Rebuilding The Rear Suspension Of An '84-'96 Corvette
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Photography by Richard Newton
Your C4 Corvette has a great suspension but it could very well be worn out. Ok—it is worn out. The C4 Corvettes are old cars and the parts have lost their edge. It's not that any one item is really bad. The normal problem is that all of the wear has added up. A little bit of wear in a lot of places means you have a lot of total wear. It's a cumulative thing. Plus, you may not even notice how worn out things are since you've probably never driven a perfect C4. Your Corvette seems perfectly normal to you even if it isn't. You just assume that all C4 Corvettes drive the way your car does.

One of the reasons aftermarket parts seem to make such a huge difference with older Corvettes is that aftermarket parts are generally used to replace worn out factory parts. People put some new aftermarket part on their car and extol the virtues of that part. They would have felt the same difference if they had used a stock GM part. All new parts make a huge difference whether they are OEM or aftermarket. Sometimes though, GM doesn't give us much of a choice. They send us to the aftermarket. Let's take the rear suspension of the early C4 Corvette. A lot of the parts you need to rebuild your rear suspension simply aren't available from the local Chevrolet dealer. We're simply forced to the aftermarket to restore the ride and handling of our early C4s.

My track car is a poster child for aftermarket parts. This '85 Corvette has been beaten to death on the track. I'm closing out my tenth year of running track events. Each lap puts a little more wear on perfectly good parts. Every few years another part gets replaced. OK, every year any number of parts gets replaced. It all depends how I feel about my Visa card balance.

One rather important item to consider is that a lot of the aftermarket suspension items make alignment adjustments easier. The rear of my '85 is a great example of that. All of the Vette Brakes parts I've installed over the years make camber and toe adjustments really, really simple. I may not get the settings right all the time but I can really adjust the hell out of the toe and camber settings. Actually, I can adjust my suspension to the point where the car will barely corner but that's a personal problem, not a parts problem.

The Design
Before I get into the details, let's take a look at the rear suspension on the C4. The C4 rear suspension is really a variation on the '63 Corvette suspension. You just knew that transverse leaf spring in the back looked familiar. Also,
keep in mind the C4 Corvette was designed around the tires. The engineers fell in love with the tires on the Porsche 928 and had Goodyear develop a P255/50R16 tire for the new '83 Corvette. Yes, boys and girls, that's how it all got started.

This new '83 Corvette was to have very low pitch, at least much less than the '63-'82 Corvette had. The engineers didn't want the nose of your Corvette diving to the pavement when you applied the brakes. They didn't want this new Corvette squatting down in back when the car accelerated, either. Both of these can be accomplished through anti-dive and anti-squat suspension geometry.

If you look at a side view of the C4 Corvette you need to think of a long arm that angles up and towards the front of the car. The ideal locating point would be above the car's center of gravity. The problem is that this single arm, like in the '63-'82 cars, would have to be so long that it would get in the way of the seats. That was a problem with the older '63-'82 Corvette. The attachment point for the trailing arm actually limited the driver and passenger area. Or you could say the driver and passenger area limited the rear suspension.

The solution for the C4 was rather simple-just use two arms whose virtual intersection point is above the car's center of gravity. In that respect the anti-dive and anti-squat characteristics of the C4 are vastly superior to the older C3 Corvette. At least when your car was new and all of the bushings were in good shape.

**Checking the Rear Suspension For Wear**

At least once a year you should check the rear suspension for wear. Remember these are old cars and things wear out. You have two places for wear to take place in the rear of the C4. The most common wear problem is the wheel bearings. Raise the entire rear of your car off the ground on jack stands. Now grasp the bottom and the top of the tire. Then try to wiggle the tire in and out. I've generally found that all C4s have a very slight amount of play in the bearings with the emphasis being on slight. After you repeat this process on the other side, you will now know if you need rear wheel bearings. With the wheel bearing diagnosis completed you should now place your hands on the front and rear of the tire, with one hand reaching all the way to the inner edge of the tire. Again try to wiggle the tire back and forth. You shouldn't have any play in the wheel.

If you find you have movement, you'll need to crawl under the car and locate where the play is taking place while your partner moves the tire back and forth. This wear can take place at the outer tie rod end or at the inner ball socket where the tie rod mounts to the differential cover. There are some specifications for the amount of play you should have in the rear of your Corvette but most of the time it's rather obvious. If you have serious wear you'll notice a huge difference from the right side to the left side. It's unusual for both sides to have serious problems at the same time. Then again these are old cars so use some common sense.
GM used two different types of toe control rods during the production of the C4. The early cars use a male tie rod end. In 1992 they switched to a different arrangement. The problem is that the parts for the early cars are no longer available. If your tie rod ends are worn on an '84-'87 Corvette, you're going to have to replace the entire assembly. You can also convert to a heim-jointed arrangement if you have a track only car.

Rear Camber
The second area of concern with the rear suspension is the camber setting for the rear tires. The goal is to have the tires at a 90-degree angle as you go around a corner. If your tire is vertical to the pavement, then you have all of the tire's tread on the pavement.

The goal is also to have everything stay in place. You don't want things moving around as you drive through a corner. Camber changes in the middle of a corner are not fun. If your suspension is worn out, the bushings compress rather than transmit movement. This is a case where new bushings can be a big help. You can purchase a new set of bushings, or you can do as I did and purchase a whole new camber rod. I wanted the rapid adjustability, which you may not need. It behooves you to look at all of the options available to you.

