threaded and welded to the frame. Use the 5/8-18 tap to chase the threads on the front and back sides of both upper mounts. Blow any remaining particles out of the hole with an air hose.



Next, chase the threads in the lower A-arm mounts with the 5/8-18 tap and blow-out any remaining particles.



Now, apply some anti-seize to the threads of the pivot stud. Also put anti-seize inside the bore of the A-arm mounts. Insert one of the lower A-arm pivot studs and then run it in all the way to its stop, it should go in easy. Use the same procedure to verify all of the pivot studs will easily thread into their mounting locations.



The lower A-arm fits tight over the mount. Slide the rear of the A-arm onto the mount and then use a piece of wood between the frame and the A-arm to pry it over the mount.



When installing the lower A-arm pivot studs, be careful not to damage the threads. Tap the pivot stud into place with your hand.

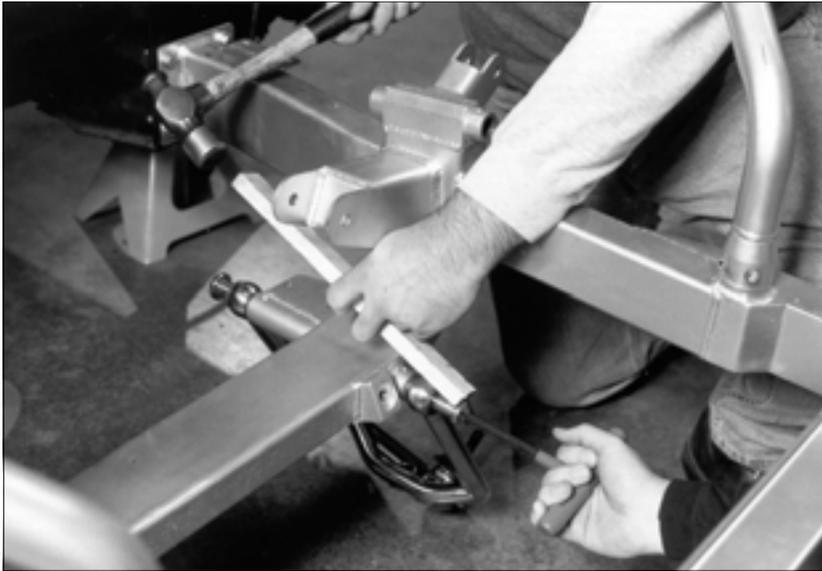


If the hand method does not work, you can use a plastic-tipped hammer to gently install the pivot stud. It is best to move the pivot stud a small amount at a time until the threads make contact.

Do not put grease on the pivot bushings they are self-lubricating.



Once the pivot studs are in place, use an Allen T-wrench to tighten them. The pivot studs should go in easily and should be tightened until they are fully seated. This will give the bushings the proper amount of crush, and allow the lower A-arm to move with a small amount of resistance.



If you have to remove the lower A-arm pivot studs, use a piece of wood and a few taps with a hammer while turning the pivot stud counter-clockwise. The pivot stud will come out easily.



After tightening the lower A-arm pivot studs, check to be sure the A-arm swings freely but snugly throughout its travel.



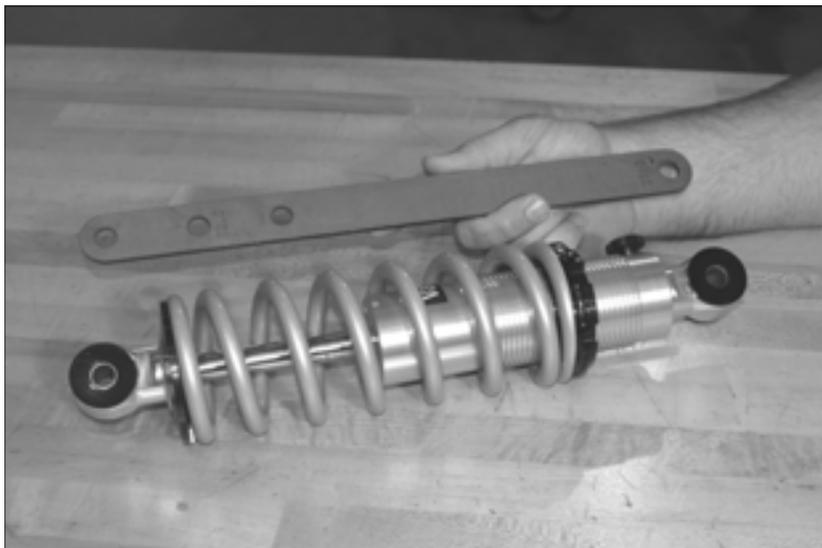
The lower A-arm should also stay suspended when released. It should take a few pounds of pressure to make it move.



