



BIG WEENIES

Installing ZR-1 rear tires and wheels on any '88-94 standard model Corvette.

By HIB HALVERSON
PHOTOGRAPHY BY THE AUTHOR

If you're a VETTE regular, you probably remember a proof-of-concept vehicle that GM's Corvette Development Group built called the "ZR2." Nicknamed "The Big Doggie," this car is a fully streetable, 1989 Corvette Convertible fitted with the optional hardtop and powered by a 385-horsepower, port-injected 454 cubic-inch big-block. Big Dog's construction was supervised by Scott Leon, an engineer working on Corvettes at GM's Desert Proving Ground (DPG) in Mesa, Ariz.

It's doubtful that Chevrolet supported the program because it was considering a big-block version of the current platform, but valuable powertrain information came out of the project. Additionally, the Chevrolet Raceshop studied a "Big Dog kit" for a time, but the idea apparently died because of its projected cost.

A third objective of ZR2 was media exposure and, without a doubt, that was Big Dog's greatest success. In fact, that car and its partner-in-crime, a 450-hp, light-weight ZR-1 called "Snakeskiner," have been responsible for more magazine coverage than some of the

GM Design Staff's megabuck efforts. Besides a big-block, the Doggie had other interesting technical features, one of which was its rear tires: the same 315/35ZR17s used on the ZR-1. But look again ... the car doesn't have the King's fat rear fenders. How did they do that? Well, Scott Leon narrowed the car's rear track by a little over an inch, just enough to get the big, nasty Goodyear 315s under a standard Corvette's rear fenders.

Leon knew the ZR2 engine's 445 lbs.-ft. of torque at 3400 rpm (55 more than the LT5 and 105 more than an LT1 ... indeed, my friends, there is no substitute for cubic inches!) would alter the car's handling balance so that it would need an increase in rear tire size, but forget the handling. Big

Dog simply needed more rubber just to get all that ferocious torque to the pavement.

The car was a factory development project, so it had to look stock. As a result, production wheels and tires were mandatory. Ah, but there was something else: maybe, just maybe, Leon wanted a sleeper!

What he came up with was a combination of parts swaps and machining operations that allows a set of ZR-1 rear wheels and tires to fit into the rear wheel wells of a car *not having* the King's wide rear body work.

So who'd want to do the Big Dog modification? Well, anyone putting a big-block into an '88 or later Corvette. This is a very rare occurrence, due to high cost, but we are aware of a few cars that have been converted. More obvious candidates would be cars with modified L98s or LT1s. Obviously, the Big Dog rear track trick has a lot of potential applications and we wanted to know more, but first we needed a car to work on.

We contacted Mark McPhail, a Chevrolet Raceshop engineer who acts as Chevy's technical liaison with car magazines. As it turns out, he was planning the Big Dog trick for a '92 Coupe that was

based at the Raceshop's western outpost, California Street Rods in Huntington Beach, Calif. McPhail told us that the Big Dog's Daddy, Scott Leon, was coming over from the DPG to do the work. Mark and Scott agreed to show us, step-by-step, how the modification process works on any '88-94 Corvette.

Now come the inevitable cautionary statements demanded by a society that's literally drunk on litigation and overrun with wealthy lawyers: first, this modification violates Chevrolet's warranty on a Corvette. Do it, and warranty claims deal-

Before starting this job, you should review sections in the Corvette Service Manual dealing with rear suspension and drive axle. Here, the Chevrolet Raceshop's Mark McPhail does just that.



The first series of operations reduces the thickness of the caliper mounting plate by 13.8mm and relocates the suspension knuckle locating step.

Chevrolet dealer or from Zip Products.

