

These two photos show an engine and Richmond 6 speed installed.



### ***Removing Stock Front Clip***



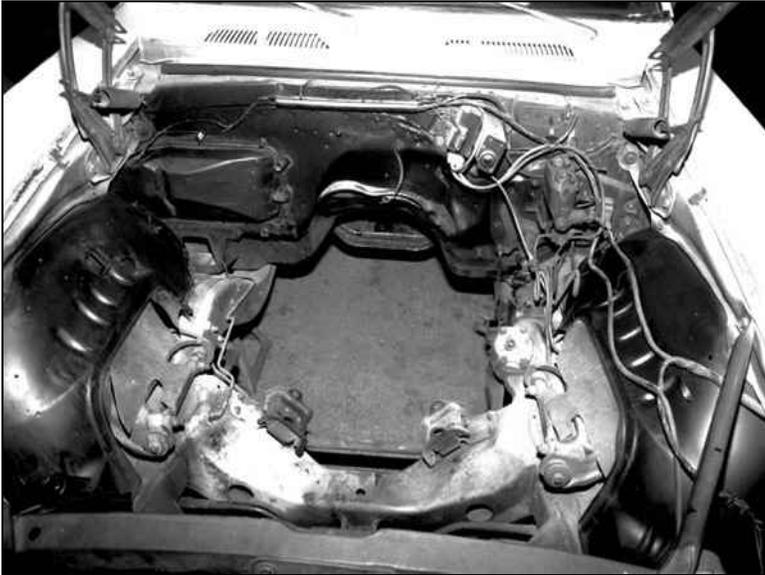
The first step is to remove the hood, engine and transmission. This will make it easier to see and work in the engine compartment. It is also important that the gas tank is empty so fuel cannot siphon out when the fuel line is disconnected.



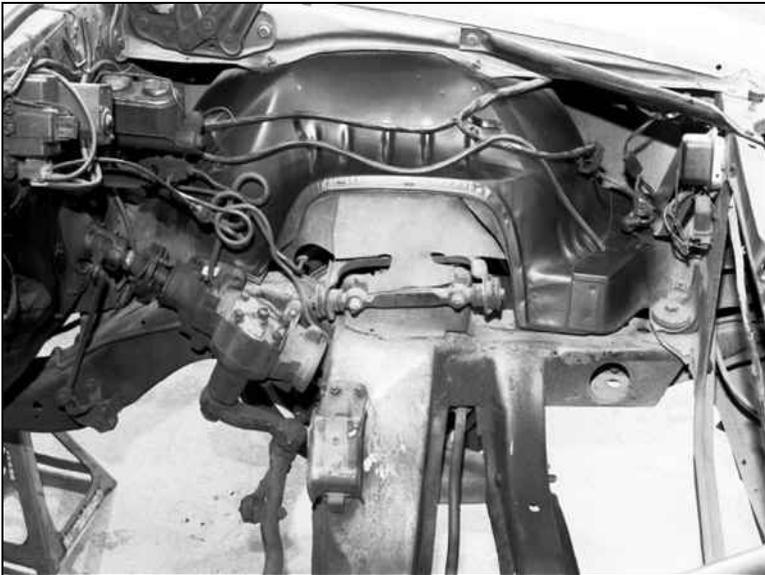
After you remove the engine, place your vehicle on jack stands. The jack stands must be supported by a level concrete surface at least as large as the car. Put two stands under the rocker panels about 4" in front of the front door. Put two stands under the rear axle. These stand locations will prevent the car from tilting backwards when you remove the front clip. **DO NOT REMOVE THE FRONT SHEETMETAL.**



This is a view of the passenger side inner fender panel before we removed any components.



This is a view of the firewall before we removed components.



This is a view of the driver side inner fender panel before we removed any components.



Your car should look like this with the hood removed and positioned on four jack stands before you go any further.



Use vise grip pliers and an end wrench to disconnect the parking brake adjuster mechanism.



Use vise grip pliers to remove the spring clip from the parking brake cable adjuster.



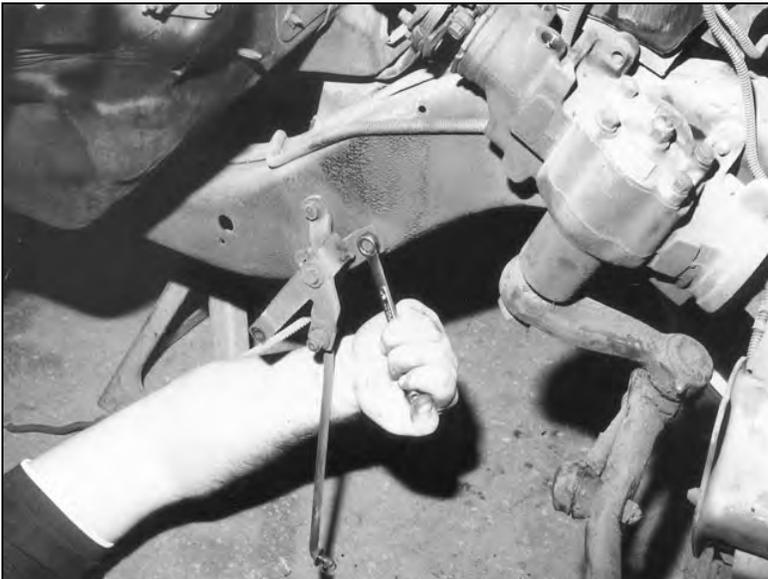
Remove the parking brake cable from the frame on the driver side.



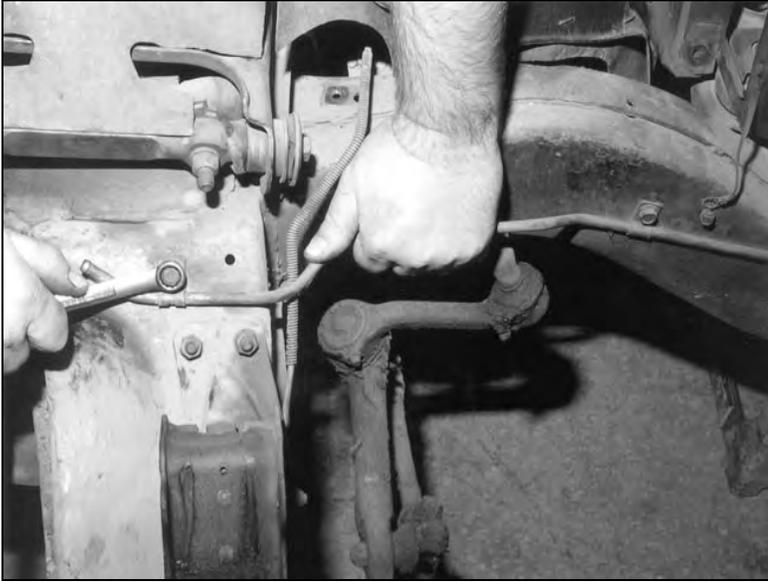
Disconnect the steering column from the rag joint using end wrenches.



Use a pair of pliers to remove the cotter pin that holds the transmission linkage to the steering column lever.



Disconnect the transmission linkage bracket from the frame so it won't hang up on something when you slide the frame out from under the car.



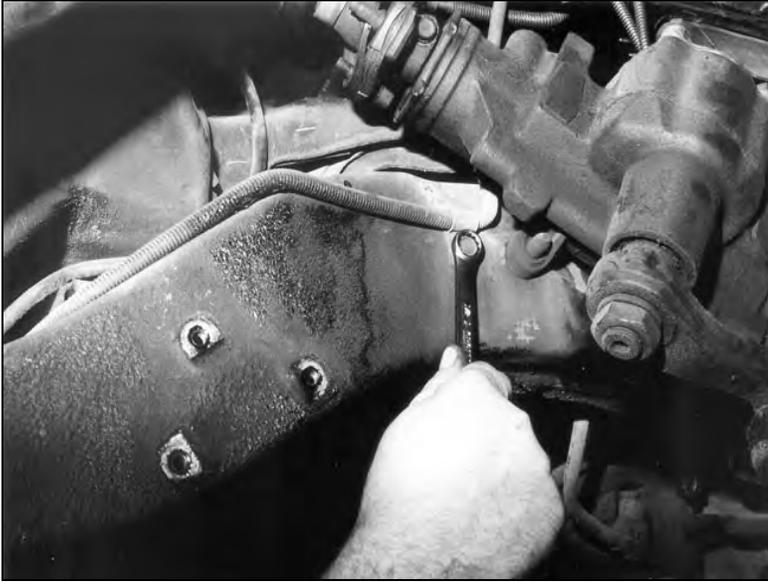
Disconnect the clamps that attach the fuel line to the frame. Remember for safety, the gas tank needs to be empty.



Use a piece of string to tie the fuel line up out of the way. Also, disconnect the ground strap from the frame.



Using a brake line (flare nut) wrench, disconnect both the driver and passenger front brake lines from the metering block under the master cylinder.



Disconnect the brake line clamp by the steering box.



From under the floor, disconnect both brake line clamps on the outside of the driver side frame rail.



Remove the battery tray for easier access to the front frame bolts.



Remove the bolts that attach the ends of the bumper to the body.



Remove the bolts that attach the bumper to the frame bracket.



Remove the bumper brackets from the frame.



Remove the bolts that attach the radiator core support to the frame.



Slide a floor jack under the front clip and center it on the drag link, this is the best balance point. Raise the jack so it has slight pressure on the drag link to hold the frame up. Do not lift the car up off of the jack stands.



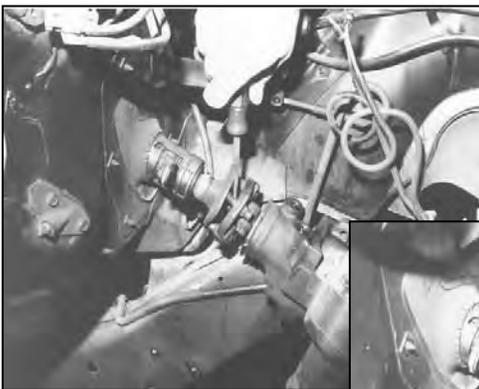
Remove the rear frame mount bolts.



