

WE PUT THREE BRANDS  
OF AFTERMARKET SHOCK  
ABSORBERS THROUGH  
A 1,000-MILE ROAD TEST —  
THE RESULTS MAY SURPRISE YOU

# SHOCK THERAPY

by E. DON SMITH



Bilstein

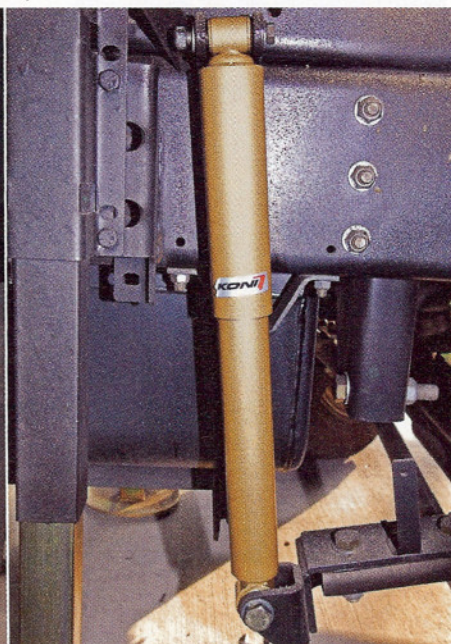
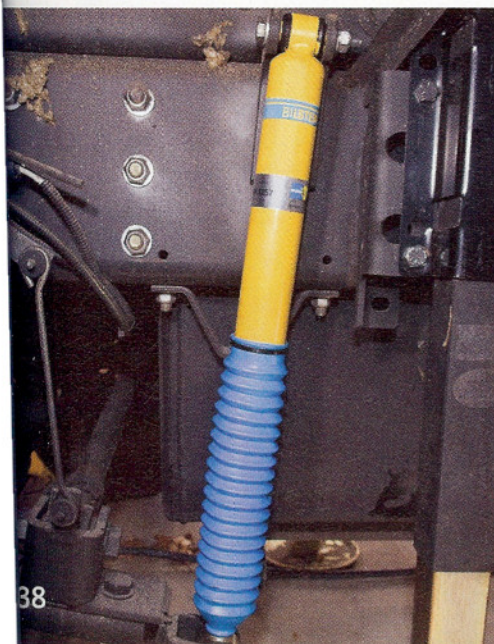
**F**or motorhome owners seeking a better ride and handling, the most popular modification to make to a coach is to replace its shock absorbers. Even brand-new motorhomes are open to improvements due to the higher quality (and cost) of the aftermarket suspension components available today. In order to determine the benefits of these aftermarket shocks, we gathered several models and put them through our own test. Currently there are three major suppli-

ers of aftermarket shocks to the motorhome market: Bilstein, Koni and RoadKing. Many new rigs come equipped with Sachs shock absorbers, as was the case on our test coach — a 2008 Tiffin Phaeton 36QSH 36-foot diesel-pusher on a Freightliner XC raised-rail chassis with a 228-inch wheelbase. In order to evaluate the performance of these aftermarket shocks, we ordered shocks specifically for this chassis. The coach has a gross vehicle weight rating (GVWR) of 32,000 pounds with 20,000-pound rear and 12,000-pound front axle ratings.

During the test we installed and removed the shocks several times, driving the coach on the same 1,000-mile route repeatedly during a three-month test program. During each shock test, my copilot and I took detailed notes on performance, and at the conclusion of round one we retested a few shocks to confirm our initial impressions.

## SACHS

The first trip was made with the factory Sachs shocks, and initially we thought they performed fairly well — with one main issue.



PHOTOS: E. DON SMITH





Koni



RoadKing

Due to the lack of low speed compression or rebound damping, the front of the coach raised or lowered 2–3 inches with the release or press of the brake pedal. We found this annoying at times; in some cases it caused the rear of the coach to drag on steep angles if I didn't pay particular attention to the brake pedal. We also thought the Sachs shocks were too soft on the road when it came to cornering and overall body roll control.

#### KONI

Next, the Koni FSD shocks were tested.