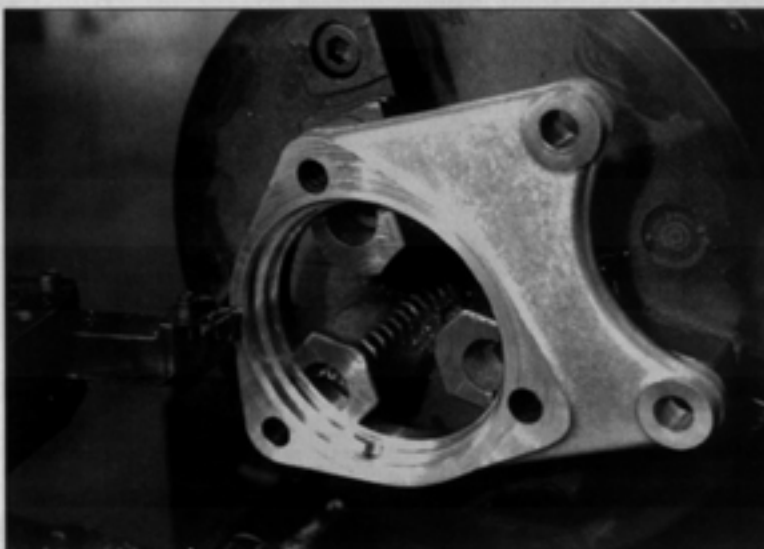
Next, you need some production drive-line parts. You can buy them new or, perhaps, find some of them at a wrecking yard. Either way, you'll step up to the counter, flip open your checkbook and buy: 1) a pair of rear spindles from an '84-87 Corvette (part No. 14087673); 2) a pair of 17x11-inch ZR-1 rear wheels (Nos. 10147988, L and 10147989, R for 1990 or 10174842, L and 10174843, R for '91-93) and a pair of 315/35ZR17 tires, available in Goodyear's GS-C, Eagle ZR or Eagle ZR-S tire lines. In the case of '93 and '94 base cars, it's advisable to upgrade the fronts to Z07/ZR-1 trim with wheels and 275/40ZR17 tires.

Block the front wheels, then get the rear of the car up on jack stands supporting

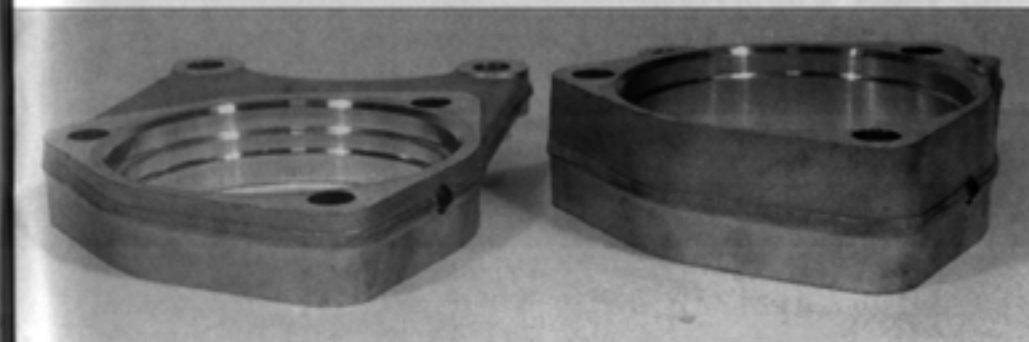
ing with rear suspension may be denied. Next, the Big Dog modification is suitable for off-highway use. While it is certainly legal, as far as state vehicle equipment laws go, to do to a street-driven car, you do it *at your own risk*. It has not been tested to the same durability standards as production pieces. The task of fitting 315 rubber on the back of a car without ZR-1 fenders is certainly *not* a bolt-on job. It takes advanced mechanical skills and a full complement of tools, and *requires* machine shop equipment.