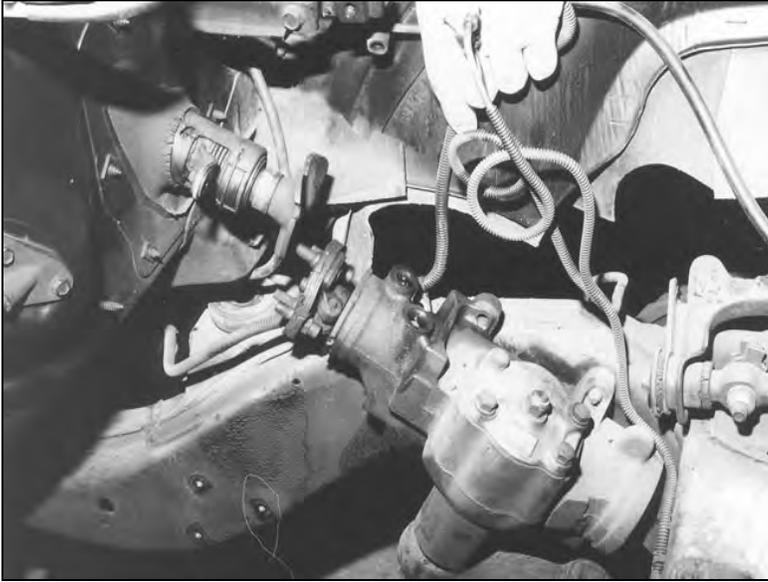
You need three people; one to operate the jack; one to steady the frame by holding on to the spindle through the wheel well; and the third person will remove the frame bolts at the firewall.



Remove the center frame mount bolts. Do not get under the car in case the frame falls.



After all the frame mounts are removed, the third person needs to pry the rag joint forward off of the column. The frame must slide forward.



Only slide the frame forward enough to disconnect the rag joint. The front frame horn to the front-end sheet metal's lower valance. Clearance is minimal; do not bend the lower valance with the frame horn.

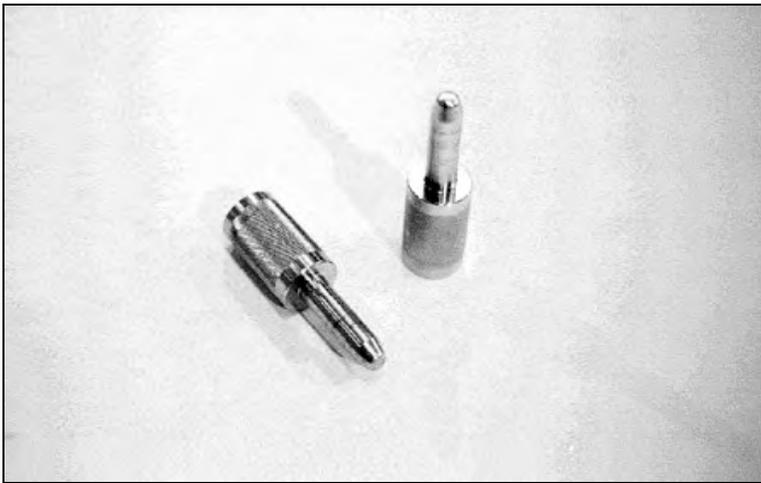


Lower the frame until the rag joint is below the steering column and then push the frame rearward about 6" to clear the valance. You will have to tilt the frame up a the front while you do this to prevent bending the valance

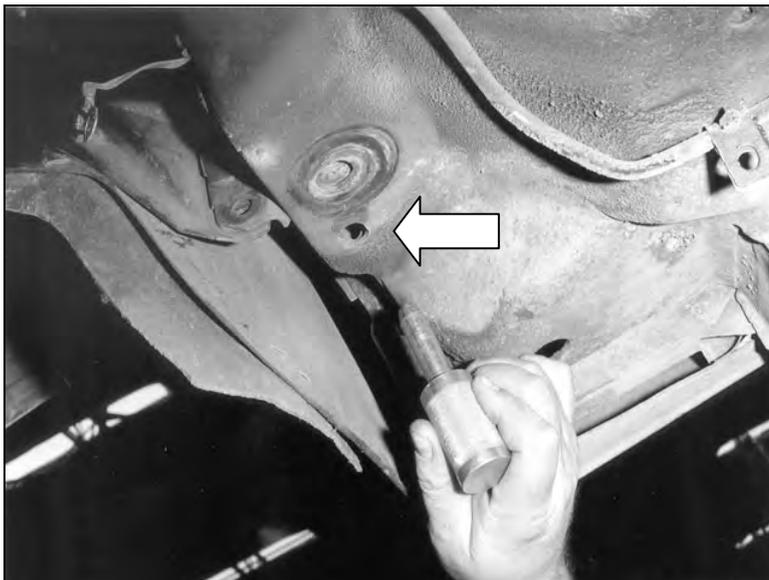


Lower the clip to the ground and pull it out toward the front of the car.

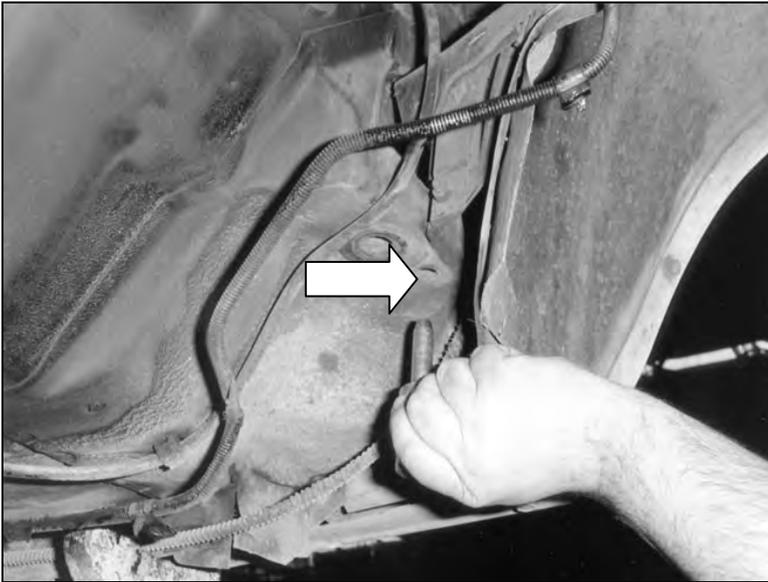
### ***Installing Bolt-On Frame***



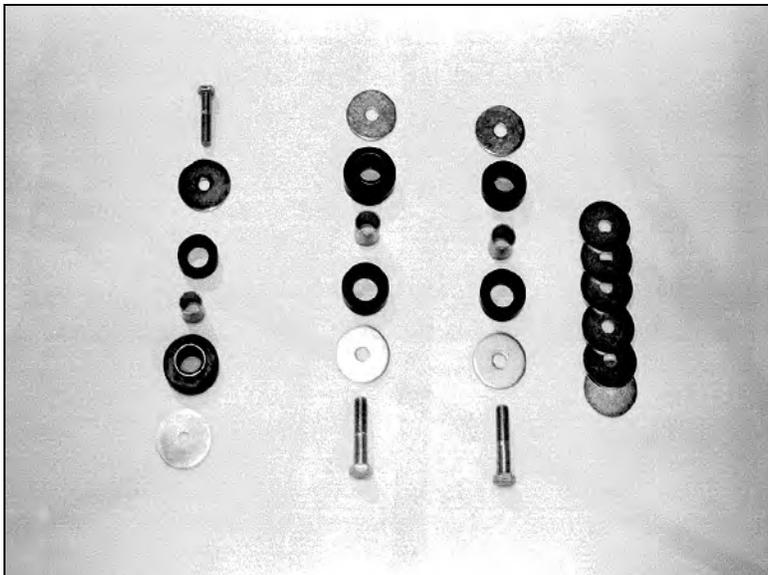
These are the Chassisworks provided frame alignment pins.



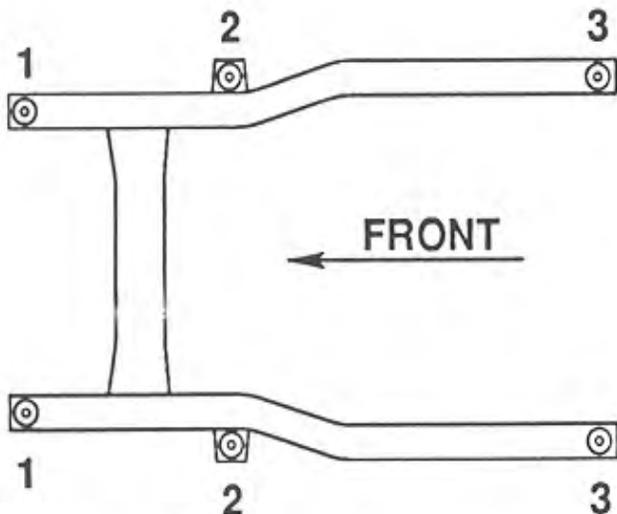
This photo shows the passenger side frame mounting location at the firewall. Notice the slotted hole beside the bolt hole for the body mount. The alignment pin is used to align the front frame during installation.



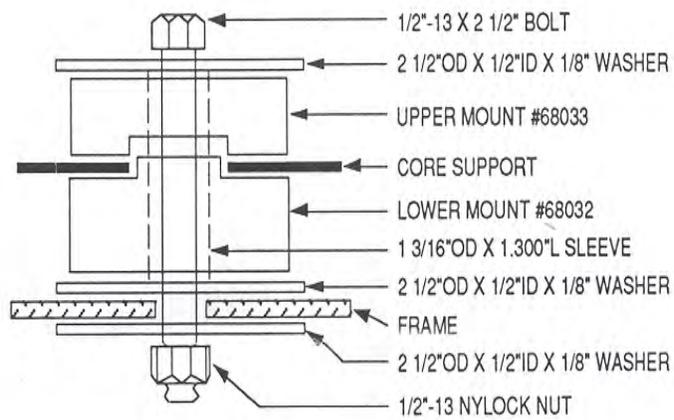
This photo shows the driver side frame mounting location at the firewall. Notice that it's alignment pinhole is round.



These are the components of the urethane bushing set for one side of the car. They are laid out how they are installed with the left side toward the front on the car. The eight 2-1/2" OD silver body shims may not be needed in your application. Some bodies or their front sheet metal will require that the frame be shimmed to take up the gap at the front valance panel.