A set screw is used to lock the A-arm pivot studs. The set screw locks on the groove machined into the pivot stud.



Before installing the pivot stud set screws, apply a drop of Loctite™ thread sealing compound to the screws. Be careful not to get excess Loctite™ in the pivot stud bore.



The next step is to install the upper A-arm and spindle. During this step you are going to need the lower A-arm at its ride height position.

Two of these shock simulators are included in the suspension kit. The top hole represents full shock extension, the bottom hole full compression, and the middle hole (at 12 inches) represents the ride height of the shock absorber.



Next, install the shock simulator at the ride height position. Install the lower bolt first and then the upper.



Installing the upper A-arm is similar to installing the lower A-arm. Slide the front rod end over the front mount first and then swivel the rear one into place.



Install the upper mount bolts just like the lower mount bolts. Do not fully tighten them now because they need to be moved when we adjust the front suspension settings later. Repeat the installation of the upper A-arm on the passenger side.



You are now going to install the dropped spindles. The "L" cast into the back of the spindles, does not designate "Left," it is the foundry mark. The best way to identify the driver and passenger side spindle, is to remember the steering arm (shown with arrow) always goes toward the front of the car.



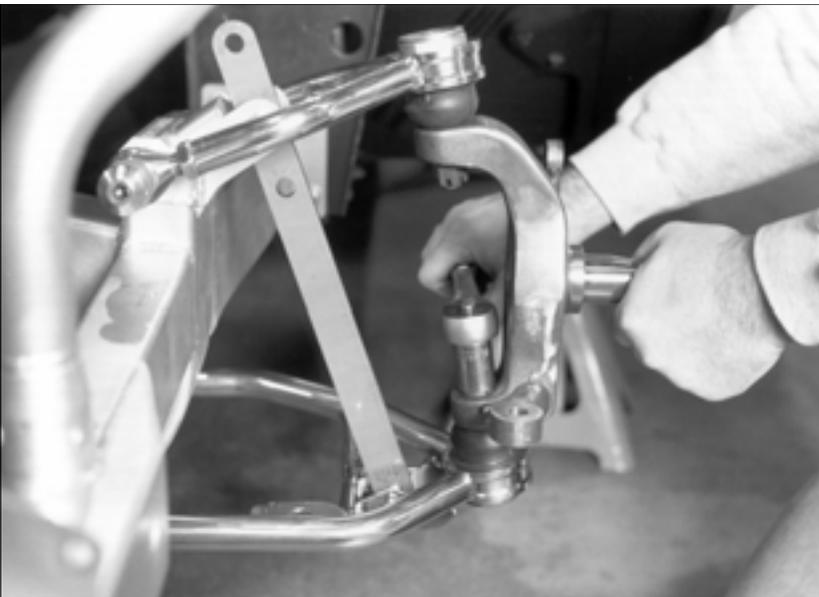
Place the driver side spindle over the balljoint and thread the 9/16-18 castle nut on.



The balljoint castle nut will not thread on easily if the threads are nicked. A thread file can be used to correct the problem. After filing, try the castle nut again before putting the spindle on. Thread files can be found at most auto parts stores.



Place the spindle over the lower balljoint and install the washer and castle nut. The upper A-arm is then lowered into position and secured to the spindle with another washer and castle nut.



Tightened both upper and lower balljoint castle nuts.



Insert the cotter pin through the hole in the balljoint. You may need to tightened it a small amount until the slots in the castle nut align with the hole.



