Struts & Writing Big

They asked me to do this month's business article, which seemed about as exciting as getting my teeth cleaned. How are you supposed to get your hands dirty on a business article?

A little cheating seemed to be in order, so we decided to do a tear-'em-down and put-'em back together again article showing how easy it is to increase profits by doing more strut and spring jobs.

We chose three cars that might fall into the "sporty" category. Unlike your average Yugo owner, the owners of these cars are more apt to spend a few extra bucks to restore that like-new feeling to their car's suspension. Who knows? They might even spring for springs and a mild suspension upgrade, if the job is sold properly.

Know Your Market

The first question everyone asks is, "How much should I be charging for this work?" And that question is always followed closely by, "How much profit is there in this kind of work?"

A little time on the phone doing a market survey in your area will give you a fair idea of what the local competiton is charging. We started with our local Mazda dealers, and checked prices for strut insert and shock replacement costs on our RX-7. Both local dealers were pretty close in price for parts and labor to replace front strut inserts and rear shocks. The total estimate came in at around 400 dollars. Of that amount, 250 dollars was in the "labor" column. Not too shabby.

Then we checked with a local service chain. Their labor charge was about a third less than the dealer's, but their parts prices were about the same. The overall bill still came in at over 320 dollars.

Then we called Mike Cork at Tire Connections in Lombard, Illinois to ask how he determines what to charge for strut/spring work.

"We don't try to compete just on price. We stay below the dealer when pricing our work, but don't try to be the cheapest in town. We also sell tires and wheels, and offer a complete package to the customer.

"With cars becoming more and more technical, it is getting harder for the customer to personalize his car. Fuel and ignition systems and even exhaust modifications are difficult, if not impractical on most new cars. Wheels, tires, and bolt on suspension components are one of the few places a customer can get creative.

"We sell that concept along with good service, and seldom get complaints about the fact that we aren't necessarily the cheapest in town."

Views From A Suspension Specialist

Jeff Hecox of Dinan Engineering in Mountainview, California also had some helpful ideas about suspension work, its potential for profits, and ways to satisfy your customers.

"When it comes to suspension work, we specialize in BMW. Since American drivers seem to be very conscious of ride quality as well as handling, we offer four separate suspension repair and upgrade options. Our

Springs

gger Profits

first two grades offer a mild upgrade in handling performance that doesn't seriously affect ride quality.

"Our third and fourth levels provide a big improvement in handling, that also results in a stiffer ride. You have to be careful not to surprise your customer with a suspension he can't live with. We feel it's important to spend time with the customer evaluating his needs, based on the type of driving he does, and the level of handling performance and ride quality he expects.

"It helps a lot if we can let the customer actually drive a car like his own that has already been equipped with a given package. That way he knows just what he can expect from his own car when the job is finished.

"Some shops have made the mistake of mismatching components. They try to do some radical re-engineering that can combine the wrong components and make problems for the customer in terms of poor ride and handling, and shorter component life."

Is There A Market For This?

It would seem that this is an area of automotive repair that has a lot of untapped potential. The key, however, seems to be the need for a greater emphasis on sales of struts, strut cartridges, and springs. Many shops still aren't looking for bad suspension parts, or trying to sell suspension upgrades.

In addition to all the OE parts available from new car dealers, there are more and more domestic aftermarket suppliers who are increasing their coverage of struts and springs for imports. We have included a chart showing sources, with a breakdown by general category of the parts offered by each. We hope it's helpful.

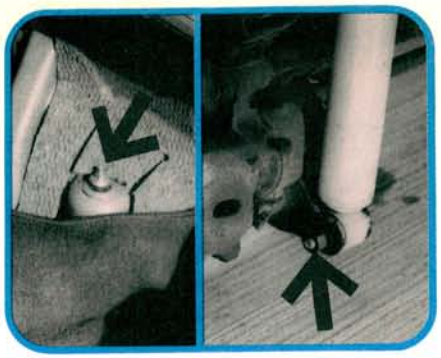
Company	Inserts/ Struts	Springs	Kits	Circle Number
Bilstein	X	X	X	200
Boge	X			201
Cofap	X			202
Gabriel	X	X		203
Koni	X		X	204
KYB	X			205
Moog		X		206
Monroe	X			207
Sachs	X		X	208
Tokico	X	X	X	209
TRW	X	X		

Our thanks to Bilstein for providing the photos used in the BMW suspension upgrade section.