### # 1 POSITION BODY MOUNT

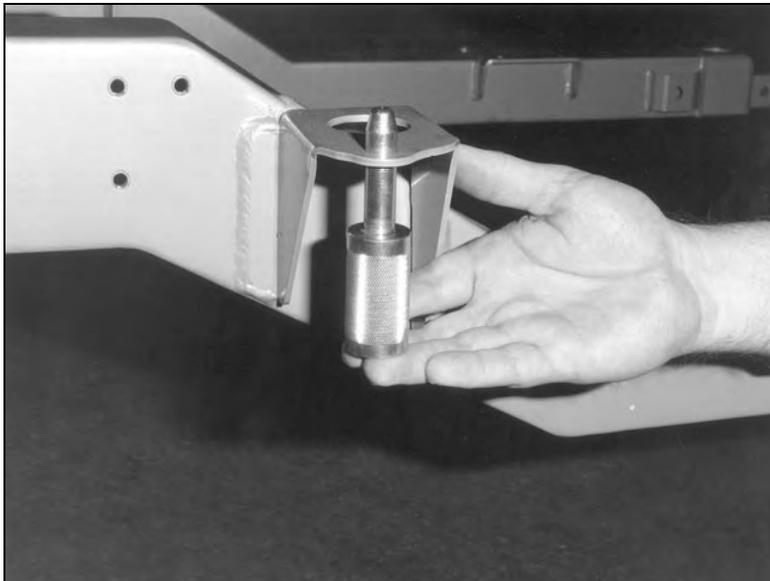
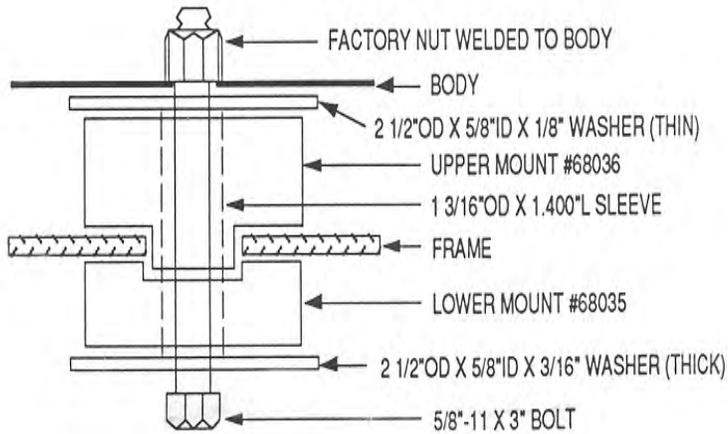


This is the correct orientation of the front urethane body bushings at the radiator core support.

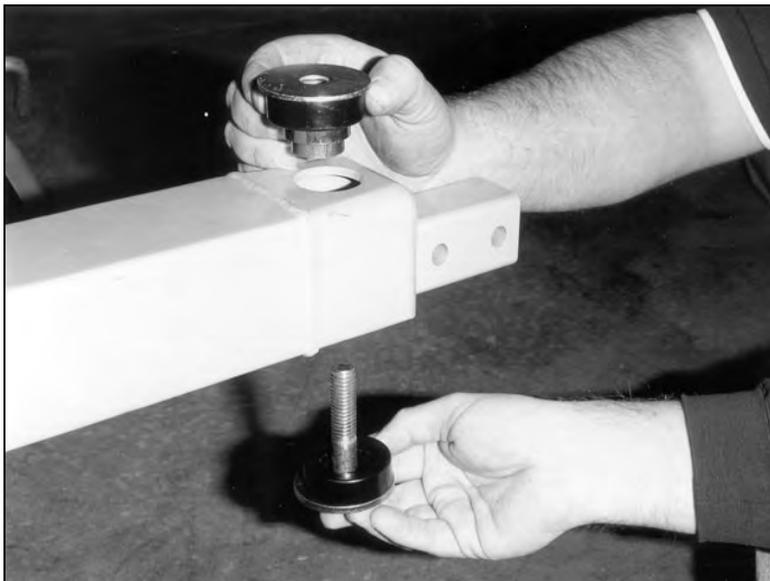


This is the correct orientation of the middle urethane body bushings at the firewall.

## #2 POSITION BODY MOUNT

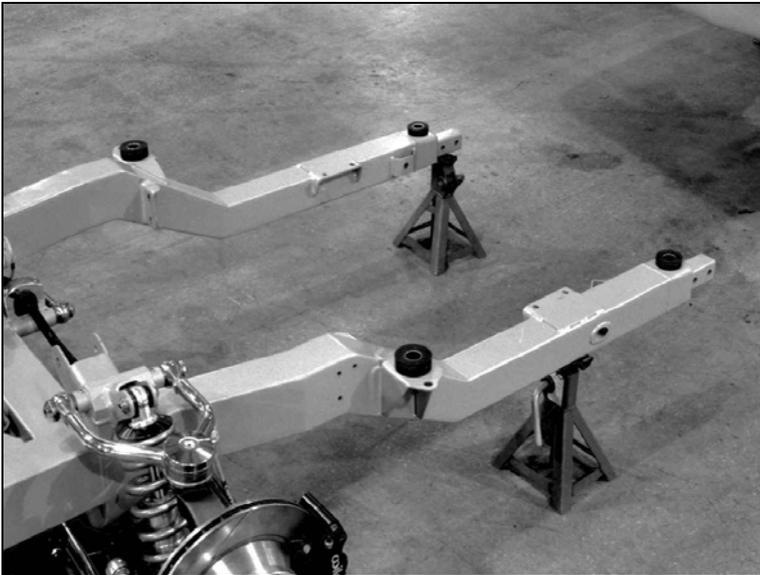
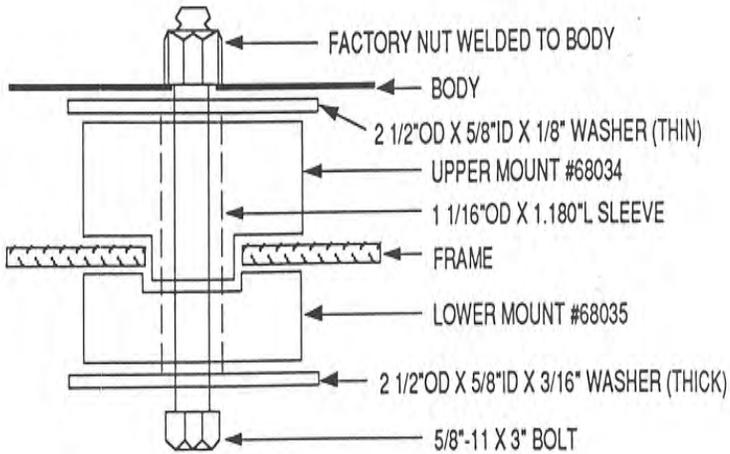


The alignment pins slide up through the 5/8" hole beside the middle body mount.



This is the correct orientation of the urethane body bushings at the rear of the frame where it mounts under the seats.

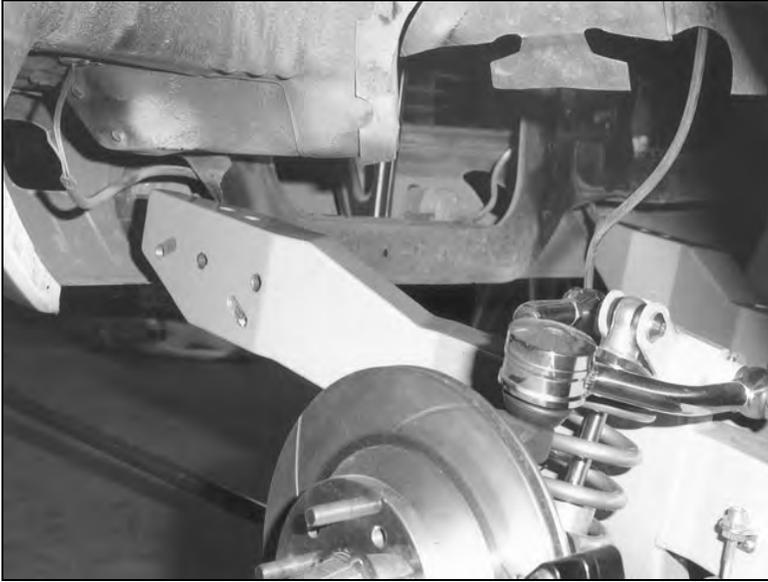
### #3 POSITION BODY MOUNT



Place the top part of the mid and rear urethane body mounts into their mounts before the next step.



Place the dropped crossmember portion of the new Chassisworks frame clip on the floor jack and slide it under the car.



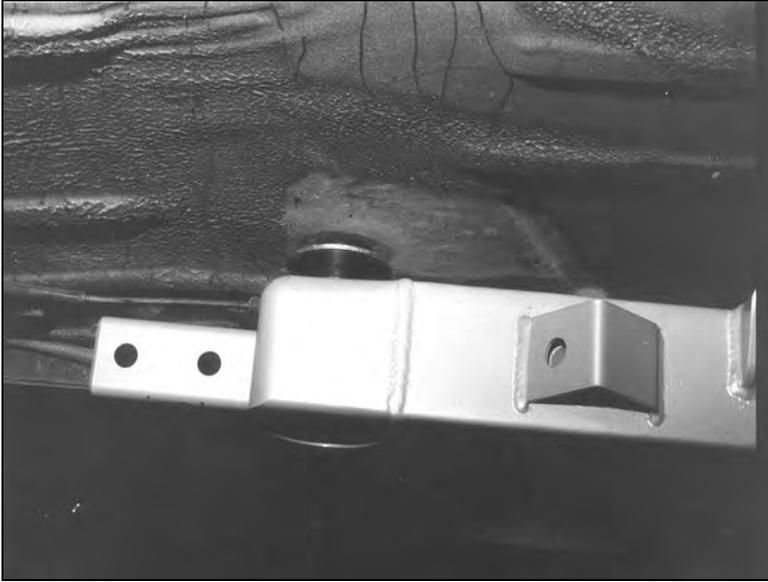
Jack the clip up with the frame on a slight angle. The front of the clip needs to be above the rear. This will allow you to slide it up above the valance. Be careful not to bend the valance. Once the front of the frame is above the valance, jack the frame up so it is flat against its middle and rear body mounts.



Lower the front of the frame just enough to install the lower half of the urethane body mount.



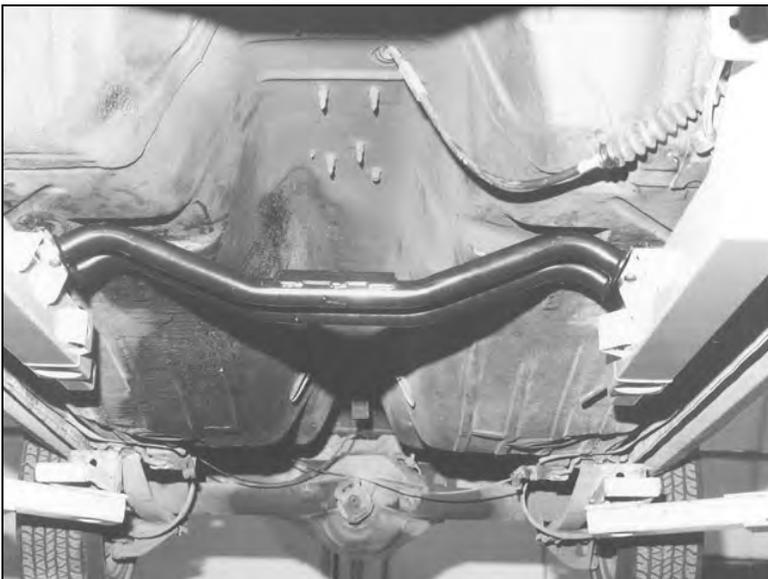
Install the upper half of the urethane body mount and screw the 1/2" bolt into the frame at least 1/2", however, the bushing must be loose.