With the cotter pin installed, use pliers to fold the legs over the castle nut. One leg goes down the other over the top of the balljoint stud.



Repeat the procedure for the upper A-arm. First tightening the castle nut.



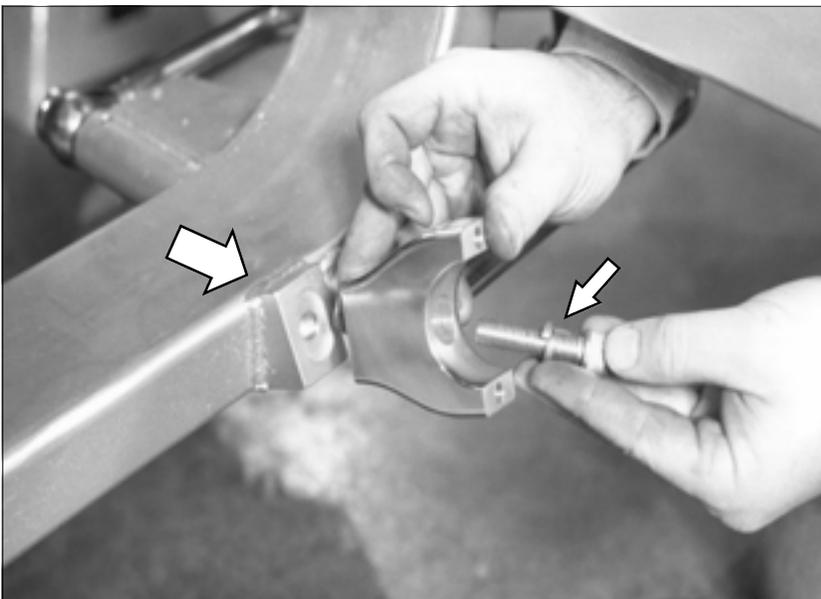
Install the cotter pin and fold the legs over as we did on the lower one. Repeat this procedure on the passenger side of the car.

## ***Installing Steering Rack***

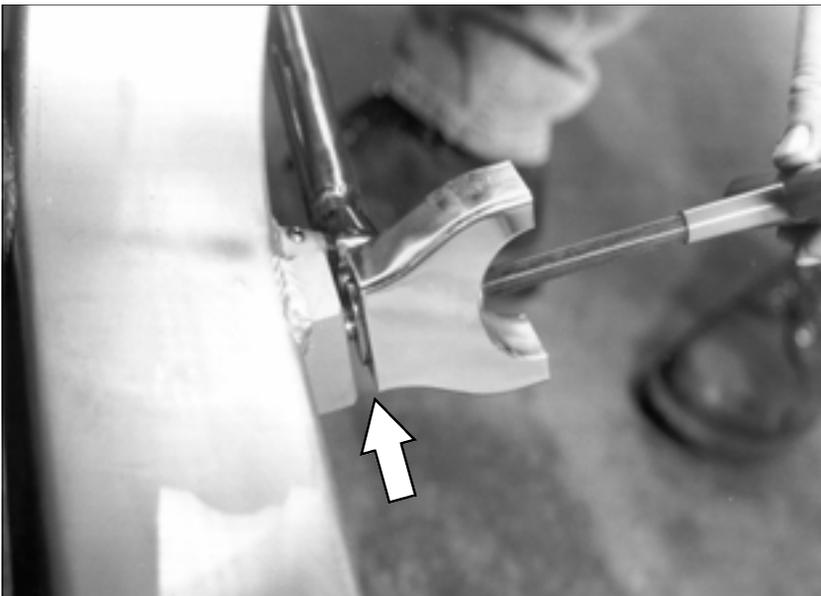
Mounting the steering rack is next. Chase the threads in the rack mounting bosses with a 1/2-13 tap before mounting the billet mounts.



The rack mounting bosses are factory welded to the frame. Use the 1/2-13 x 2" socket head allen and custom 1/2" lock washer to mount the lower half of the billet rack clamp to the mounting boss. Use a small amount of Loctite™ on the socket head allen.



The raised section on the back of the billet clamp matches the milled recess on the mount bosses.