Now, if you've gotten by all these discouraging words and plan to proceed, we suggest you get a Corvette Service Manual for the model year of car you are going to work on. You can order it from a

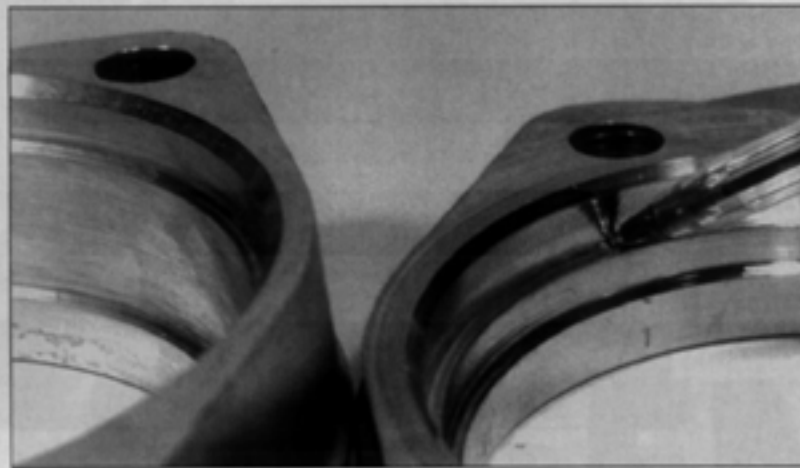
Both parts of this task can be done on a lathe. However, doing the first part on a mill and the second part on a surfacing machine would be a better choice.



This comparison shows the modified plate (left) and a production unit (right). The change in thickness is pretty obvious, but the new position of the knuckle locating step is not.



Yeah, you're right. This car's got two tires on the back. But, look closely—the ZR-1 tire on the right fits inside the fenders.



The pen points to the relocated step on the slimmed-down plate (right).

the frame as per the jacking instructions in the Service Manual. Do not do this work with the car supported by a floor jack alone. It's best to do this one side at a time, so from here on, we'll examine how to do the Big Dog mod on one side. Of course, the other side uses the same procedure.

The first step is to remove the rear wheels and tires. If you're working on a car with the same tire size front and rear ('88-'92, all; '93, w. Z07 only), don't get rid of them, yet. That's like throwing away money, and you'll need it to pay Biliary! Store them until your existing fronts are worn out. Then put the stored rears in place of the fronts. Break the worn-out tires off the old front rims and sell the wheels. You'll get the best value out of your tires that way.

Disconnect the transverse leaf spring. This must be done carefully to prevent damage to the spring. Put a three-inch section of 2x4 on the pad of a floor jack. Position the jack so the wood contacts the spring just inboard of the metal surround-

ing the spring eye. Jack up until the spring end is free of the spring insulator. Disassemble the spring bolt, insulators and nut. Slowly lower the jack until the spring is free.

Next, set the parking brake.

Break loose, but do not remove the spindle nut. Release the parking brake and disconnect the parking brake cable from the

brake caliper. Unbolt the caliper mounting plate from the caliper, then tie the caliper with a big tie-wrap or equivalent so that it's



The last nasty task is relieving the outermost part of the knuckle's inside diameter.



This job turned out quite neat because of the special abrasive wheel Leon used. However, using a carbide burr is just as functional.

Here we have three spindles with ABS rings. L-R: 1) '88-94 with ABS ring in stock position; 2) '84-87 with ABS ring in Big Dog position and 3) '84-87 with ABS ring in stock position. Yes, we know No. 3 is really only right for '86-87 because those were the only years when early spindles had ABS rings.

out of the way and the brake hose is not pinched or bent severely.