Install the lower half of the rear urethane body mount but do not tighten it. Leave the bolt loose.



Install the lower half of the middle urethane body mount. Again, do not tighten it. Leave the bolt loose.



### ***Installing The Transmission Crossmember***

Before we align the frame, install the transmission crossmember. The crossmember must be installed before tightening the frame to the body. The frame can be flexed when tightening to the body so if the crossmember is not installed, it may not fit later on.



The transmission crossmember is designed to raise up into the pocket in the floor. This provides extra exhaust clearance. The transmission crossmember may have to be slapped to get it into location. A firm slap with the palm of your hand will usually do the trick. A plastic hammer would also work.



Tighten the transmission crossmember bolts before bolting on the frame. If the transmission crossmember mounting bolts do not fit centered in their slots, have someone pull the frame apart or, press it together while you tighten the bolts. This will make the crossmember easier to remove and reinstall after the frame is bolted to the body. Also, some of the more swept back crossmembers (like the Turbo 400 model) will touch the floor slightly after they are installed. If this condition causes a rattle in your car, use a body hammer to push the floor up where it hits the crossmember.



### ***Aligning The Frame***

The first step in aligning the front end is to put the alignment pins in both the firewall body mounts. Do not remove any of the other body bushing bolts. If your front sheet metal is correctly installed, getting both pins in will be easy. Do not expect the radiator core support 1/2" bolts to be centered in the urethane bushing sleeves. If it appears that your core support won't allow the frame to be positioned correctly, remove the front body mount bolts and continue with the alignment procedure. Push the driver side alignment pin against the body mount bracket and tighten the body bushing. Repeat this procedure on the passenger side.



Measure from the lip on the rocker panel to the side of the frame clip at the front of the rocker panel and the rear of the frame. Bump the frame around until the frame is parallel with the rocker panel on each side and the same distance from the frame to the rocker lip on each side. If the lip under the rocker panel is not straight, use a body hammer and dolly to straighten it before measuring. Try to bump the frame around so that the largest measured difference between any two of the four rocker panel lips is less than 1/4 inch.



After you have finished the previous step, verify the distance from the rear frame gauge hole to the back of the frame. The length should be within 1/8 of an inch from side to side.

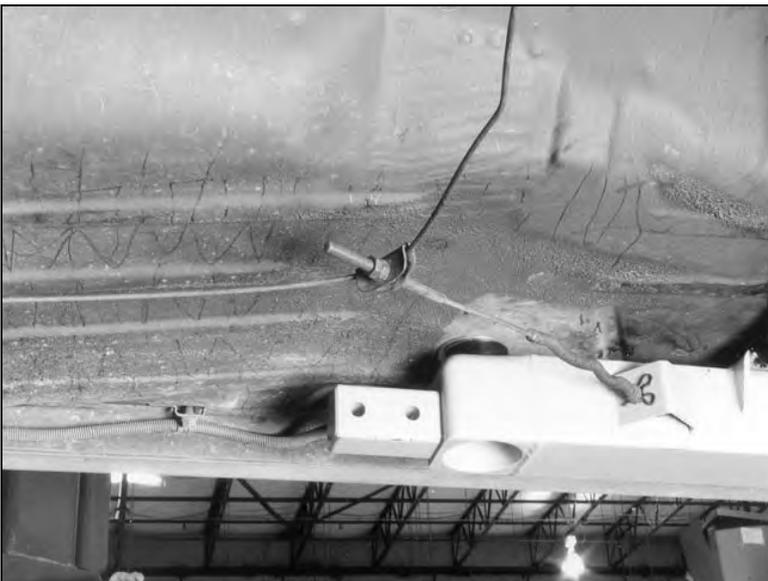


After all dimensions verify, tighten frame to the body mounts with the alignment pins installed. Verify your measurements after tightening.



In some cases, you may have to shim the subframe to get the front-end radiator core support to attach. You can put shims between the floor and the urethane to raise the frame in the front. Or, you can put shims between the frame and the urethane core support mounts. You can also shim the firewall body mounts to lower the frame at the core support. Some vehicles come from the factory with shims. If your vehicle has shims, it is probably best to reuse them.

If your core support will not line up after you have the clip aligned and attached to the body, then you need to reinstall the front sheet metal. Remember, these cars are over 30 years old so there is no telling what your car has been through. Sometimes you can get the core support to fit by simply loosening all its bolts and pushing it around and then retightening it. **Retorque all body mounts after 1000 miles of use.**

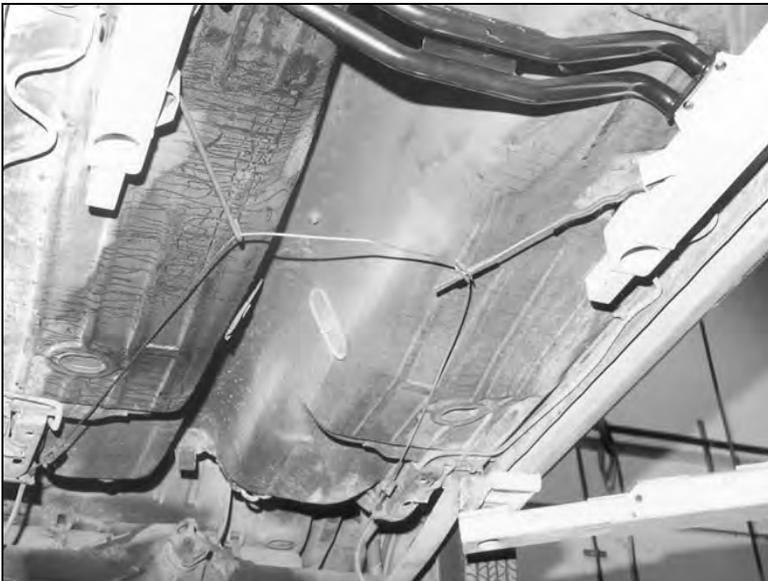


### ***Reinstalling Factory Components to Frame***

Reinstall the parking brake cable into the Chassisworks frame using the stock spring clip.



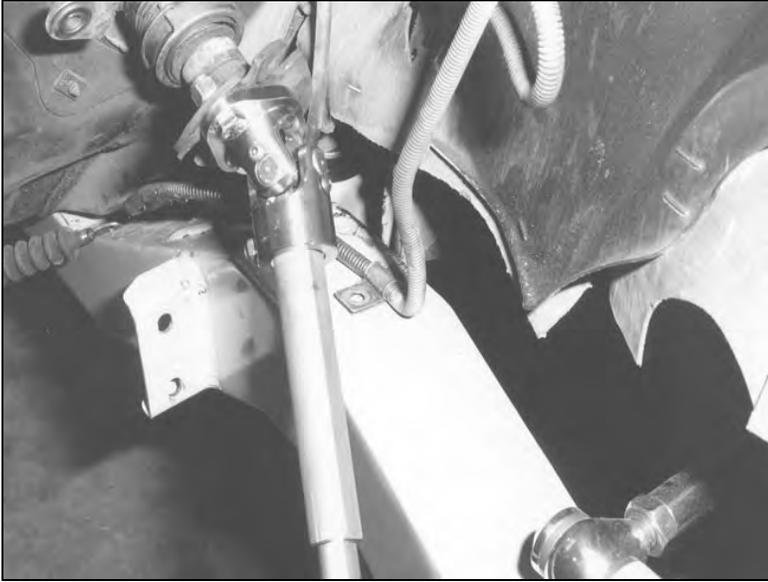
Attach the stock hook rod to the passenger side of the Chassisworks frame and stock parking brake cable.



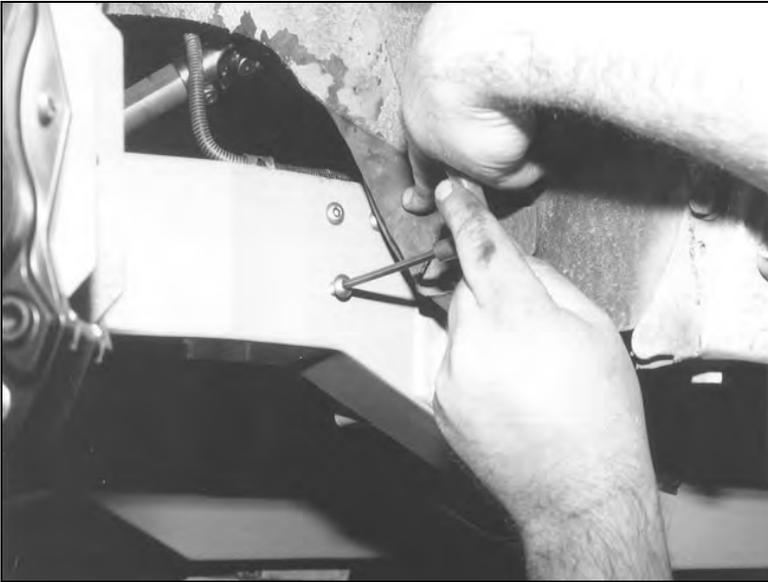
Adjust the parking brake mechanism for correct operation.



Drill two 1/4" holes in the driver side of the frame to attach the brake line clamps. Attach the clamp to the frame with the stock 5/16 self-tapping screw at the firewall and rear mounts.



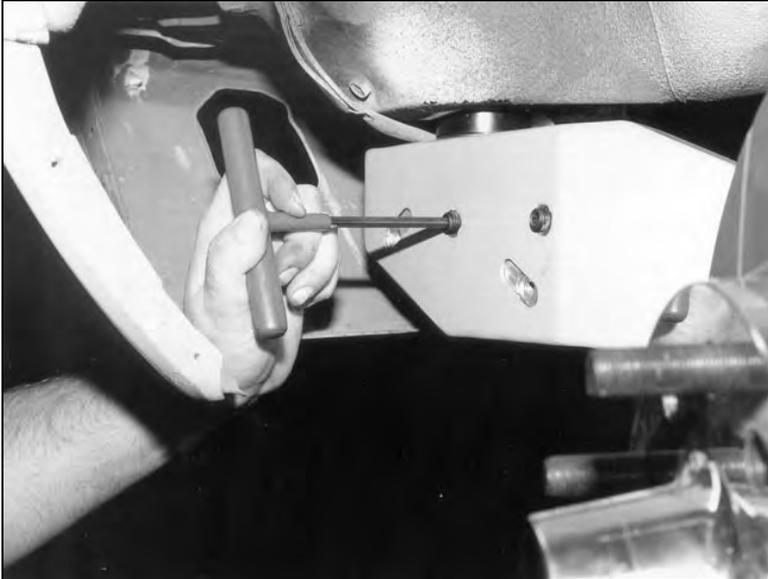
Bend the rear brake line under the master cylinder so its clamp sits on top of the frame where shown and attach it to the frame with its stock 5/16 self-tapping screw.