Now repeat the procedure for the other billet rack mount.



With the lower half of both rack mounts installed on the crossmember, the rack itself is set into position.



One of the exclusive design features of our rack and mount is the ability to rotate the rack to provide any desired angle from the steering column to the rack input shaft. Here the shaft is laid almost against the crossmember.



If additional clearance is needed between the pinion and the crossmember, you can raise the pinion up higher. A lower angle will be used to clear the side motor mount bracket. Rotate the rack to minimize the U-joint angle.



Push the rack firmly into each mount. Secure the rack by installing the billet rack clamp caps. Use the provided 5/16-18 x 1" stainless steel socket head allen and custom lock washer. Use a small amount of Loctite™ on the socket head allen.



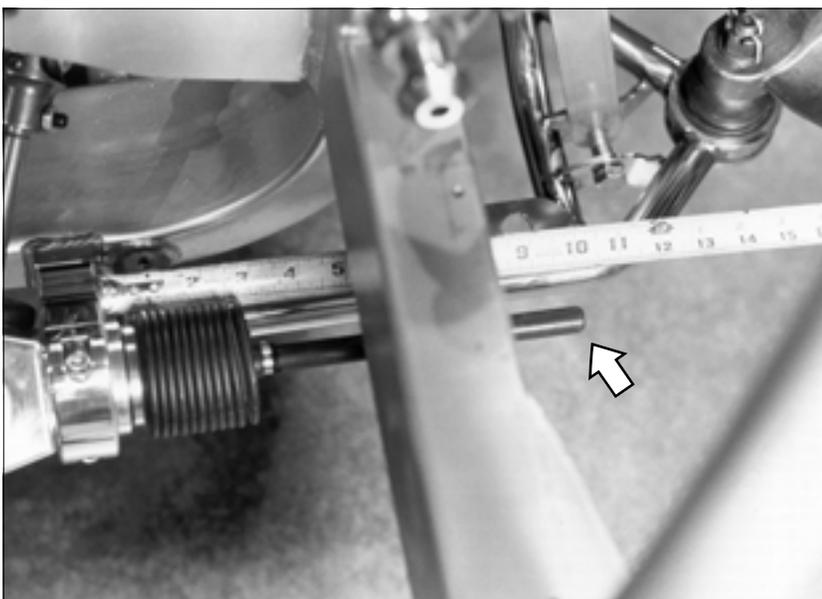
Tighten the cap with your T-Handle Allen wrench. Once you have the cap tight, the next step will be aligning the front end.



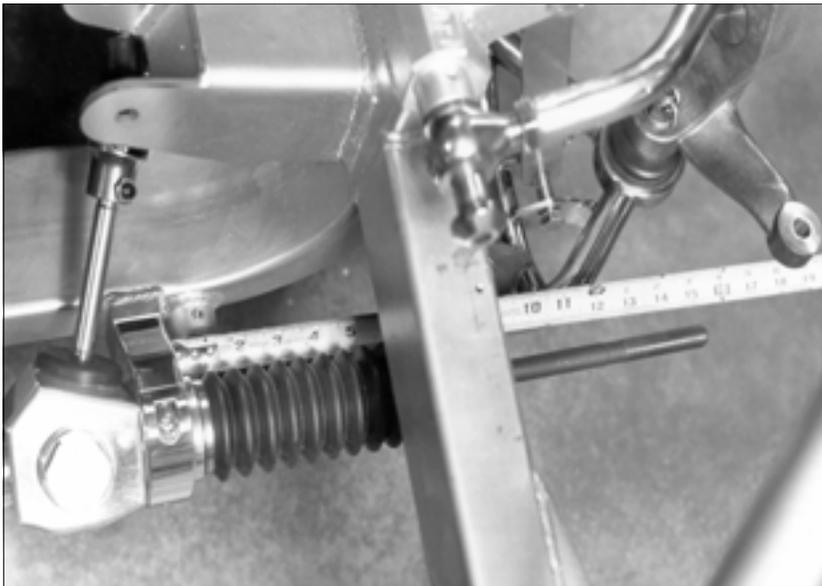
The first step in aligning the new A-arm front suspension is to center the rack in its travel. Placing a U-joint on the rack makes turning it easy.



