

Wench With a Wrench

By Gail Wagner



A Shocking Discussion

There are lots of things you want out of your Miata driving experience and one of them is a smooth ride. A key factor that contributes to this experience is your Miata's suspension. Suspension is literally what stands between you and the road so shock absorbers, struts, and springs at the bottom of your car are essential for overall performance and comfort.

In their simplest form, shock absorbers are hydraulic (oil) pump-like devices that help to control the impact and rebound movement of your vehicle's springs and suspension. Along with smoothing out bumps and vibrations, the key role of the shock absorber is to ensure that the vehicle's tires remain in contact with the road surface at all times (unless you're Steve McQueen ☺), which ensures the safest control and braking response. At rest or in motion, the bottom surface of your tires is the only part of your vehicle in contact with the road. Any time that a tire's contact with the ground is broken or reduced, your ability to drive, steer and brake is severely compromised (understatement). Despite popular belief, shock absorbers do not support the weight of a vehicle.

As mentioned, shock absorbers are basically oil pumps. A piston is attached to the end of a piston rod and works against hydraulic fluid in the pressure tube. As the suspension travels up and down, the hydraulic fluid is forced through tiny holes inside the piston. Because these orifices only allow a small amount of fluid through the piston, the piston is slowed which in turn slows down spring and suspension movement. Shock absorbers automatically adjust to road conditions because the faster the suspension moves, the more resistance they provide. The shock absorber (shocks) came into widespread use after WWI but examples of earlier hydraulic concepts began around 1908-1909. The 1927 Ford Model A had shocks as optional equipment.

The following is a condensed and edited and amended (by me) article derived from *Moss Motors Miata* that I thought pretty much said it all about shocks. I hope you enjoy.

Should I or Shouldn't I? That is The Question

When considering shocks, the first and most important question that needs to be answered is "Do I need new shocks and if so, how can I tell?" As always, there's that important distinction between "I need and I want"; if there's a visible leak from the shock shaft or if your car has started to give a harsh ride, then you are indeed in need of new shocks. If not, and you like the ride quality of your car, then save your money and just enjoy your car as it is. The Miata came with a really good suspension right out of the box (which is why we love 'em and why it's become as popular as it is) so unless you have a problem, leave it alone. Unless, of course, "you want" ☺ and you have decided you want to upgrade your suspension.

The next most important question to ask is "What are my driving objectives and driving style?" Your choices will be very different depending on how you answer. Broken down are some suggestions into some different categories to help you decide. These are purely suggestions based on experiences of enthusiasts and of professional installers. "Enthusiasts" drive fairly aggressively on the street (not me, of course ☺) and take the car to the track occasionally and have their own set of preferences. Installers do their best to listen to people to tailor the car preferred style and consider important factors such as daily ride quality, parts warranty history, and "repeatability", meaning that a year or two down the road, if the person needs to replace a damaged shock, can they easily source it or do they need to send it out for a "custom rebuild" replacement?

Note: if you're upgrading your shocks to a performance option, as some of you out there know, you may need to upgrade your springs as well as part of the suspension "system". The overriding factor in choosing a shock isn't just the shock itself but whether that shock and spring work well together as a unit. If there's not enough damping, then the ride will be harsh. This is what you feel with a worn shock when the damping has gone away. The same thing will happen if you decide to go with a higher performance spring (higher spring rate) without changing to a shock that can handle it. Don't make the mistake of trying to save money by upgrading the springs and not the shocks since it's a formula for unhappiness. A common misconception is that a higher performance (higher rate) spring will cause a harsher ride. That is absolutely not the case as long as the damper (shock) is up to the job.

Types of shock absorbers

Although all shock absorbers do the same job, different types of vehicles and suspension designs require different types of shock absorbers which can appear radically different. No matter the application, all shock absorbers fit into one of three broadly defined types: conventional telescopic shock absorbers, struts or spring seat shocks.