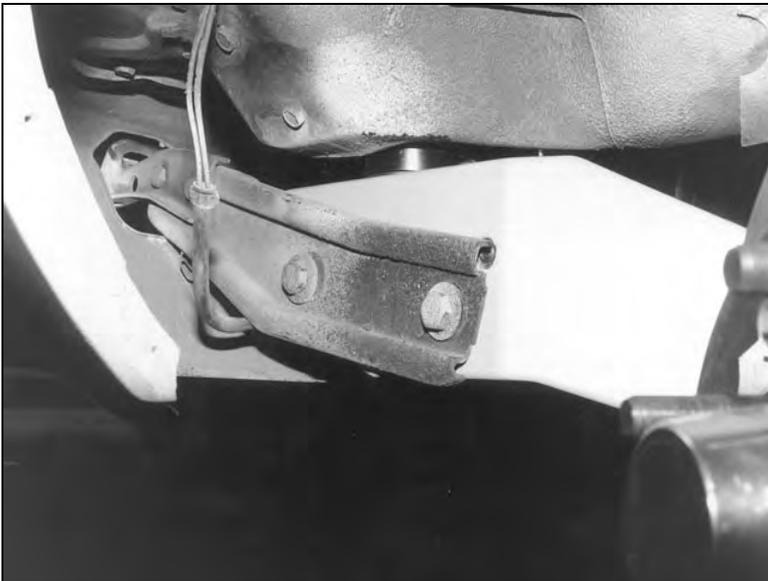
If you are using an automatic transmission, install three 5/16" button head screws to close the holes where the clutch linkage torsion shaft bracket goes.



Install a self-locking set screw in the spare hole in the top of the front frame horn. Do this for each side.



Install two 1/2" self-locking set screws in the spare holes for the bumper mount in the frame horn. Do this for each side.

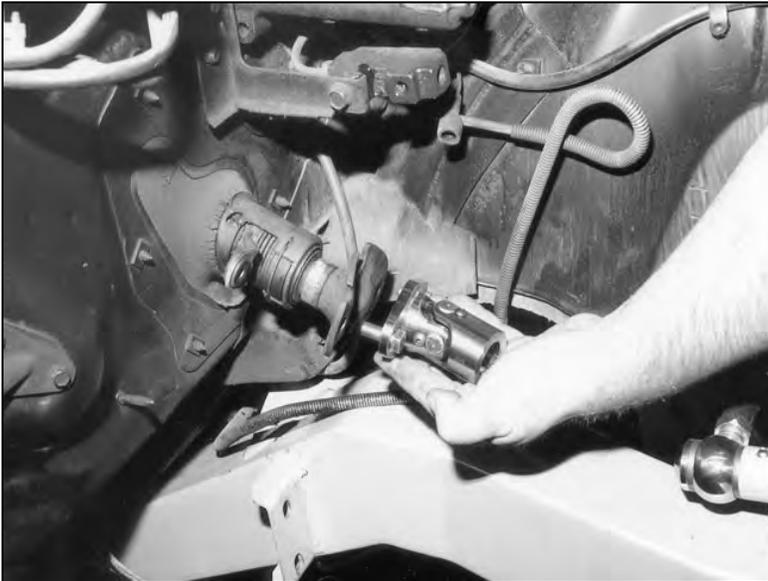


Reinstall the bumper brackets using the stock hardware in the correct holes. Reinstall the bumper and correctly align it with the body.



### ***Installing Steering Shaft***

This photo shows the flanged 1" DD u-joint that attaches to the stock steering column. There are also two u-joints shown that attach to the rack shaft. They are both sized as 3/4-36 x 3/4 DD. The longer u-joint is a VIBRATION isolator style u-joint. This type of u-joint will isolate some of the road vibration from the steering wheel. Both u-joints install the same way, however, we will show the isolator style u-joint in the installation photos.



The first step to installing the steering shaft is to bolt the 1" DD shaft u-joint to the factory steering column where the rag joint attached. Just like the factory stock column, the flanged side of the u-joint has a 5/16" and a 3/8" bolt hole.



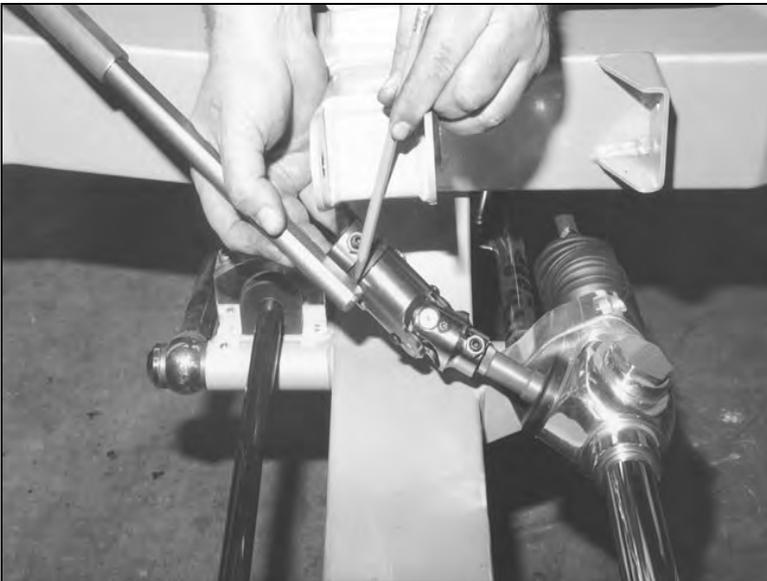
Install the 5/16" and the 3/8" bolts into the flange and place the u-joint up against the column. A flat washer goes over each bolt against the stock column flange and is secured with a locknut.



Slide the larger end of the steering shaft into the u-joint until it bottoms out. Then, just barely tighten one set screw so it won't fall out. Do not tighten the set screw enough to mark the tube. You will be removing it soon.



Slide the splined end of the u-joint onto the rack input shaft and tighten the set screws into the groove in the shaft.



Hold the 3/4" DD lower end of the shaft up against the u-joint. Line them both up straight and parallel to each other. Mark the shaft even with the lower end of the rubber flange around the u-joint. The lower flange is even with the bottom of the bore in the u-joint. On the regular u-joint, make the 3/4" DD shaft even with the lower end of the 3/4" DD bore in the u-joint yoke. Use a hacksaw to cut the shaft to length and file a 1/32" chamfer on the end.



The intermediate shaft should be flush with the U-joint bore. If it protrudes more than the pointer shows, it will bind. Use a sander to shorten it for proper fit.



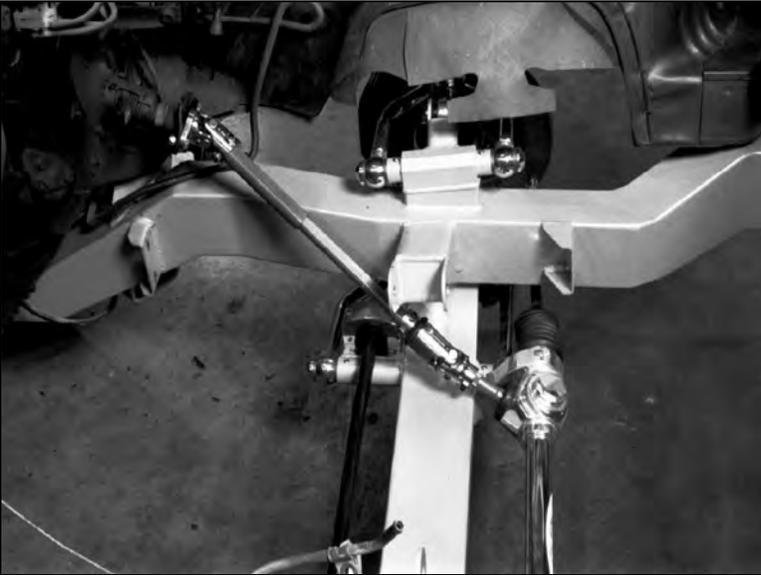
To install the 3/4" DD shaft, you will have to remove the rack clamps to push the rack forward. Use a 1/4" drill to make a dimple on the 3/4" DD shaft for the set screws.



Repeat the dimple procedure for the top u-joint. Do not drill the dimple so deep that the drill starts to make a 1/4" hole.

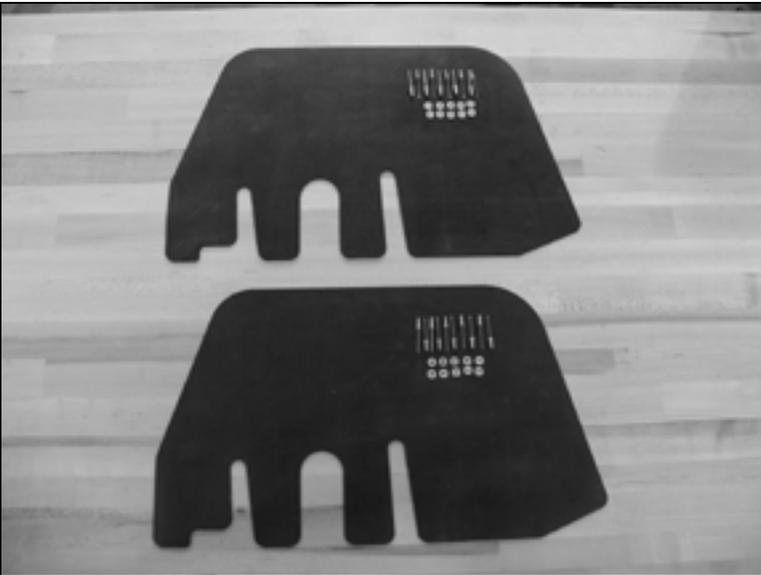


The final step after the shaft has been installed, is to verify that with the steering wheel level, the wheels point straight ahead. Rotate the rack so the wheels point straight ahead. Follow the procedure used when aligning the front end. Level the steering wheel. Slide the splined u-joint onto the rack shaft. Reinstall the rack clamps. Because the rack has 36 teeth, the steering wheel can only be positioned every 10 degrees. If you want perfect alignment, you can adjust the center position of the shaft by turning 1 tie rod in and the other out. Make sure you turn them equal amounts and in the direction that requires the least rotation. If you do this, be sure to verify the front-end alignment for toe-in.



This is a photo of the completed installation. Wire the column lever to the position it would be in park or the key mechanism won't function properly. Paint the U-joints and steering column shaft to prevent rusting.