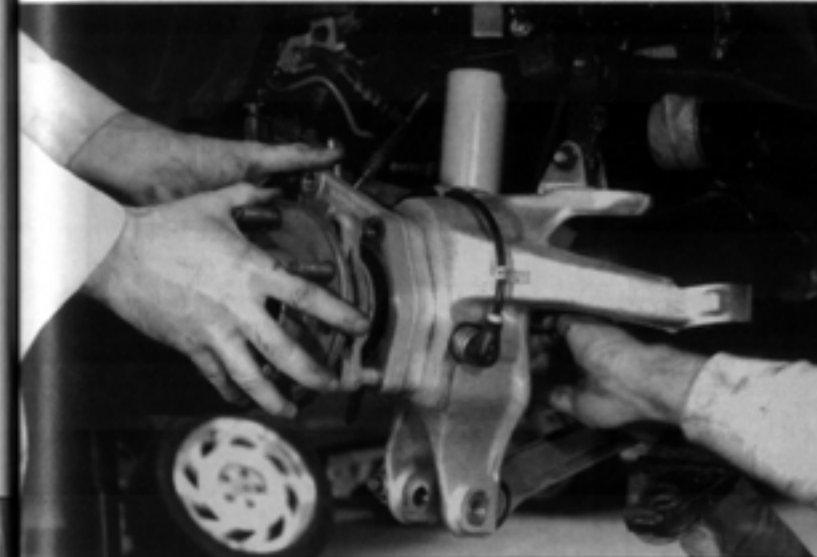
Remove the outer, lower control arm bolt and drop the arm. Remove the nut holding the toe control rod to the suspension knuckle and drop the toe rod. You may need a tie rod end puller to separate the two parts. Do not use a hammer or other impact device to break loose a stubborn tie rod. Remove the bolts holding the axle shaft outer end, then drop down the end of the axle shaft.

Tape the exposed ends of the universal joint so the caps won't fall off; you'll never find all the needle bearings if that happens. Remove the spindle nut. Tap the spindle

out of the wheel bearing/hub assembly with a plastic hammer.

Now, before you go any farther, find the wheel spindle washer that is on the spindle just above the anti-lock brake tooth (ABS) ring. That is a very unique and quite expensive, anti-noise thrust washer. It is coated with "unobtainium" lubricant. Do not touch the faces of the washer. Do not allow contamination of the washer's thrust surfaces. Handle it by the edges and store it in a clean plastic baggie. Lastly, remove the

Once reassembly begins, pay special attention to the reinstallation of the spindle washer. Handle by the edges and make sure it's oriented correctly.



After the spindle is installed and its nut torqued, the rest of the reassembly is pretty straightforward.

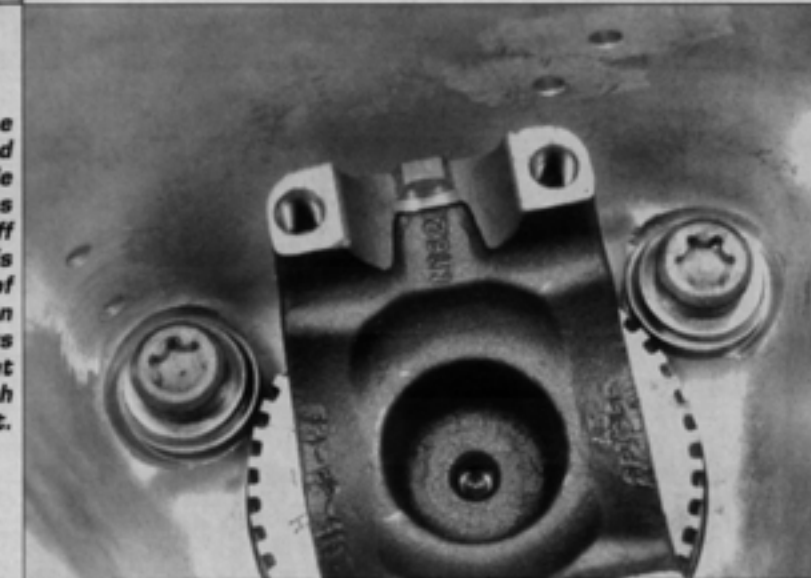
deeper in the plate, which effectively moves this step 13.8mm outward.

