

TWEAKING AND TUNING FOR TWISTIES

Installing a Highly Adjustable, High-Performance Suspension Under Our '05 GTO PART II: Out Back

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If you've been reading along with the build of our '05 GTO, you're familiar with the nicknames the car has received—notably, Shamu. From the factory, the '04-'06 GTO is an incredible performance car with a high level of comfort, but it's not the most impressive car on a road course or around the cones because it's designed to be a street car, not a race car. We want to shift the balance of our project car more toward the performance side of the scale since though it's driven on the street, it's a true weekend warrior at the road course.

As we've progressively improved upon some of the shortcomings of its chassis, we've yet to address some of the most important parts of the car: the bushings and struts. After completing the GTO Suspension Buyer's Guide (*HPP*, March '10) and getting a better idea of where to start, we contacted two companies offering excellent solutions for our Goat.

In the last issue, you read about the parts we used up front, why we chose them, and how we installed them. In this issue, we continue to do the same for the rear suspension. Andy Kollar of Kollar Racing offered us some knowledge on each bushing we would replace and why, and Jay Chen from KW Automotive served up some insight on his company's products.

THE PARTS

Andy provided Lovell's crossmember bushings (N92350) to reduce wheelhop, rear control arm bushings (N61483) to sharpen suspension performance, and camber-adjustable rear control arm bushings (X63109). "The factory does not provide for camber adjustment in the rear," says Andy. "This kit allows you to correct the factory alignment and is a must for all cars with a 0.75-inch drop or more. Failure to correct the rear camber will result in accelerated tire wear."



Greg Lovell installs the GTO's KW rear coil spring during our suspension install.

For our shock selection, we went with the KW V3 coilover suspension. Unlike the front, it uses a remote adjustable perch located in the factory spring location. The KW suspension retains the front McPherson-style coilovers, while the rear uses the factory inboard spring location, which reduces unsprung weight and shock static friction in the rear. Currently, there isn't a true coilover system for the '04-'06 GTO that has the coil spring mounted to the shock. In spite of this, KW assures us that this system is very effective, and it provides a similar setup for many other applications.

The rear springs included have a progressive rate that is more performance-oriented than the factory springs. This will, of course, come at some cost to ride quality.

These parts are more durable than the stock items. The bushings are polyurethane and should last the lifetime of the car, and the shock bodies are constructed from stainless steel. KW's website features videos of the shocks operating while completely submerged in saltwater. After a while, the traditional shock corrodes and freezes up. We won't have to worry about driving under water—for now (kidding).

INSTALLATION

As we suggested with the front suspension, it's best to have a professional install the components, or at least have one on hand, but the task can be handled by a mechanically minded hobbyist.

Greg Lovell of Anti Venom (no relation to Lovells suspension) was back in the HPP garage to help us with the rear suspension install. We found the back of the car was much less involved than the front, and we didn't need to use the press. There was, however, some drilling and creativity involved. Read on to find out more.



In this side-by-side comparison, we can see the difference between the worn factory bushing and the heavy-duty Lovells piece. The rubber bushing is brittle and very flexible, but the Lovells part is rigid. One compromise associated with using these new bushings is increased road noise.



With the upper pad in place, Greg slides the Lovells crossmember bushing in. Though it is greased in the photo, Lovells says this bushing doesn't require it.



The first step was to get the GTO onto the lift. Once it was elevated, we removed the 13mm bolts that hold the swaybar endlinks to the body and the three 15mm bolts that hold the cradle to the body. Next, with some leverage provided by a floor-jack handle, Greg was able to loosen the center 19mm bolt.



The cover should come off with the center bolt and reveal the crossmember bushing. Greg simply pried it out with a heavy flat-head screwdriver. If it's being stubborn, another way to remove this bushing is to place a large socket between the body and the bushing and lower the car slowly. This will free up the bushing.



After removing the 15mm bolt that holds the rear control arm in, Greg got creative. There are two or three ways to get the bushing out. One is to use a press. This requires the removal of a bunch of parts and it just isn't a practical idea. Another way is to remove it with a torch, which could be dangerous, but is efficient. The third solution is to cut it out. This is difficult and messy, but very effective. The HPP shop had an air drill, so we loaded it with a properly-sized bit and started slicing away. According to Greg, "The best way is to sort of stab into it and keep going around until you've removed enough material that they easily come out."



After about five minutes, Greg had made very good progress. We would already be moving on to the other side with a torch but this was the safer option.



◀ *These are the new Lovells polyurethane crossmember bushings.*



The factory doesn't allow for any adjustment in the rear camber. We are about to change that with these rear control arm camber/toe adjustable polyurethane bushings.