Polyurethane Bushings
Everyone sells polyurethane bushings. They're not very expensive, and if you believe the ads they're a miracle cure for your Corvette's handling. Let me just say that I've used them in every possible point on my suspension. Let me also say that if I had an alternative I would get rid of them. I would replace all of them with Delrin or even aluminum. Delrin is just much harder than polyurethane and compresses even less. The problem is that Delrin bushings are just not available, and I'm too lazy to machine my own Delrin bushings.

Polyurethane bushings are not all the same. The hardness varies widely from one company to another. Some are really soft and deform under use. Keep in mind that polyurethane is not like rubber. Once it deforms it will stay deformed. I used some soft polyurethane bushings in my rear control links and they actually ovalized in the course of a year. The stiffest polyurethane bushings seem to come from Vette Brakes and Products. I've never had a problem with their bushings. At this point they're the only ones I use. Now it's just a matter of getting all the other ones out of the car.

If you have over 100,000 miles on your C4 you're probably a candidate for polyurethane bushings. They're not as easy to install as some would have you believe but it's not all that bad. You can do them on one of those weekends when nothing else is going on. It's just a matter of taking your time. New bushings may very well be the least expensive way to revive your old tired suspension. I think it's worth the effort, just don't believe all the hype that you're suddenly going to pull 2.0 Gs in a corner.
Here are the basics. This rear suspension is the same as what was used in 1963. Some things have been refined but the basics are all the same. You need to be concerned about bushing wear and deterioration. These bushings hold up nicely but remember once you get over 100,000 miles and two decades of use almost anything is possible. View Related Article
There's not a whole lot of stock Chevrolet left here. The thing to keep in mind is that all of these aftermarket parts do exactly the same things that the stock GM parts did at one time. The only real change in geometry is the bracket for the inner camber rod control arm. The other big difference is that all of the factory bushings have been replaced with either polyurethane or heim joints. There are two big advantages for all these parts. First, you can make adjustments very quickly. The parts also remove almost all of the compression that takes place with the factory bushings. Vette Brakes produces the stiffest polyurethane bushings and Energy Suspension has the softest polyurethane. I prefer the stiffer bushings on my track car. View Related Article
This bracket is from Vette Brakes and Products. It’s part of what they call their Smart Strut package. Basically, it changes the inner location for the camber rod. View Related Article

We’re checking for play in the toe control rods when we have our hands in this position. This wheel is off the ground for this check. If you have movement, you’re going to have to find a partner to crawl under the car to determine where the movement is occurring. You can easily have wear on the inner ball socket. View Related Article

In the late ’80s Doug Rippie discovered that what was ideal for the street wasn't necessarily the best thing for the race track. Getting the Corvette to squat during acceleration could actually be a good thing. The idea is that as you exit a corner you want more weight transfer to the rear. This gives you a little extra traction on exit. Now you can just reverse this process when you brake on corner entry. A little extra transfer to the nose plants the front tires just a little bit better. The factory bracket is on the right. The one on the left is from Doug Rippie.
When you use the Rippie bracket, you change the angle of the two trailing arms. This changes the anti-squat and anti-dive characteristic of the car. One of the things you should consider is replacing the bushings in the ends of these rods with polyurethane bushings that everyone sells. I really haven't seen a need for the adjustable aftermarket trailing arms with heim joints on all the ends. Those are just wretched excess.
This is a stock C4 toe control rod system. Under the rubber boot is a ball socket, and wear can take place in the ball and socket. If you have excessive wear in that area, the toe setting will change as you drive down the road. This is from an early C4 and replacement parts are no longer available. You can replace this with one from the earlier cars or the heim joint arrangement from Vette Brakes.

This is the Vette Brakes system. With this arrangement there is absolutely no play in the system. The only downside is that it might be a little noisier but I can't tell on my car. My only advice is that you must use the grease seals from Seals-It if you use this set-up on the street. The one thing I really love is how easy it is to change the toes settings with this unit. Just turning the control rod lengthens or shortens the rod. Once you have the toe setting where you want it you just tighten the jam nuts.

This is how you check for play in the rear suspension. If you can move the wheel around with your hands in this position you have wheel-bearing play.
This is the outer end of the Vette Brakes toe control rod system. In this instance, I don't have the Seals-It rod end seals installed.
I haven’t felt the need to heim joints at this point. Heim joints would be nice but at this point I’m just not sure the incremental improvement would be worth the cost. The bushings here are polyurethane but Delrin would be even better. That is if anyone made Delrin bushings for Corvettes. Corvette suppliers all seem to love the polyurethane bushings for most applications. I think it’s a cost issue. Also Delrin can be a little more difficult to fit properly. They need to be machined to fit the specific application.

This little rubber seal makes heim joints streetable. Ok, almost streetable. Until these were created heim joints were strictly for the race track. At the end of the weekend every rod end was checked and cleaned. Normal road dirt destroys heim joints.
There are a few things going on here. First, the red bushing for the spring is polyurethane. That's no big deal and it's really easy to do. I'm not sure you get anything from the use of polyurethane in this application but it's cheap and easy to do. The long bolt you see is a lot more important. The bolt is much longer than the stock bolt and it allows you to lower the rear of the Corvette. The third thing is the camber control rod from Vette Brakes. The real beauty of this system is that you can easily change the rear camber. The left decal you see on the rod means that it's a left hand thread.