Step two of the mounting plate operation removes 13.8mm from the surface of the plate that faces the inside of the car. This operation can be done one of three ways. The best is with a surfacing machine such as that used to "deck" engine blocks or surface cylinder heads. Doing the job on a mill is also a good choice. It can even be done on a lathe and, in fact, that's how Scott Leon has done all the Big Dog rear track tricks to date. We must caution you, however, that if you don't have access to any of those pieces of equipment or do, but

three bolts holding the caliper mounting plate and bearing/hub unit, then disassemble those parts.

We're ready for the first machining operation: reducing the thickness of the caliper mounting plate by 13.8mm. (0.543 in.). However, before we cut down the plate, we must reposition the step inside the bore in the mounting plate that locates the plate on the rear knuckle. This operation must be done on either a mill or a lathe. Orient the side of the plate that faces inward toward the cutting tool. The step on the plate's inside diameter that is closest to the tool must be machined 13.8mm

With the knuckle and spindle assemblies mocked up off the car, this view, inside of the suspension knuckle, shows the spacers that are on each hub bolt.



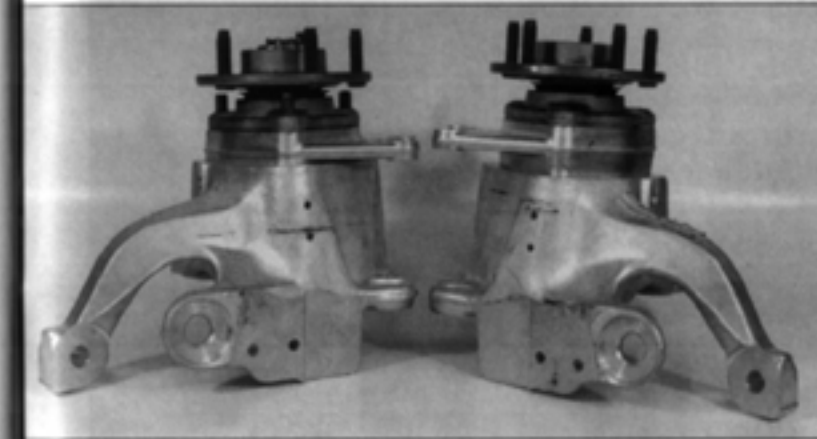
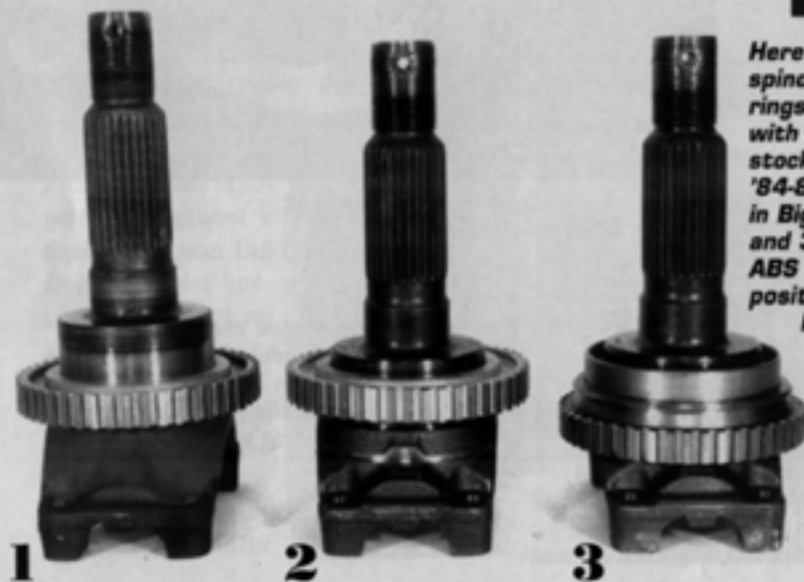
Both the stock and Big Dog modified (left) knuckle assemblies are mocked up. The 13.8mm difference between the two is clearly evident. The overall track width reduction is 27.6mm, or 1.09 in.

are unfamiliar with their use, have the job done by an experienced machinist.