Conventional telescopic shock absorbers:

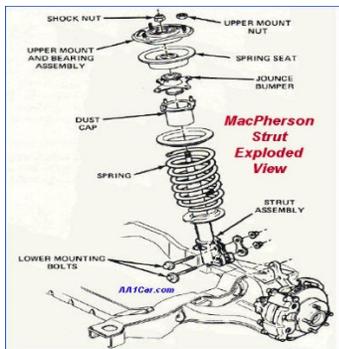
This is the simplest type of shock absorber and is generally replaced rather than repaired. This type of shock absorber can be found on both front and rear suspension systems and is relatively inexpensive.



Bilstein B6 HD Shock

Strut type shock absorbers:

Most Miatas have independent double wishbone suspension on all four wheels with a few exceptions and shocks are typically used, not struts, but I include it here just for information purposes. Although they do the same basic job, struts replace part of the suspension system and must be more ruggedly built to cope with greater loads and forces. Although most commonly seen on the front and rear of small to medium cars, larger cars are now tending towards strut-based suspension design. The strut category is further divided into sealed and repairable units. As the name suggests, sealed units are designed to be fully replaced, whilst repairable (McPherson) struts are able to be fitted with replacement strut cartridges. The major difference between shocks and struts is that a strut is a structural part of the car's suspension system where a shock is not. A strut is also a crucial part of the steering system and greatly affects alignment angles.



Basic Happy Street Driving

If you just love your Miata the way it is and don't want to lower it or make handling changes, then leave the springs alone and install a good quality OE (Original Equipment) replacement shock. The OE shocks on most Miatas will work fine or you can find a reasonably priced replacement that will work well. There were certain models of the NA's, NB's, and NC's that came equipped with Bilsteins (brand name) so if you are happy with how the car rides and handles, stay with what came with the car. All of this is recommended only if you're keeping the stock springs.

More is More



So, you want “a little more”... (like Gail) ☺

The labor to change shocks and springs as a package is the same as just doing either shocks or springs, so if you're going to upgrade your suspension, this is the time to do it. A popular package for enthusiastic street drivers (including those who do occasional track days) is where ride height is only slightly lowered and the springs and shocks work extremely well together to give both an excellent ride and a marked improvement in handling. The added benefit of this setup is that the shocks can be *adjustable* allowing further fine-tuning of the handling for personal driving style.

Lots More is Lots More - Especially Lots More Money \$\$\$\$\$

So, you want to make a BIG difference in your Miata's handling or hey, you just wanna' be cool

At this level, the change in handling can be really dramatic (and also can get pretty expensive). You are now firmly in the "I want it" category ☺ and also the area of most debate if you read any Miata forums.

If you are considering or compete in auto crossing or just want to upgrade handling, then your best bet is to look at *coil overs*.

"Coil over" is short for "coil spring over shock". It consists of a shock absorber with a coil spring encircling it. The shock absorber and spring are assembled as a unit prior to installation and are replaced as a unit when the shock absorber has leaked. This provides damping without torsional loads. Some coil overs allow adjustment of ride height and preload. More advanced adjustable coil over systems use a threaded shock body along with an adjustable lower mount for ride height adjustment while an adjustment knob is used to adjust damping. Stiffness is changed by switching the spring for one with a different spring rate.

What coil overs do is to corner-weight (balance) your car. Each corner of the car is adjustable so the car is put on set of scales (one under each wheel) and adjusted using the driver's weight to achieve optimal balance. Don't be intimidated by this as it's something that is generally done once (by a pro) and then left alone, not something you play with in your garage at home! Ask your local alignment shops if they can perform this for you or search out a professional race team in your area. Koni and Bilsteins are good brand names.



Coil over for 1990-2005 Miata

And Finally...

This is a lot of info to absorb but the bottom line is that the choices above are based on your taste and goals with your Miata. You should be the final judge of what works best for you or what you want your Miata to be.

Zoom Zoom Safely!

Gail

DISCLAIMER

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