Turn the rack toward the passenger side of the car until it stops (full lock position).



On the driver side, measure and record the distance from the rack mount to the end of the tie rod end. In our example the length is 9 3/4 inches.



Next, turn the rack all the way to the driver side and record the measurement from the rack clamp to the end of the tie rod. In our example the length is 15 inches.

To calculate how far back to move the rack to center it, use this formula: add the two lengths together and divide by two. This is the distance from the rack clamp on the driver side to the end of the tie rod with the rack centered.

Example:  
Driver side length equals 15"  
Passenger side length equals 9 3/4"

15" plus 9 3/4" equals 24 3/4" divided by 2 equals 12 3/8.

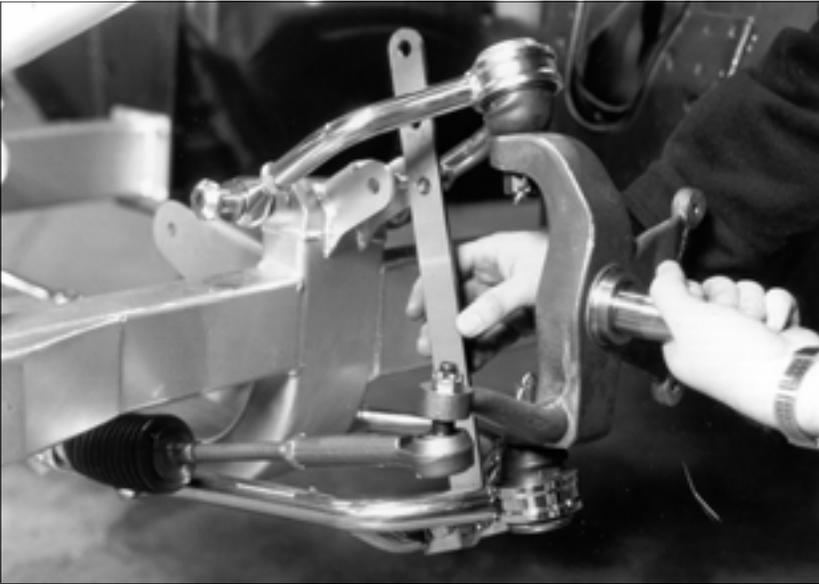
Turn the rack back toward the passenger side until the length is 12 3/8 inches. Check your rack, do not assume our dimension is correct for your rack.



With the rack & pinion centered, you can set the spindle alignment. Measure from the outside of the frame to the inner edge of the tie rod hole in the steering arm. Set this dimension to 8 5/8 inches. This will make the spindle straight forward while you adjust the tie rod length.



Remove the tie rod end from the steering arm and thread it onto the tie rod until it contacts the jam nut. Next, reinstall the tie rod end into the steering arm. Verify the distance from the frame to the inside of the tie rod end, this should be  $8 \frac{5}{8}$  inches as measured earlier.



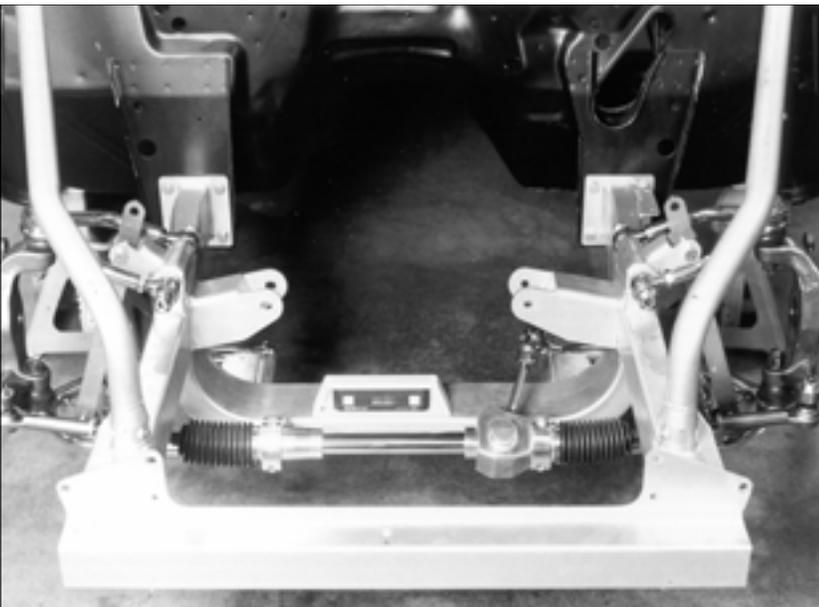
Loosely install the castle nut on the tie rod end. Make sure the spindle moves smoothly from full shock extension to full compression, as indicated by the holes in the shock simulator.