—By Ralph Birnbaum

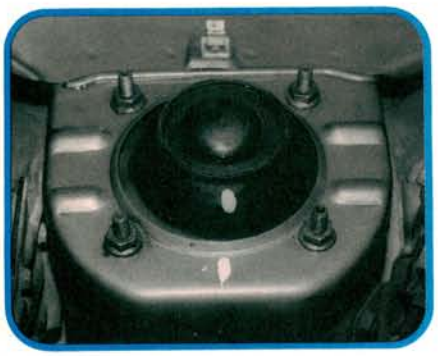
1

Our first car is a Mazda RX-7. The rear shocks on the RX are not coil-overs. The most difficult part of replacing these shocks is the removal of the inner quarter panel trim panels, but even that part is pretty easy. There are only six screws in each panel.



2

With the interior trim removed, the rear shocks look like any other shocks. Unbolt the shocks at the upper body mount and also at the rear axle. Don't worry, even with the shock unbolted, the axle didn't fall far enough to launch the springs.



3

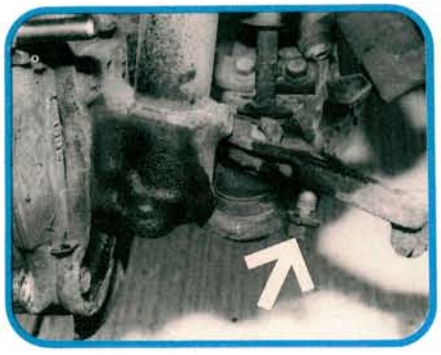
The front struts require a little more work. The upper strut mount on the RX-7 is eccentric, allowing you to rotate the mount and make limited camber and/or caster adjustments. Mark the inner fender and the mount with a dab of paint before removing the four strut mount nuts, so you don't change the alignment.

4

Raise and safely support the car. Remove the front wheels. I use the car to hold the strut tube for me while I loosen (but don't remove) the retaining nut on the strut tube. This big old pipe wrench fits between the spring coils, and it's never taken "no" for an answer yet.

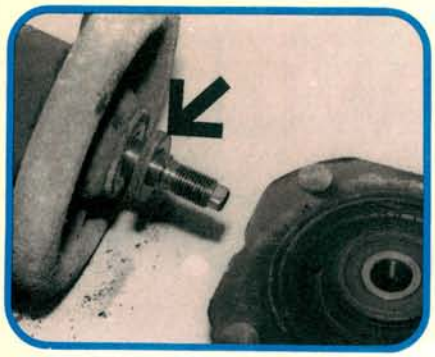
5

The Mazda repair manual says you have to remove the rotor and unbolt the spindle from the strut assembly to replace the strut inserts. No you don't. Remove the caliper and the brake hose retainer clip at the strut tube. Move the caliper to one side and hang it from a piece of wire.



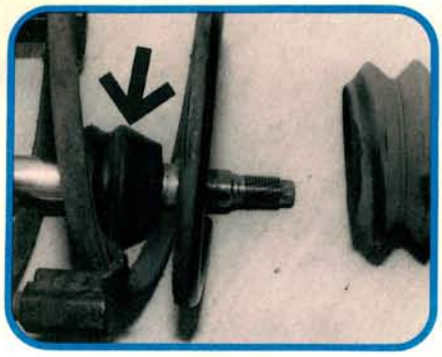
6

Remove the two bolts holding the knuckle arm to the base of the strut tube. (The knuckle arm is the steering arm bolted between the ball joint and the strut tube.) Push down on the control arm to separate the knuckle arm from the strut tube and swing the strut assembly away from the car.



7

Compress the spring and remove the retainer nut and washers from the strut shaft. Remove the bearing housing (upper strut mount), noting the position of this large spacer between the bearing housing and spring cap. Remove the spring cap.