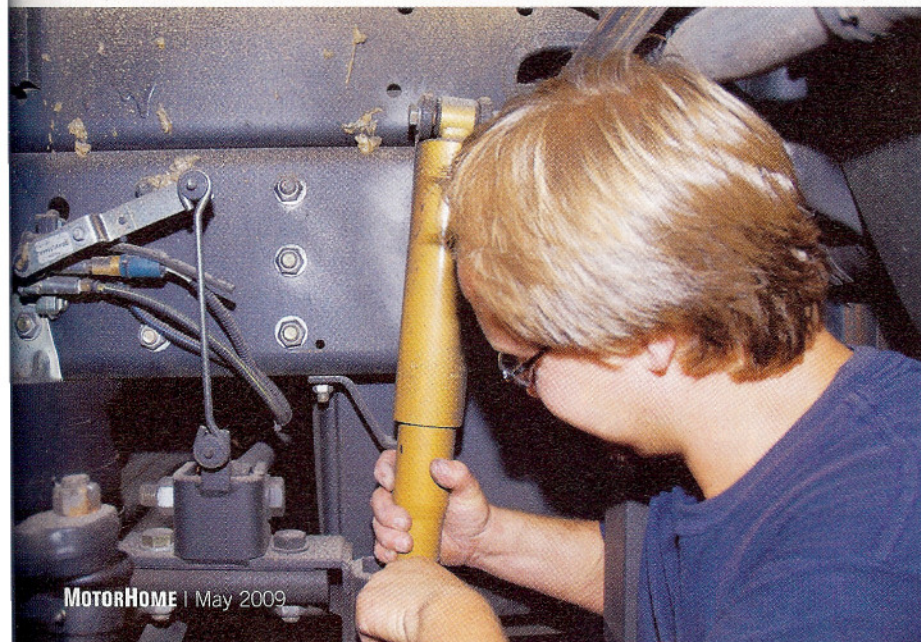
Koni shocks are made in Holland and are well known in the racing world. The first thing we noted about the Koni shocks was the complete lack of front-end bounce at low speed while braking.

On smooth roads the Konis were great, and they exhibited much less body roll than the Sachs. The coach handled better and driving was less stressful due to the lack of sway. However, when the road got really rough with potholes, highway expansion strips, or any sharp bump, we noticed the Konis were considerably harsher than

the original Sachs shocks. Unfortunately, the Konis did not perform as well under poor road conditions. The Konis for this motorhome carry an MSRP of \$181 each.

#### BILSTEIN

We had the German-made Bilstein Comfract shocks installed at our local Camping World and set out on our test trip. Bilstein is also a well-known worldwide producer of shocks for motorhome chassis, racing and other high-performance applications. The Bilsteins exhibited a similar level of low-



This page and opposite page: We tested three aftermarket shock absorbers (shown left to right, Bilstein, Koni and RoadKing) that were ordered specifically for the Freightliner XC raised-rail chassis with a 228-inch wheelbase. As you can see, each shock uses a different design and construction. The Bilsteins at the far left are gas-pressurized monotubes, as are the billet aluminum RoadKings, while the Koni and Sachs units are lower-tech twin-tube shocks. For installation, we turned to Camping World of Chattanooga in Tennessee, where Rick Guthrie (RVIA Master-Certified Technician) carefully mounted and torqued the shocks to the proper specifications. While the front shocks are fairly easy to access, the rears are much more difficult.



BRAND	CORNERING AT SPEED	SLOW SPEED HANDLING	ROUGH ROAD COMFORT	SMOOTH ROAD COMFORT	TOTAL	VALUE
Bilstein	4	4	3.5	4	15.5	5
RoadKing	4.5	4	2	4	14.5	1
Koni	4	4	1.5	4	13.5	4
Sachs	2	1.5	3	3	9.5	3

*1 = Poor, 2 = Fair, 3 = Average, 4 = Above Average, 5 = Exceptional*

speed control while going on and off the brakes as compared to the Konis.

On the smooth parts of the road the Bilsteins handled the ride well. They were comfortable but still maintained nearly the same level of roll control as the Konis. When we hit the interstate the real test began. Within a few miles it was clear that these were significantly less harsh compared to the Konis, though they still possessed similar handling and roll control. At an MSRP of \$125 each these are the least expensive of the group.

### ROADKING

The RoadKings were the last set of shocks in our test. They are a new entry into the motorhome market, though RoadKing has been producing shocks for 18-wheelers for years. Two of the main claims of RoadKing are the ultralong life of the product and the fact that its shock is rebuildable. The company claims the typical life is up to 350,000 miles.

Once we got on the road, the RoadKings also showed an immediate advantage over the stock Sachs shocks. In fact, every shock we tried was an improvement over the OEM shock in one aspect or another and, as with the Bilsteins and Konis, the brake-induced dive/rise was completely gone.

The RoadKings displayed perhaps the best handling of the group during slow and highway speed handling on smooth roads. Body lean was minimal and the low-frequency bumps were handled with ease. They had a bit more firmness on smooth roads compared to the Bilsteins.

The next leg of the trip was the interstate and, just as with the Konis, the RoadKings were quite harsh. Both damping and compression were just too stiff for a coach of this weight. At an MSRP of \$400 each they are easily the most expensive product on the market. Though we didn't have the ability to measure the life of the shocks tested, these would have a lot of cost to overcome when compared to the other products tested.