Now, set the shock simulator in the ride height position before you start to check the suspension settings. Do this on the driver and passenger sides.



### **Front Suspension Alignment**

Before checking the front end alignment, check to be sure the car is still level. Put a level on the rocker panel, just inside the door, and adjust the jack stands until the car is level front to rear.



A digital level is preferred for accuracy when setting the front end alignment. Level the crossmember and if needed, adjust the height by placing shims under one of the jack stands.



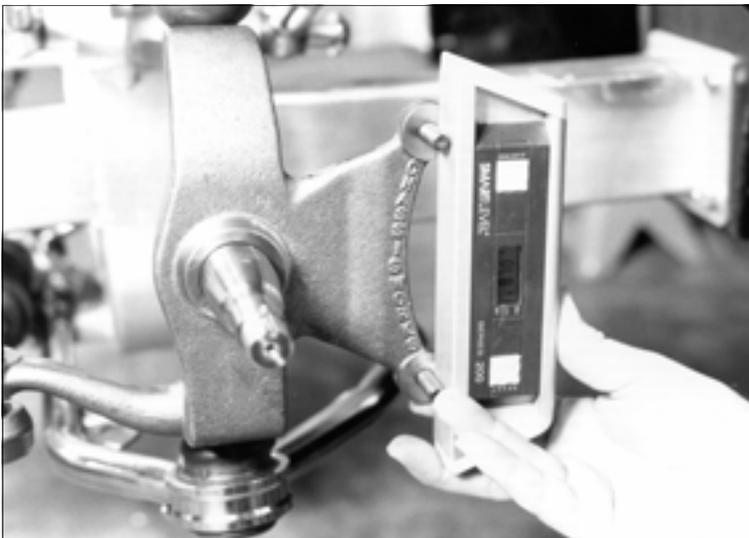
First, check and record the camber and caster readings, they will be adjusted later.

The caliper mounting bosses are machined perpendicular to the spindle so they are an excellent place for the level.

To check the camber, hold the level against the machined caliper mounting pads on the spindle. Record the reading.



Next, check the caster by installing the 3/8-16 x 1 3/8" caliper mounting socket head allens (supplied in your brake kit) into the threaded bosses on the spindle.



Set the digital level against the caliper mounting bolts. Record the caster reading. Positive caster is when the spindle top is tipped toward the rear of the car when viewed from the side.

We will now fine tune the camber and caster settings.



The adjustment for both caster and camber is made through the adjustable rod ends on the upper A-arms. Moving both rod ends out increases positive camber.