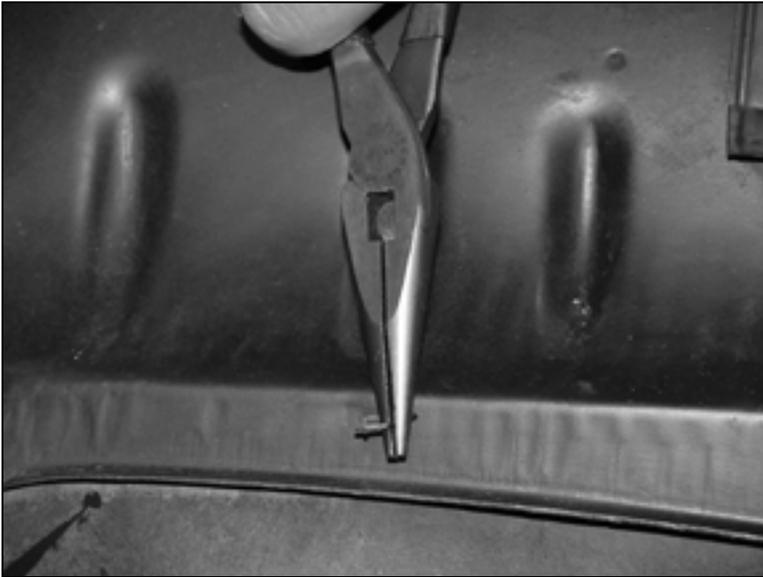
### ***Installing Fender Flaps***



The Chassisworks splash flaps replace the factory rubber flaps.



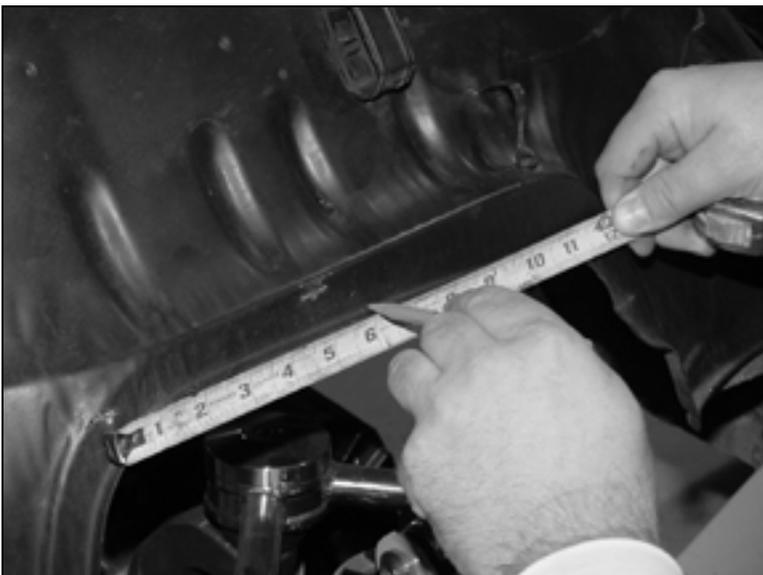
Use a flat blade screw driver and hammer to open up the staples.



Use a pair of needle nose pliers to remove the staples.



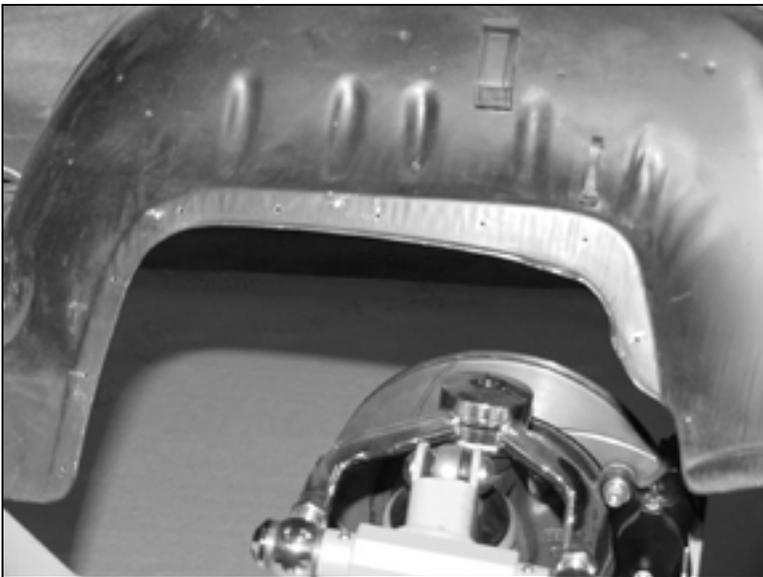
Use a wire brush to remove any crud from the inside of the fender well.



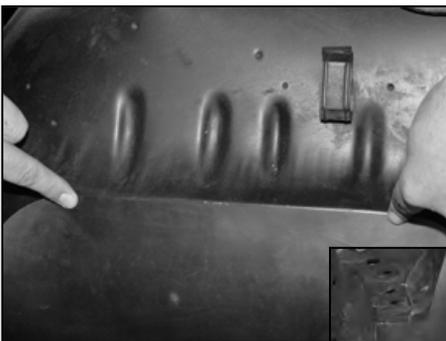
Mark the center of the opening on the inner fender panel.



Drill a 1/8" hole centered in the opening on the flat of the inner fender panel.



Drill a total of 10 holes in the fender panel on 2-1/2" centers.



Lay the splash boot on top of the upper A-arm and even with the formed ledge in the fender panel.



Hold a 1x2 board across the top of the splash boot to hold the boot flush while drilling.



Use the top row of holes for a drill guide and drill the flap to match.



Move the splash flap to the tire side of the fender panel. Put a row of clecos in the top row of holes. The clecos are installed from the wheel side.



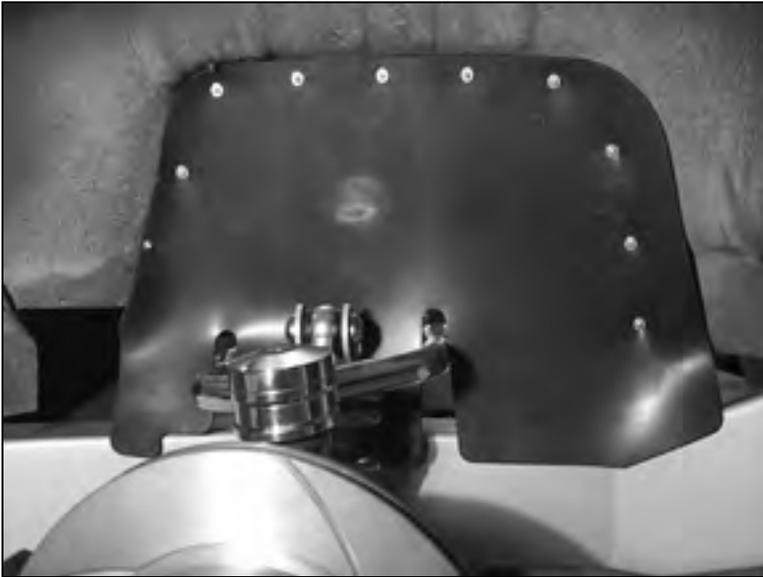
Drill the remaining rivet holes starting from the top. Use the end of your 1x2 held against the splash flap from the tire side for a backup tool to drill the rivet holes. Make sure the flap sits flush against the fender panel.



Install clecos in the remaining drilled holes. Remove the top center cleco and install the pop rivets from the engine side of the fender panel.



The pop rivet backup washers go against the rubber splash flap on the tire side of the fender panel.



After all of the rivets with backing plates are installed, the splash boot will look like this viewed from the tire side of the splash panel.



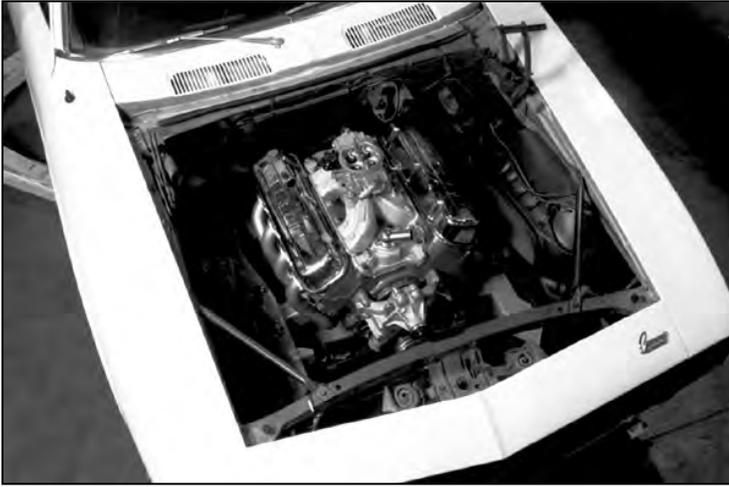
This is a view of the splash boot completed installation for the passenger side viewed from the engine bay.



Repeat the procedure for the driver side.

Note: The Nova inner fender panel opening is shaped a little different than the Camaro. The Chassisworks splash flap is designed to fit both cars. The rivet positions will be slightly different, however, the procedures are the same.

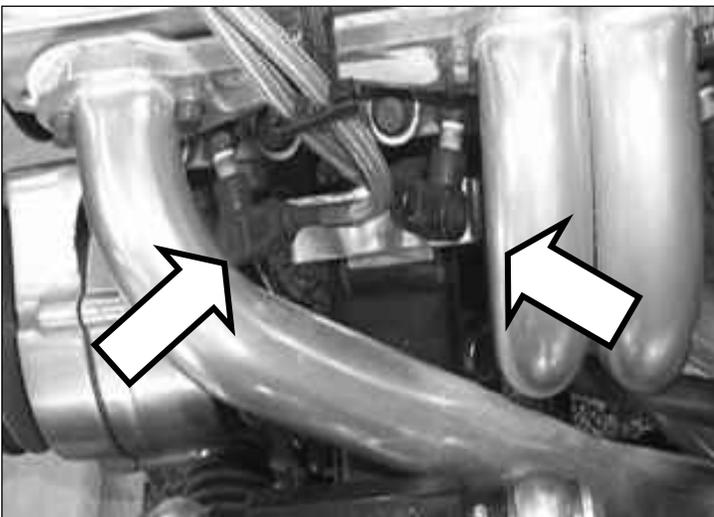
## ***Installing Headers***



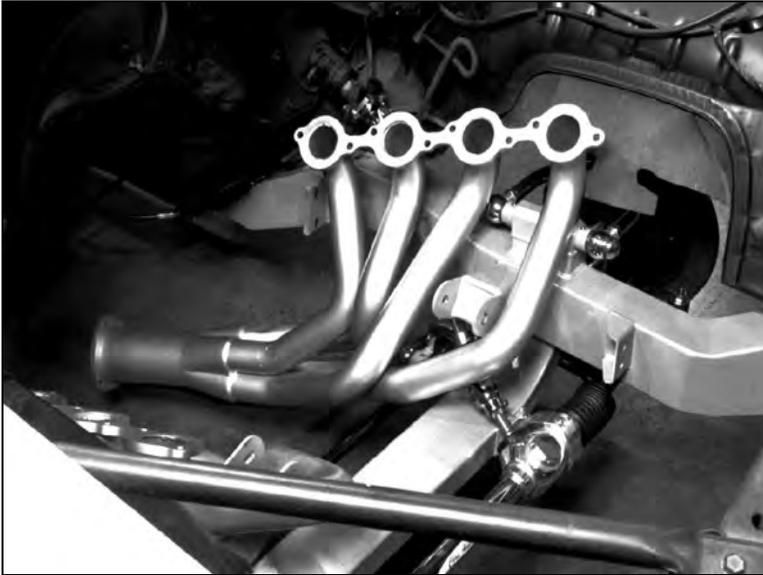
**Special Note:** We suggest leaving the headers in their plastic bag during the initial fit. If the headers do not fit your application, you can return them within 30 days of the purchase date for credit of the purchase price only. The returned parts must be in new condition (no scratches, dents or dings). Chassisworks reserves the right to return to the customer any header kit that is returned in substandard condition.