8

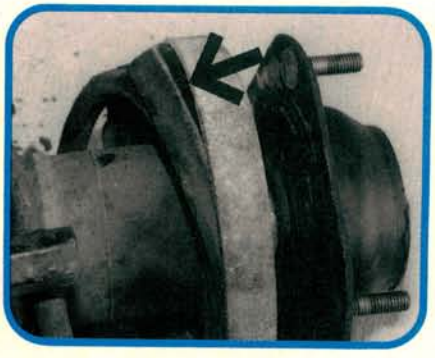
Remove the dust boot. The rubber bumper beneath the boot will probably be stuck fast to the shaft so you may have to twist and shout to remove it. Remove the spring from the strut tube and finish unscrewing the retainer nut loosened in step number four.

9

If this is the car's first strut service, be careful as you tug on the strut shaft to remove it or you'll get a face full of oil. The replacement inserts are self contained, but the factory uses the strut tube as the outer shock housing, so it's filled with oil.

10

Install the new insert in the strut tube. These Monroe inserts come with a new retainer collar. Make sure the collar is screwed down tight against the new insert. If you can grab the strut shaft and move the insert inside the tube, the collar isn't seated. Check for debris in the strut tube threads.



11

There's a rubber cushion between the coil spring and the spring retainer. The spring has to fit squarely in the cushion as you release the spring compressors. Lube the rubber with a little petroleum jelly. This cushion got pushed out to the side of the spring and spring cap. This is no good.

12

Reassemble and reinstall the strut assembly in reverse order of disassembly and removal. Don't use your impact to tighten the strut shaft nut or you'll spin the shaft in the insert, and may damage it. There's a hex in the end of the shaft. Use it to hold the shaft while tightening the new locknut.

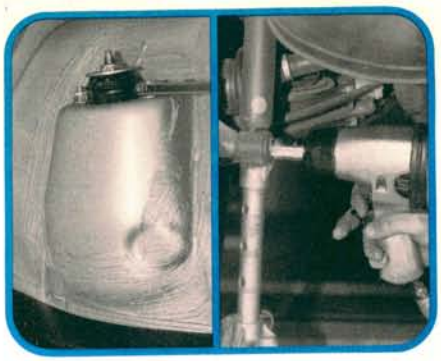
BMW/Bilstein BTS Sport Package

Our next car is a 1989 BMW 325i that's getting a matched suspension package from Bilstein. Here's one job you can do while the car's still in warranty.

Unlike the simple cartridge replacement we did on the Mazda, this is a complete spring/shock kit. The kit includes specially valved strut inserts and rear shocks and shorter-than-stock progressive-rate springs.

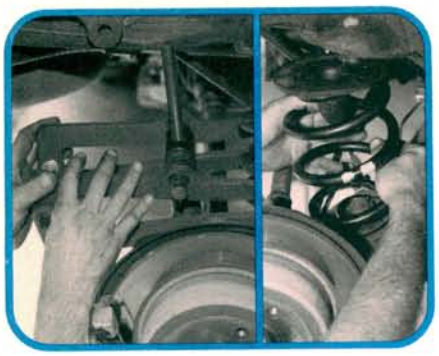
In addition to the springs and inserts, the kit includes new dust boots, lock nuts, and retainer collars, plus a special spanner tool for tightening the collars.

The advantage of a kit like this is that it is a matched package, and takes the trial and error out of matching spring rates to shock damping.



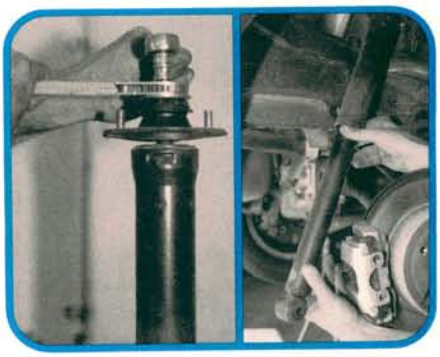
1

Raise the car and support the rear control arms with jack stands. Open the trunk and remove the nuts on the top shock mount (left photo). This box ratchet works well in these tight quarters. Next remove the lower shock mounting bolt and swing the shock out and away from the car.



