



▲ Adding the sublime-handling Griggs Racing Products GR40 suspension to the already sophisticated S197 Mustang puts it in danger of becoming a real car. The combination yields a gentle-riding, corner-carving road companion that will embarrass cars costing three times as much.

# Better Than Good

BRUCE GRIGGS LIKES TO BE FIRST, AND HE IS WITH A RADICAL SUSPENSION REVAMP FOR THE ALREADY SHARP-HANDLING S197

**W**hen we first drove the '05 Mustang, we marveled at its chassis. Compared to earlier models, it was as if BMW had built it—such was the improvement in chassis rigidity and precision.

Another thought crossed our minds during those first S197 drives: *This is a great Mustang. How much better can the chassis experts make it?*

We just sampled the new Griggs Racing Products equipment for the S197, and the

answer is plenty. The newest Mustang is a great car off the showroom floor, but it's still a mass-market automobile with all the safe understeer and cost-containment issues the term "mass market" implies. As is the company's style, Griggs has re-engineered the S197 Mustang suspension (mainly by replacing it), transforming the S197 into a no-compromises driving machine designed to thrill the most demanding and skilled among us.

Our drive in one of the first GR40-modified Mustangs, owned by Jeremy

Grossman, was at Buttonwillow Raceway Park. The '05 GT carried the full gamut of Griggs suspension equipment and brakes for the S197, but it was otherwise stock. This combination of high-dollar SLA front and torque-arm rear suspension with a stock powertrain (sans cats) would be unlikely in a Fox or SN-95, but it doesn't seem unusual in the ever-evolving S197 market.

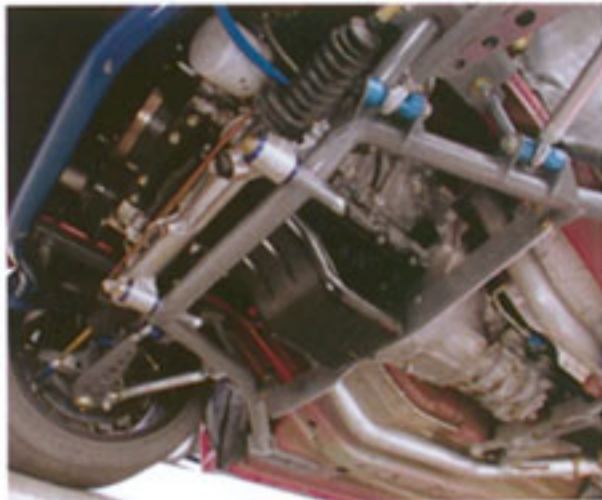
The drive was our typical race-pace sampling. As expected, the Griggs-modified S197 took to the track as if it had been born

Text and Photos by **Tom Wilson**

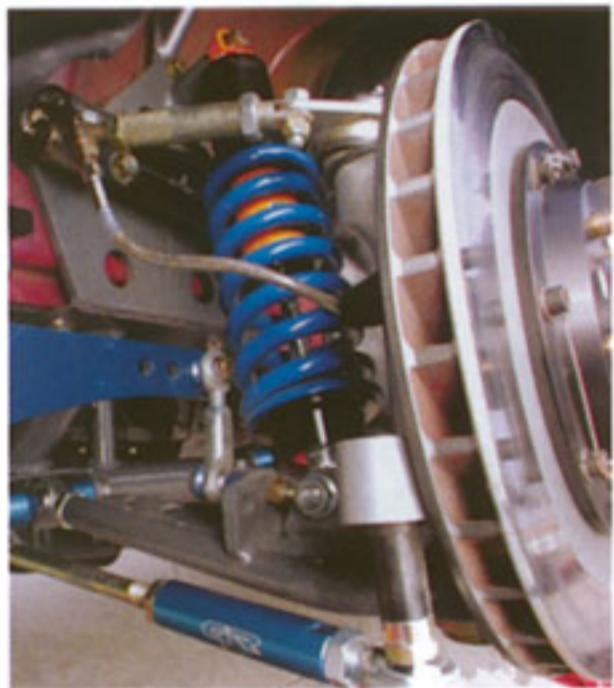
**Horse Sense:** Bruce Griggs' gear can make lions out of cats. We once sampled his 408ci Windsor-powered SN-95 with all the good suspension stuff at an open-track populated by high-dollar European marques. Those wankers in the 930 turbos are still in therapy wondering how a Mustang could cruise around the outside of them, and we're sure the aggressively driven Corvette that spun off trying to keep up never told his friends.