### THE RESULTS

When comparing the shocks and the resulting ride, we thought the Sachs were most like a big, heavy sedan — such as an older-model Buick or Cadillac — soft and mushy with a lot of body roll on turns and a lot of bounce over bumps. The Bilsteins felt more like a BMW — smooth and comfortable yet in control. The Konis and RoadKings have great handling and body roll control but, like a track-ready sports car, they were just too firm for our liking.

After driving thousands of miles comparing all these shocks, it was clear which ones performed best in each category. We rated them all on a scale of 1 to 5 (with 5 being the best), then added a value score based on the cost of each product. Because the Bilstein shocks showed the best performance and the lowest cost they received the highest score.

Of course, everyone has a different opinion of what the most important aspect of an ideal shock is; with this in mind, we have given individual ratings to help you select your ideal product in the event you have a different list of needs for your shocks.

### HOW SHOCK ABSORBERS WORK

Technically, shock absorbers are damping devices, because their real function is to slow and dampen the compression and rebound of your suspension. This is done by controlling the rate of movement of the piston inside the shock housing. Each manufacturer has its own design philosophy on the best way to achieve this function, but in the end they all serve to dampen the up-and-down motion of a motorhome while in motion.

If you took high school physics, you were taught about the conservation of energy. As applied to a suspension system, this means that the energy in the suspension cannot be destroyed. This kinetic energy is simply transformed into thermal energy (heat) and is dissipated into the atmosphere as the coach moves down

the road. The shocks turn the bounce into heat; the best ones do a great job of it, while others do not, based on our tests.

There were two types of shocks used in our test: twin-tube and gas-pressurized monotube shocks. The RoadKing and the Bilstein Comfitrac shocks are both gas-pressurized monotubes, while the Koni FSDs and the factory-installed Sachs shocks are both of the twin-tube variety.

The twin-tube design works using two separate cylinders, or tubes, inside the body of the shock. One is an inner tube and the outer tube (or reservoir) is simply the body of the shock. In order to dampen the linear motion of the shock, a piston inside the shock is made with tiny holes to restrict the flow of the oil used inside the shock. The sizes of the metering holes as well as the viscosity of the shock oil are two of the factors that determine the level of damping.

The main drawback of the twin-tube design is that during rapid motion this constant pumping of the piston causes the oil to overheat and foam. Once the shock oil foams it greatly reduces its ability to be precisely metered and the shock loses its ability to dampen.

The gas-filled monotube shocks, such as the RoadKing and Bilstein, overcome this foaming issue by putting the fluid under a high pressure condition. Due to the high pressure within the shock, the entire assembly has to be precisely machined, which can result in a more expensive shock to produce. Without this level of precision, shocks under this type of pressure would simply leak and ultimately fail.

In this monotube design a high-pressure chamber sits below the oil chamber of the shock and with the oil under extreme pressure the piston can move as rapidly as needed without the foaming problem that is common in the twin-tube shock. These shocks can be distinguished from twin tubes because the high pressure causes the shock to always fully extend itself due to the pressure inside the shock, whereas the twin tubes we tested can be fully compressed and they will stay there indefinitely.

Within each type of shock there are differences and the Koni, RoadKing and Bilstein shocks we tested each feature unique properties. The Koni FSD twin-tube shock uses its own proprietary system called Frequency Selective Dampers



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(FSD). According to Koni, the internal FSD system allows the shock to remain firm on smooth (low frequency) bumps, but when the coach is subjected to rough (high frequency) bumps an internal valve is employed to help reduce the typical harshness that would result if the shock used single-stage valving. Koni offers a lifetime shock warranty for the original owner.

The Bilstein Comfitrac gas-charged shock has a special 1.81-inch diameter piston that allows the shock to react normally over smooth roads, but when the road gets rough the shock uses a bypass valve to divert the flow of shock oil, and the result was noticeable as shown by our ratings. Bilstein backs its product with a lifetime aftermarket warranty.

RoadKing modifies the gas pressurized system by greatly increasing the size of the internal piston. This shock uses a 2 $\frac{5}{16}$ -inch piston bore, which results in a large increase in total piston area inside the shock. This greater diameter allows the shock to spread out the damping load over a greater area and reduce the overall harshness over rough roads while still maintaining control on smooth roads and corners according to RoadKing.

As you can see in our ratings, each shock has its strengths and weaknesses. Because we are not suspension engineers, we can only comment on the results obtained in our tests as opposed to deciding a winner based on engineering or design. Now that you are armed with more information, hopefully you will be able to select the shock that most suits your needs. ♦

### FOR MORE INFORMATION

#### **BILSTEIN AFTERMARKET AND MOTORSPORTS — WEST**

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[www.bilstein.com](http://www.bilstein.com).

Circle 226 on Reader Service Card.

#### **KONI NORTH AMERICA — RV DIVISION**

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#### **ROADKING SHOCKS**

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