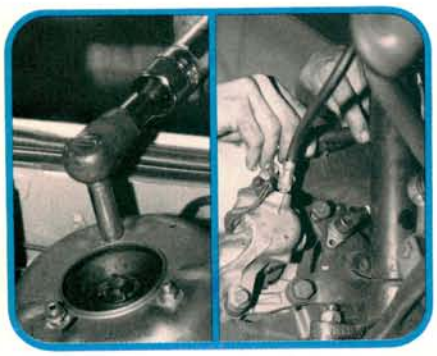
2

Raise the car. Support the rear control arms with stands. Use a spring compressor to compress the OE springs slightly. Raise the car off the stands. Compress the OE spring and remove it from the car. The new spring is shorter than the OE, so you don't have to compress it to install it. The top spring cap rubber center will hold the spring as you lower the car.



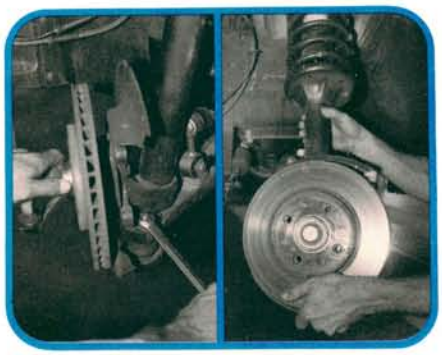
3

Remove the shock mount hardware from the OE shock. Check it for wear or damage. Install it on the new shock using two wrenches: one to hold the shaft from turning, and one to tighten the retaining nut. Slide the shock back into place and torque the lower bolt and top mount nuts to factory specifications.



4

Let's move on to the front. Raise the hood. Loosen (but don't remove) the three nuts on the strut tower. Raise the car and remove the wheels. At the inboard side of the knuckle assembly, unfasten the brake line keeper and remove the caliper. Support the caliper so it doesn't hang from the brake line.

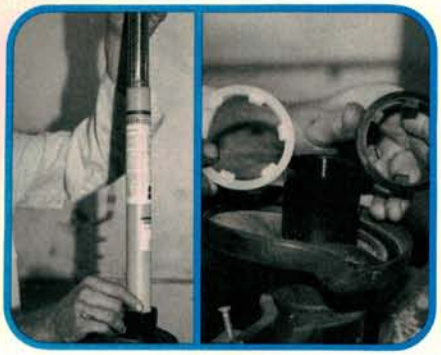


5

Unbolt the strut assembly from the control arm at the ball joint (left photo). Disconnect the tie rod end from the knuckle. Mark the upper mount for location. Finish removing the three nuts at the upper mount. Remove the strut assembly from the car (right photo).

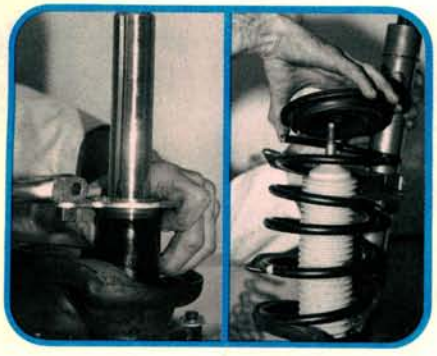
6

Mount the strut tube in a suitable strut holder like this one from Branick (left photo). Just tightening the tube in a vise may damage it. Compress the spring. Remove the locknut from the strut shaft. Then you can remove the spring cap and the spring itself.



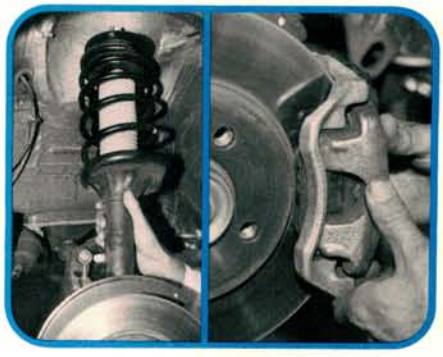
7

Your pipe wrench is just as effective for removing the strut tube retainer nut as it was on the Mazda. Remove the nut and the OE insert. Pour out the oil and install the new, shorter insert. The Bilstein kit includes two, new retainer nuts to fit different applications. Screw the correct retainer on, finger tight.



8

The Bilstein kit also includes this spanner wrench for final tightening of the new strut tube retainer rings. Compress the new spring from the kit and install it on the strut tube perch. Slide the new dust boot from the kit over the collar on the strut, and reinstall the upper spring cap and bearing assembly.