▲ On the S197 Mustang, it's the front suspension that needs all the work. Currently, Griggs offers only its up-market SLA frontend. It provides unreal precision and control in mid-corner—it's amazing to actually make minute corrections right through the corner apex.



▲ On earlier Mustangs, it's called a K-member, but on S197's, the two-piece subframe that holds the engine and locates the suspension is called a cradle. The Griggs cradle provides needed strength, relocates the steering and suspension pickup points, and eliminates many pounds of frontend weight, among other things. The separate rear crossmember section—the flat plate—and the fact the engine mounts are welded to the main tube section means engine swap requirements are easily accommodated. Griggs also reports the S197 chassis is precise. You still want to check measurements, but so far the company has found its suspension bolts in and requires no adjustments for precise component alignment (cradle cross-dimensions, and so forth).



◀ Peeking in from the front wheelwell, we can see the general layout of the coilover and twin A-arm system. As is everything else, the Griggs bumpsteer kit displayed prominently here is derived from the company's race cars.



▲ A tubular cradle gives a huge improvement in working room, such as around the steering shaft and headers. Griggs says the S197 steering rack is too short in length, so SN-95 racks are used in the kits. The company also offers high-precision racks for track warriors.

▶ Look to the top of this photo and the engine mount is visible. It's easy to see how various engine mounts can be accommodated as long as you specify what engine you're using when ordering your GR40 parts.



## GRIGGS BRAKING SYSTEM

Griggs has developed its own braking system, the 4on4. It packages affordable cost with excellent performance and first-rate modulation. The front and rear calipers feature four pistons each, hence the name.

### 4ON4 BRAKES

Far from being a suspension specialist, Griggs Racing works bumper-to-bumper. Among its latest projects has been an in-depth exploration into Mustang performance brakes. Using laboratory and track testing, Griggs has developed its own line of four-wheel, four-piston disc systems, the 4on4 brake.

All too briefly, the time during the development of the 4on4 brake kit was one of those rare times when carefully tested and selected affordable hardware proved equal to the high-dollar stuff. As the end result, Griggs has rotors and four-piston calipers made to the company's specifications, which are offered in brake kits. The cast-calipers keep costs in line, with complete kits—four disc brakes, master cylinder, and all hardware, minus hoses and pads—starting at \$2,860. Griggs also makes a compelling argument regarding low operational costs, as its pads are priced under market.

The technical highlights include some interesting facts. Griggs says the company's lightweight, relatively inexpensive, cast, lug-mounted, four-piston calipers are actually more rigid and exhibit less torsional flex than many higher-dollar calipers. With relatively small piston areas, these calipers are compatible with Mustang ABS systems until you get into Griggs' larger racing-only brakes. Full ABS action is preserved. That's safer on the street and faster on the track.

The 13.5-inch front and 12.19-inch rear discs benefit from huge testing investments by DaimlerChrysler and Greyhound, while the pads are the latest from circle track racing. Pad dimensions were specifically chosen in popular sizes for maximum availability and low cost. The hats, brackets, and adapters are made by Griggs in the U.S., and the calipers and discs are also U.S. made.

Griggs 4on4 systems fit on either SN-95 or Griggs billet spindles and use a stock Cobra master cylinder. They're available with or without a small drum emergency brake inside the rear discs. We drove the brakes at Buttonwillow and were impressed by their sensitive feel and modulation. Especially so was the linear release—the best we've ever felt.



there, exhibiting the excitingly neutral handling and superb balance we've come to expect, but more so. Precision and bite were abundant, with newfound precision available right through the corner apex. The resulting speed from the stock powertrain was phenomenal. No stock 5.0 ever dreamed of such velocity with only a chassis under it.

This really was seductive speed, with the quiet exhaust, fully housebroken engine manners, stock interior, and so on. The car was buttery smooth and surprisingly supple, and it wasn't until we began reeling in some of the more powerful cars on track that we realized how fast we were lapping.

We were also amazed to learn the Griggs S197 kits don't have any chassis reinforcement. While every Griggs suspension part is made of sterner stuff and is carefully designed to retain its shape under high loads, not a single brace is used. Ford's S197 chassis is that stiff. To a magazine staff raised on Mustangs with the rigidity of cooked spaghetti, this is an amazing development.

The only negative is the S197's weight. These new cars are hundreds of pounds heavier than previous Mustangs, which were built too lightly and require all sorts of heavy and expensive frame reinforcement before they dream of handling this well. In the Griggs-equipped S197, the weight manifests itself in what we at first swore was a lack of grip. Not bad, mind you, but the car slides wide as it reaches the limit. Then we understood the tires were simply being asked to contain 4,000 pounds of car and driver at such high speeds.