To install the new springs and shocks, we started by removing the lower shock-to-control-arm nut, which is 19 mm. We monitored the brake lines to make sure they weren't stressed.



Because of their two-piece design, installation is as simple as just sliding them in the control arm.



With the control arm bushing greased up nicely, Greg slides in the offset inner rod that will give the GTO camber adjustability.



This freed up the control arm and Greg twisted the spring out.



▲ Here are the other rear control arm bushings. There's no way to get around this—they're hard to take out, and even more so to photograph while trying. They are held in by 15mm bolts and Greg brainstormed on how to get them out without resorting to the torch, as suggested by Andy. "I was under there for an hour cursing left and right trying to get them out," says Greg.

► Then he came up with this tool to remove the bushing that made the job very easy. By combining a large, deep socket and a bolt with a washer to pull the bushing into the socket, he was able to use an impact gun to remove the bushing. In this photo, Greg is using the tool with a control arm out of the car, but he was able to position the control arm and remove the bushing without having to take out the arm. This makes the removal much easier. The new bushings were installed like the camber/toe adjustable bushings and the control arm was bolted back up.



The KW springs are noticeably shorter and firmer than the factory springs. According to Jay, their progressive rate, which is proprietary, was selected for this application as the best performance solution. Some companies that offer lowering springs don't provide a sufficient spring rate.



As per KW's suggestion, Greg cleaned the surface where the adjustable perch will be placed. We left it bottomed out to reduce tension while we were installing the spring.



We reused the soft rubber pad from the factory springs up top. The spring went in easily since there was so much slack in the suspension from the shock being unbolted.



Now that we had the spring in place, Greg ballparked the camber setting so we could move the GTO around before having it aligned. Here he is adjusting the offset bushing using wood to leverage the bushing out of place so he could easily rotate it. He then torqued the crossmember fasteners.



The final step was to install the rear shocks. With the bottom bolts detached, the only things holding them into the car were the top fasteners. We had to remove the carpeting...



... to reveal the top 17mm bolts (driver's side shown).



The passenger side is hidden around the fuel-filler line, but it's easy to reach behind and remove it by feel. Greg positioned himself under the car to catch the shock once I removed the fastener.



▲ The KW shocks have their own dust shields and bump stops, making them a simple swap. The KW has a shorter shock stroke due to the lower ride height, as indicated by the shorter dust shield.

◀ Since it's hard to see inside the car, we mocked up how the shock is to be installed. The factory rubber insulators were in terrific shape, so we reused them. The short nut on top is a locking nut that KW supplies to prevent the nut from backing out. With the shock in, we moved to the cradle.

PARTS

PART	PART NUMBER	PRICE
Lovells Crossmember Bushings	N92350	\$160
Lovells Rear Control Arm Bushing	N61483	\$48
Lovells Camber Adjustable Rear Control Arm Bushings	X63109	\$100
KW Variant 3 Coilover Kit	35262002	\$2,295



▲ Here is a crucial element in the entire install—bolting the cradle back in using the cradle alignment tool. This ensures that the rear cradle we were just playing with is perfectly aligned from front to back and left to right. Without this tool, the cradle could be a little off and the tires won't be centered in the wheelwell. Once done and with the tires back on, Greg lowered the GTO to the ground and tightened the control arm bolts and other fasteners to the proper torque specs.



Lastly, the swaybar was reattached via its endlinks. We set the bar to the #2 position for a baseline for track testing.

TORQUE SPECS

Control Arm to Cradle (Support Brace)	74 ft-lb
Rear Cradle to Body (Support Brace)	52 ft-lb
Inner Adjustment Link	46 ft-lb
Outer Adjustment Link	46 ft-lb
Shock to Control Arm	85 ft-lb
Shock to Body	10 ft-lb

INITIAL DRIVING IMPRESSIONS

With all of the parts we've selected for the Goat and a proper wheel alignment, it feels ready for open-course service and has been transformed into one hell of a street car. The Lovells bushings eliminated all of the play the factory bushings are notorious for, and allow the KW suspension to work to its full potential. There has been an improvement not only in steering feel and brake-pedal feel, but also in corner stability and turning response.

This has completely transformed our little Goat into a totally different car that has almost endless adjustability. That can also pose a problem though. With this much adjustment, it's hard to know where to start. In the next installment, we'll discuss how to properly adjust an adjustable coilover for the street and road course, and explain alignment setups. We'll head out to the track and identify how the suspension characteristics change with each adjustment.



◀ With everything bolted in, our GTO already looks meaner. The stainless-steel bodies of the KW shocks are sure to take the punishment of weather and withstand the open course abuse, while the Lovells bushings tighten things up and make the car perform more effectively. The dust on the parts is a hint that this photo was taken after track testing. We'll cover that in the next issue.

SOURCES

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