Next, transfer the ABS ring from the stock spindle to the early-style unit you're going to use instead. It is imperative that this ring be seated on the early spindle in the same position, relative to the inside end of the spindle, as it was on the stocker. If this does not happen, your anti-lock brake system will not work.

Use the following procedure to ensure that the ABS ring goes on in the right

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Big Weenies

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place. Before the transfer, place both spindles vertically on a flat surface with the universal joint mounting end *down*. Lay a 12-inch straight edge over the top of the ABS ring on the late spindle you removed. Use the straight edge to mark a line on the replacement, early spindle.

The ABS ring transfer *must* be done with a hydraulic press. Also, it must be done with care because the material from which the ABS ring is made is very soft and easily damaged. Install the stock spindle into a hydraulic press and remove the ABS ring. Then press the ring onto your early-type spindle. Position the ring so the top is even with the mark you made earlier. After the ring is in place, apply "green" Loctite 290 thread locking compound right where the shaft comes out of the ABS ring. Do not use other types of thread locking compounds for this purpose. Loctite 290 has a "wicking agent," which causes the thread locker to penetrate into the space between the ring and the shaft. Once it dries, the ABS ring is locked in place.

The next modification is relieving the rear suspension knuckle (aka "rear wheel bearing carrier" or "rear upright"). Because we are moving the position of the rear wheel bearing/hub assembly inward, in some cases part of the hub assembly contacts the inside diameter of the knuckle. To see if you have this problem, mock up the part. If the wheel hub assembly won't seat on the caliper mounting plate, the knuckle needs to be machined.

This job can be done with the knuckle on the car using a carbide burr in a die grinder. Make sure you use eye protection! It may not end up looking as good, but it can't be seen once everything is bolted together. Be careful not to remove too much material, strive to keep the hole round and (a hot tip) spray the burr with WD-40 every once in a while to keep the teeth from loading up with aluminum. Remove any aluminum chips by washing the inside of the knuckle with some spray carburetor cleaner or equivalent, then blow dry with high-pressure air.

The last change that must be made is to space the rear wheel bearing/hub bolts properly. Since we've moved the hub inward, this must be done to prevent the bolt ends from contacting the hub. However, you cannot cut the ends of the bolts due to the remaining thread length being too

short. Six spacers are required. The dimensions of each are: .300 inch thick, 1.125 outside diameter and .500 inside diameter. The best way to do this is buy at least a three-inch length of 1.125-inch aluminum round stock. If you can't find 1.125, use more-common 1.250 stock, then, on a lathe, turn it down. Use the lathe to drill a .500-inch hole down the center. Lastly, cut off six (that's three per side) .300-inch-thick sections of the now-hollow round stock.

Place one of your new aluminum spacers on each bolt. Push the bolt through the back of the knuckle, then reinstall the caliper mounting plate and the bearing/hub unit. Torque each bolt to 66 ft.-lbs.

Slide the unobtainium-lubed spindle washer (remember, handle it by the edges) over your modified, early-style spindle and make sure it is seated against the spindle. The washer's lip should face outward or toward the threaded end of the spindle. From inside the knuckle, push the spindle through the bearing/hub assembly and install the spindle nut. Torque that nut to 164 ft.-lbs., then add the nut retainer and a new cotter pin.

Reattach the axle shaft and install the universal joint bolts. Jack the knuckle upward until it is approximately at ride height. Reconnect the lower control arm, install the bolt, washer and nut, then torque the nut to 107 ft.-lbs. Lower the jack, then reinstall the toe control rod, torque its nut to 37 ft.-lbs., then install a new cotter pin. Slide the brake rotor in place and reinstall the brake caliper. Bolt on your new ZR-1 tires and wheels. Head out for a test run, and try to light those big, nasty Goodyears.

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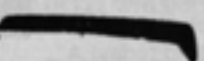
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