There are many manufactures of cylinder heads and several of them have made changes to the basic dimensions of the stock head. These changes will affect how our headers fit because we have built our headers to a close tolerance. Below are suggestions of modifications that can be made during your installation to insure the best fit.

1. Bolt hole resizing of the header flanges.
2. Different spark plugs to gain clearance for spark plug wires.
3. Different spark plug boots or wires to clear the header tubes.
4. Shimming the transmission mount up or down for additional tube clearance to the frame. If the transmission has been relocated from the stock location or replaced with a different model, the header fit may be affected.
5. Minor dimpling or denting of the header tubes.
6. Minor grinding of the header flange around the head bolts.
7. Changing the cylinder head fastener style for more clearance ( i.e. 12 point bolts or nuts, no washer or head studs).
8. The shape of the exhaust port may require a gasket change or modification for best seal.
9. Not all cylinder head manufactures use the same specifications on the width, height, and angle of the exhaust ports. If the ports are changed from the stock location in any way, the headers will be too wide to fit between the frame rails.
10. It is a good idea to test fit the headers on the engine prior to installing them. Make changes before you have the headers in the car.



We suggest angle plug heads for better fit. The spark plug clearance will be very tight on the straight plug heads. A shorter length spark plug is available from most vendors. Champion C63YC is a good starting point for a street small block with straight plugs. However, even this spark plug will come very close to some tubes. MSD makes a heat shield material that should be wrapped around the tubes that have spark plug boot interference.



It is best to install the headers in the frame and lower the engine over them.

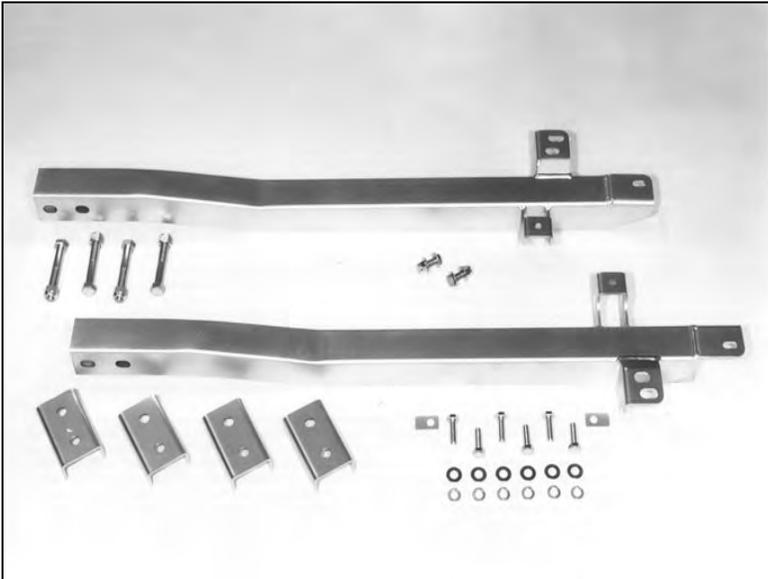


Engine installation is at least a three-person job. One on the hoist, and one on each side holding the headers.



After the headers and engine are installed, you will have to reinstall the steering column.

## ***Installing Subframe Connectors***



The subframe connector kit includes the items shown.

Part number 5601-20 is for the 1967-69 Camaro/Firebird.

Part number 5601-21 fits the 1968-72 Nova.



For this installation we have the car on our lift.

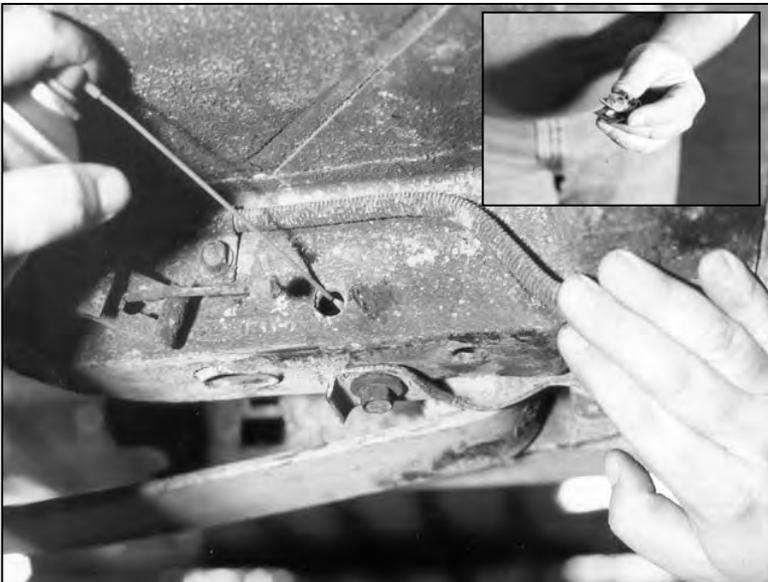
You can install them with the car on jack stands under the front and rear of the rocker panels. The car should be at least 14 inches off the ground.



So there is no tension on the leaf springs, use a second pair of jack stands as support for the rear-axle housing. You can now remove the driver side shock absorber.



This is the driver side front leaf spring hanger. You will need to loosen it in order to get the rear on the subframe connector under the inside two bolts.

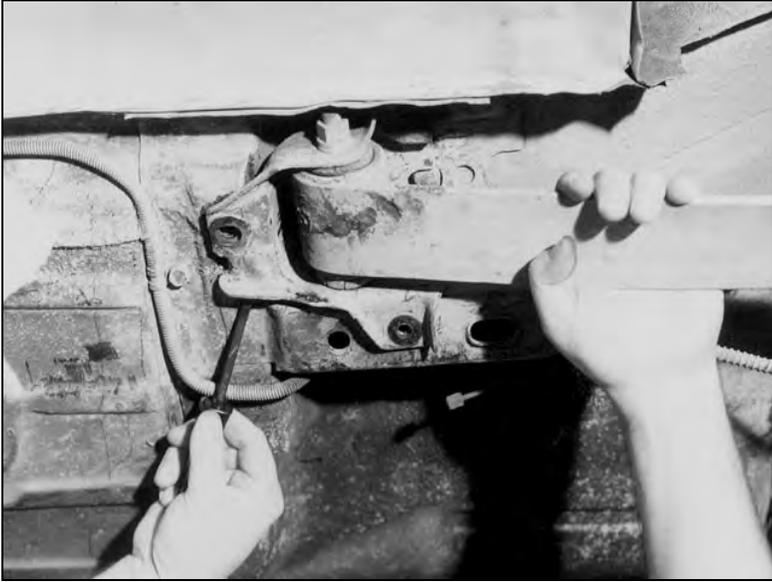


Unbolting the forward leaf spring hanger should never be done with an impact wrench. The nuts holding the bolts in place are just spot welded to these spring clips and they're easy to break.

Spray the nuts with a lubricant or penetrating oil before you start to loosen them.



Carefully remove the three bolts that hold the spring hanger in place. If the spring clips do break, they are available from both GM and the aftermarket.



Once you have all the bolts removed, use a small pry bar to separate the spring hanger from the unibody frame rail and floor.

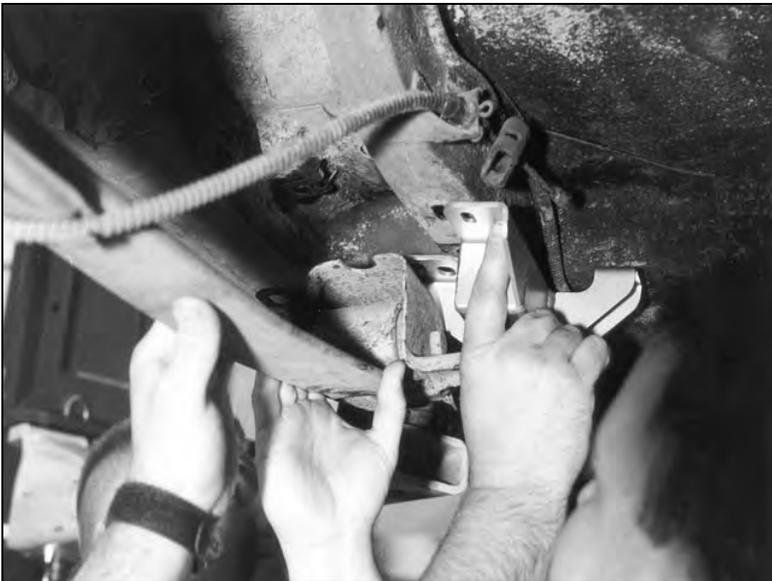


Slide the driver side subframe connector over the back of the bosses on the front-clip frame rail. Once you have it started over the boss, slide it as far forward as you can. The slotted holes allow for any slight length difference from car to car.





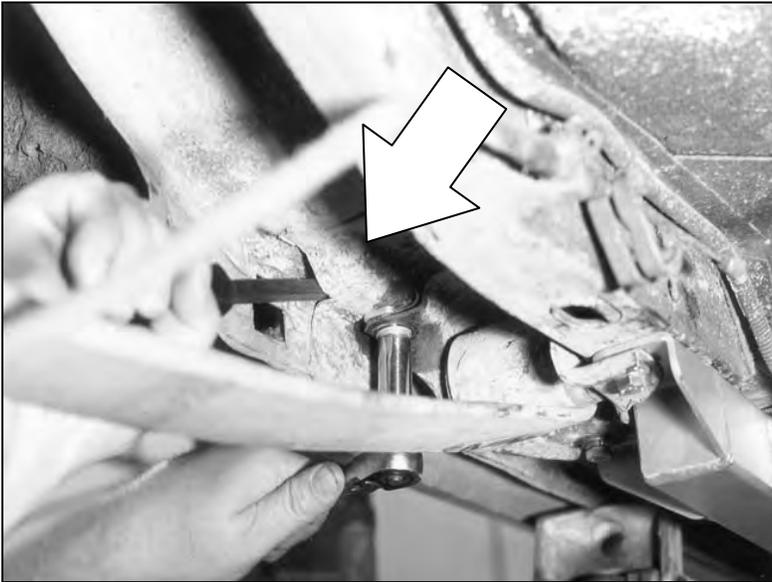
You will need two people for this step. Let the rear end housing down enough so the front spring hanger drops about 1/2 inch away from the body.