9

Hold the strut shaft with an allen hex key and finish tightening the lock nut on the shaft. Install the strut assembly and reassemble the front suspension in reverse order of disassembly, observing all OE torque specs. Make sure the brake lines are repositioned and properly secured.

VW GTI

Our last car was a 1984 Volkswagen GTI. We chose another matched set of struts and springs, this time from Sachs. The Sachs Sporting Set comes with struts and springs. Front strut bearings and the body mount rubbers for the rear shocks are not included.

This brings up an important consideration. The GTI donkey car had a nasty knock in the front suspension, especially noticeable when driving over parking lot speed bumps at slow speeds. We checked the front strut bearings, and sure enough they were bad. If the customer expects the strut replacement to eliminate the knocking noise, he'd better be prepared to add the cost of the bearings to the invoice.

We haven't tried to cover each and every minor detail of the VW remove and replace procedure. It's a pretty straightforward strut assembly. Instead, we tried to highlight some of the problems we ran into along the way, as well as some potential problem areas.

1

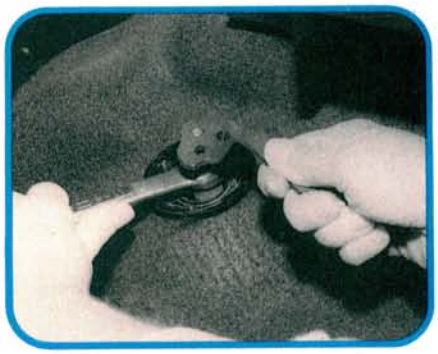
Check the strut bearings first. Open the hood and remove the strut covers. The center metal insert in the strut bearings pulls away from the rubber over a period of time. The bearings will stick up above the rubber mount as a result. On badly worn mounts, the bearings will be loose in the mount.

2

The lower strut mount bolts were seized. We needed a flame wrench just to get them moving. These are Ohio bolts. Ohio bolts get so rusty that their shanks and threads all but disappear. If you're lucky enough to live where they salt the roads, check these bolts carefully and replace them when they're bad.

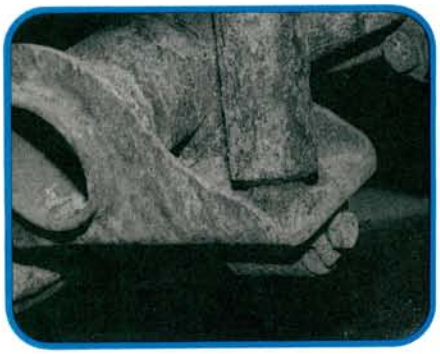
3

This is no substitute for a proper alignment, but we marked the position of the eccentric (camber adjustment) bolts before removing them. That way we knew we'd be close when we got to the alignment rack, so close in fact that one side was right on the money.



4

Remove the rear upper shock mount covers. Hold the shaft stationary while removing the upper mount nut, cap, and rubber grommet. The upper spring cap lock nut and spacer can also be removed at this time. Raise the car on a frame contact lift to drop the tops of the rear struts away from the body.

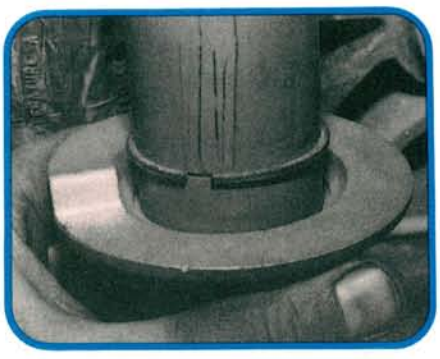


5

The lower shock bolts and bushing sleeves were also a little reluctant to come apart. We cut the lower shock eyelet open and removed the smoldering bushing just to get at the seized inner bushing. More heat. More beat. Darned Ohio bolts.

6

The rear springs in the Sachs kit have to be installed right side up. One end of the spring is bent outward just a tad. Install this end at the top and locate that tab in the spring cap. The bottom of the spring does not have this tab, and sits in the lower spring perch like the OE spring would.



7

The rear spring perches are supported on the shock by thin snap rings. The spring perch has a small ledge on its bottom that fits over the snap ring to lock the snap ring in a groove on the shock. Make double sure the perch fits all the way down over the snap ring to hold it tight in the groove.