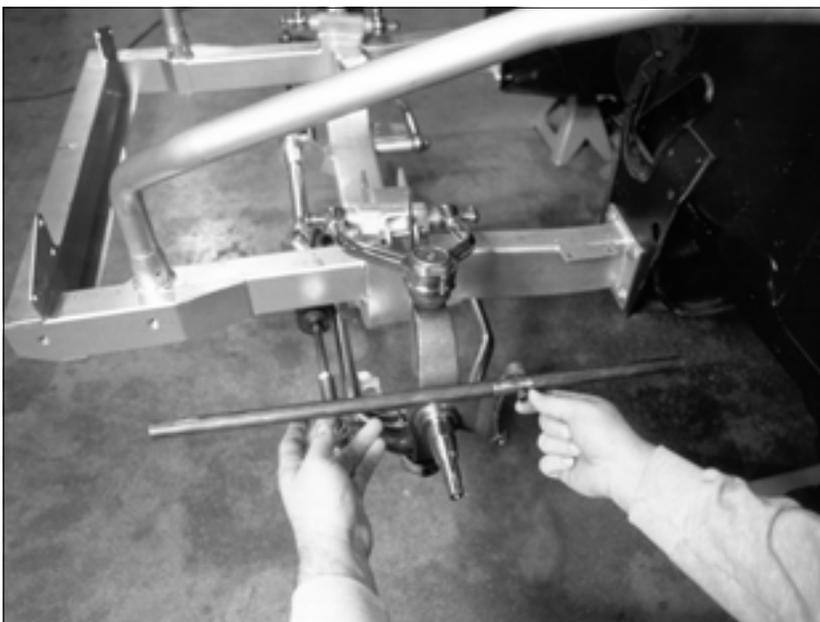
To adjust caster, move the forward rod end out further than the rear. This increases positive caster.

Adjust the upper A-arm rod ends until you have the camber set at zero, or 90 degrees on the digital level and the caster set at 1 to 5 degrees positive. Both sides must be the same.

Remember, if your car has a forward rake when sitting on the ground the positive caster will be decreased by the angle of the bodies rake. Three degrees of positive caster with the body level, will only be 1 degree of positive caster with a 2 degree body rake. Adjust one rod end at a time one-half turn until you have the correct setting. Repeat for the passenger side before going to the next step.



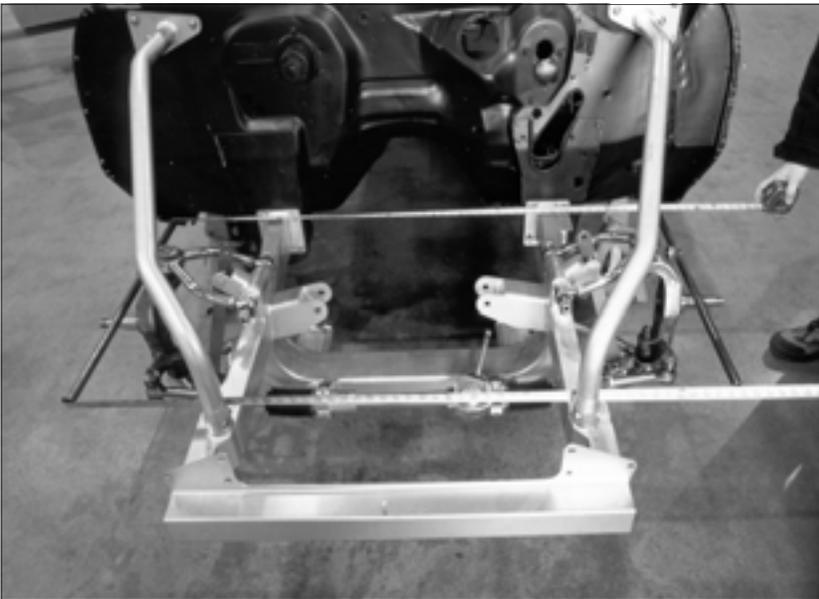
The next step is setting the toe-in. Cut two pieces of 3/4 inch tubing or electrical conduit, 26 inches long. Drill a 3/8 inch hole through each tube 9 inches from one end. These tubes will assist in setting the toe-in.



Bolt the tube to the upper caliper mounting boss with the long end to the front of the car. The 26 inch length simulates the tire diameter and drilling the hole 9 inches from the end centers the bar over the spindle.



Next, set the bar level and tighten it down. Do this on both the driver and passenger sides.



Using two tape measures, measure the outside width at the front and the rear of the tubes. The front dimension should be  $\frac{1}{8}$  to  $\frac{3}{16}$  less than the rear, this is the total amount of toe-in. Record the front and rear dimensions and calculate the amount of toe-in by subtracting the front measurement from the rear.



To adjust the toe-in, rotate the tie rod ends to move the spindle in or out as required. Make sure to rotate both the driver and passenger side the same amount. One-half revolution of both tie rod ends will change the toe-in by approximately  $\frac{1}{4}$  inch, front to back.