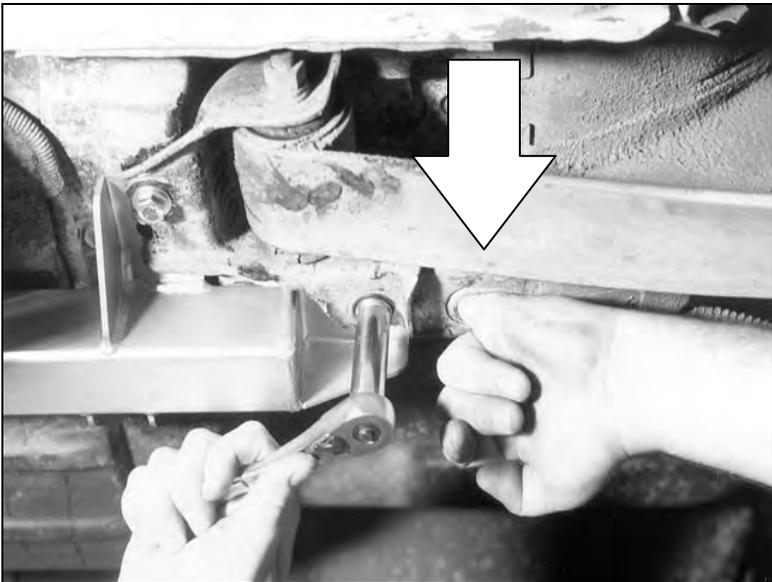
Have one person pull down on the front of the spring while the other person works the connector into place between the spring hanger and the car's body. The connector may need to be moved slightly front to rear to allow it to slide into place.



Since the mounting pad for the subframe connector doesn't extend to the outer spring-hanger bolt, a spacer is provided to keep the spring hanger in its correct location.



The spring clips can be just as tricky to reinstall as they were to get out. Use a bent-tip tool or your finger on the top of the bolt to hold it while starting the threads of the bolt.



The subframe connector inner mounting bracket has been positioned so that the head of the bolt winds up under the rear seat. It's necessary to remove the seat and peel back the carpet to install the bolt.



Remove the door sill plates to get at the carpet. The carpet needs to be pulled back before drilling the hole through the floor from the bottom of the car.



Use a 3/8 inch diameter bit to drill a hole through the floor, using the hole in the subframe connector as a guide.



Insert the 3/8-24 x 1 hex bolt and 3/8 flat washer through the hole from inside the car under the rear seat. Hold the bolt with a 9/16 wrench while tightening from under the car.



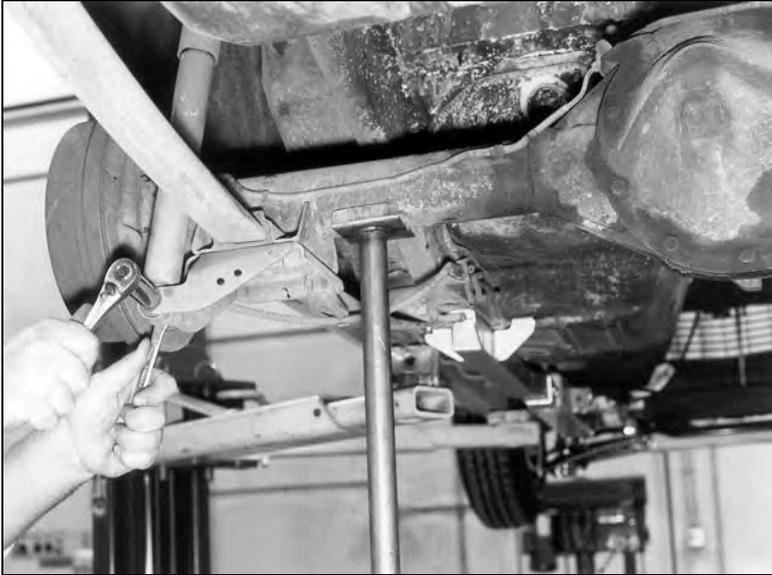
Slide a 3/8 inch flat washer over the bolt and secure with a 3/8-24 locknut. Tighten all three bolts at the rear spring hanger before going to the next step.



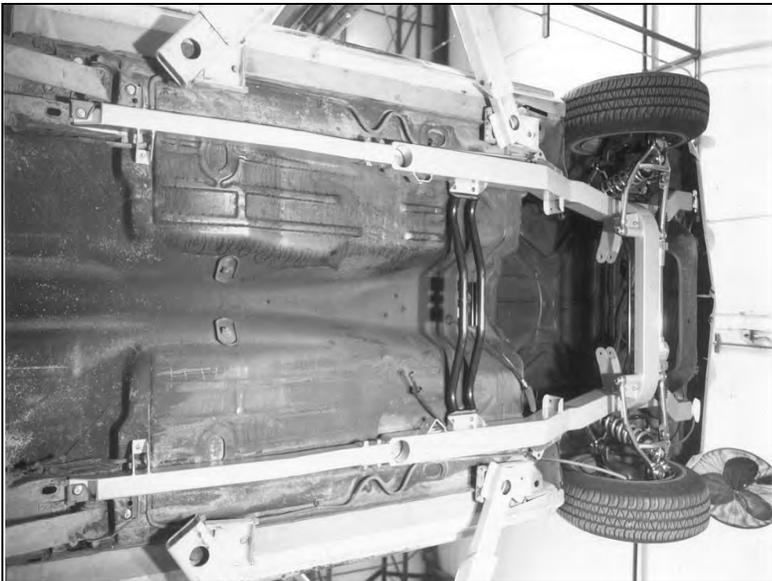
Slide the two clamping brackets over the subframe connector. These are used to provide a firm attachment between the subframe boss and the subframe connector.



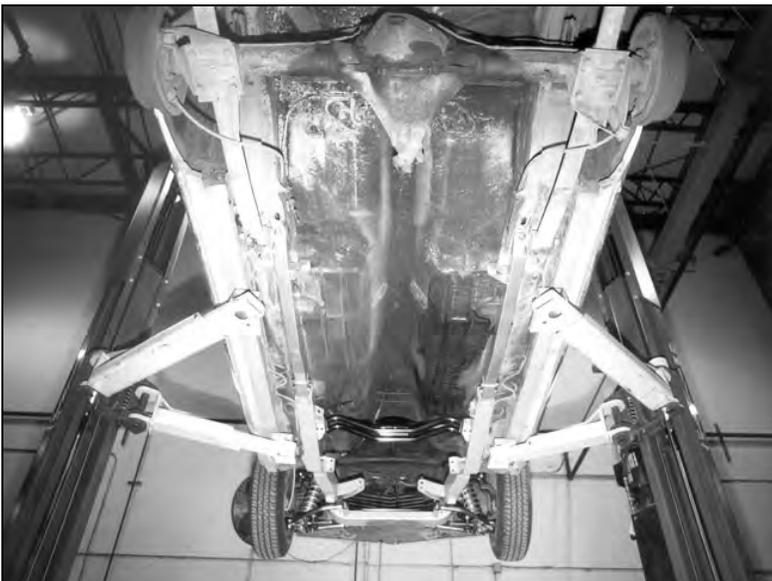
Install the 1/2-20 x 3 inch bolts and locknuts with the nut toward the outside of the car to keep them away from exhaust-system heat. Torque to 45 lb-ft.

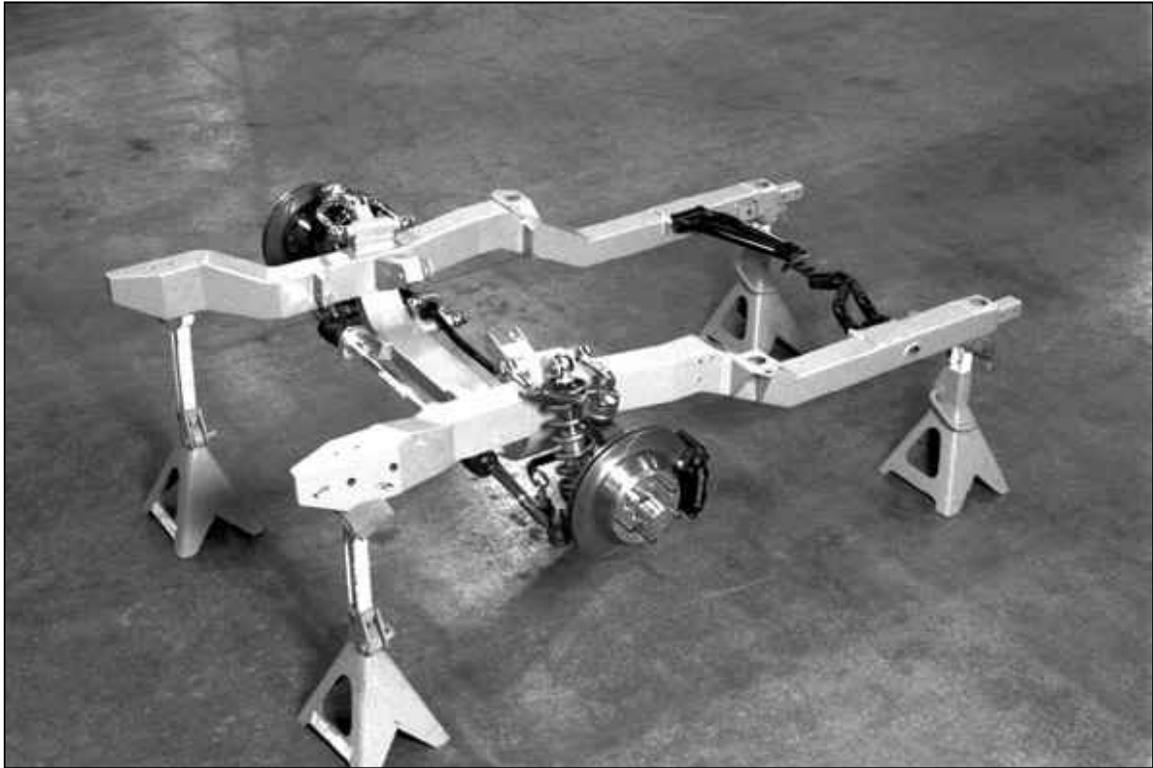


Reattach the shock absorber, then move on to the passenger side of the car to repeat the process.



With the bolt-on frame clip and subframe connectors installed this is what your project should look like.





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