This is not to say the Griggs-equipped S197 felt heavy. It actually feels lighter than stock, thanks to weight reduction from the Griggs front crossmember, along with lighter steering from the more accurate, flatter suspension and steering geometry. It's just so accurate, balanced, secure, and easy to drive fast that the tire is the limit. Without a load of understeer to mask the front tire's response, it's much easier to drive the tire to its limit. Given the balance the Griggs gear gives the S197 chassis, the front and rear axles give up at nearly the same time, and *voila*, you might think the tires are lying down on the job.

Not unexpected, but worth mentioning, was the Griggs car plushness. The smooth ride is a Griggs characteristic, as Bruce Griggs wants suspension that actually travels; his cars invariably ride softly with only slight body roll.

## NUTS AND BOLTS

Stock, the '05-and-later Mustangs use a strut front and three-link rear suspension. It's a good arrangement, but Ford builds it with too much understeer. The steering could be quicker and more communicative,

and the rear axle hops under hard acceleration. Furthermore, the S197's front lower ball joint, spindle, and K-member are inexplicably lightly built and aren't ready for higher loads imposed by better/larger tires, according to Griggs.

Griggs' goals for the S197 suspension were the usual suspects—less understeer, better steering feel, faster steering, more precision, and so on—along with the specific need to eliminate wheelhop and strengthen the front ball joint, spindle, and K-member.

Because not everyone can afford an SLA frontend, Griggs would normally offer a strut frontend as its entry-level and the SLA as an up-market option. But the company prefers Koni dampers, and Koni has yet to import struts for the S197, so the Griggs strut-based suspension is yet to come. In the meantime, the all-out SLA option is the only choice. If you have the financial stones, it's the best option there is.

In back, Bruce believes a three-link suspension isn't bad, but a torque arm is better. The Griggs Racing Products' offerings at the rear begins with improvements to the three-link and move on to a torque arm system.

## FRONT SUSPENSION

Griggs' front suspension begins with a new K-member—actually it's a pair of crossmembers that Griggs collectively calls the front cradle. It substitutes SN-95 spindles for the flexible S197 variety, uses new triangulated lower control arms, and adds upper arms and the mounting brackets, replacing the strut. This SLA system naturally takes a coil-over spring/shock unit. The sway bar is also replaced for rate and geometry reasons, and the steering rack is replaced with the earlier SN-95 unit because the S197 unit is too short, as are the stock S197 lower control arms.

In other words, the entire front suspension is new. Its advantages make an impressive list. The system is 30 pounds lighter than stock, headers have maximum room, engine swaps are much easier because the mounts can be adjusted when ordering the kit, the ride height can be brought down to a mere 2½ inches (measured at the main crossmember), the geometry is right, the system is rigid, and huge 285-18 tires on 10-inch wheels can be accommodated under the stock sheetmetal. Installation of this front suspension calls for drilling four 7/16-inch holes and no welding. The rest is bolt-in.

An important option is Griggs' newly developed spindle. This strong billet-aluminum piece provides a 2-inch drop in ride height for a lower center of gravity, but without the geometry-destroying characteristics of lower springs or other tricks. The catch is the cost. The billet spindle, while the right way to lower a performance car, retails for \$2,999.95,



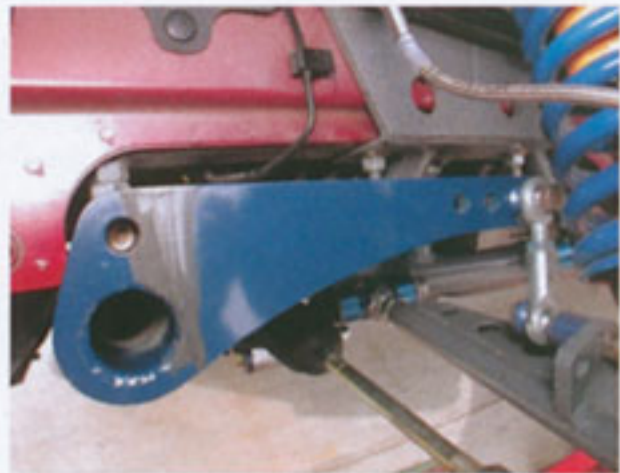
▲ Looking from the ground up, the lower control arm's fabricated A-outline is easy to spot. Griggs uses a combination of the company's fabricated parts and off-the-shelf circle track racing bits to build its control arms and mounts. This contains costs—somewhat—and allows easy replacement in case something gets bent.



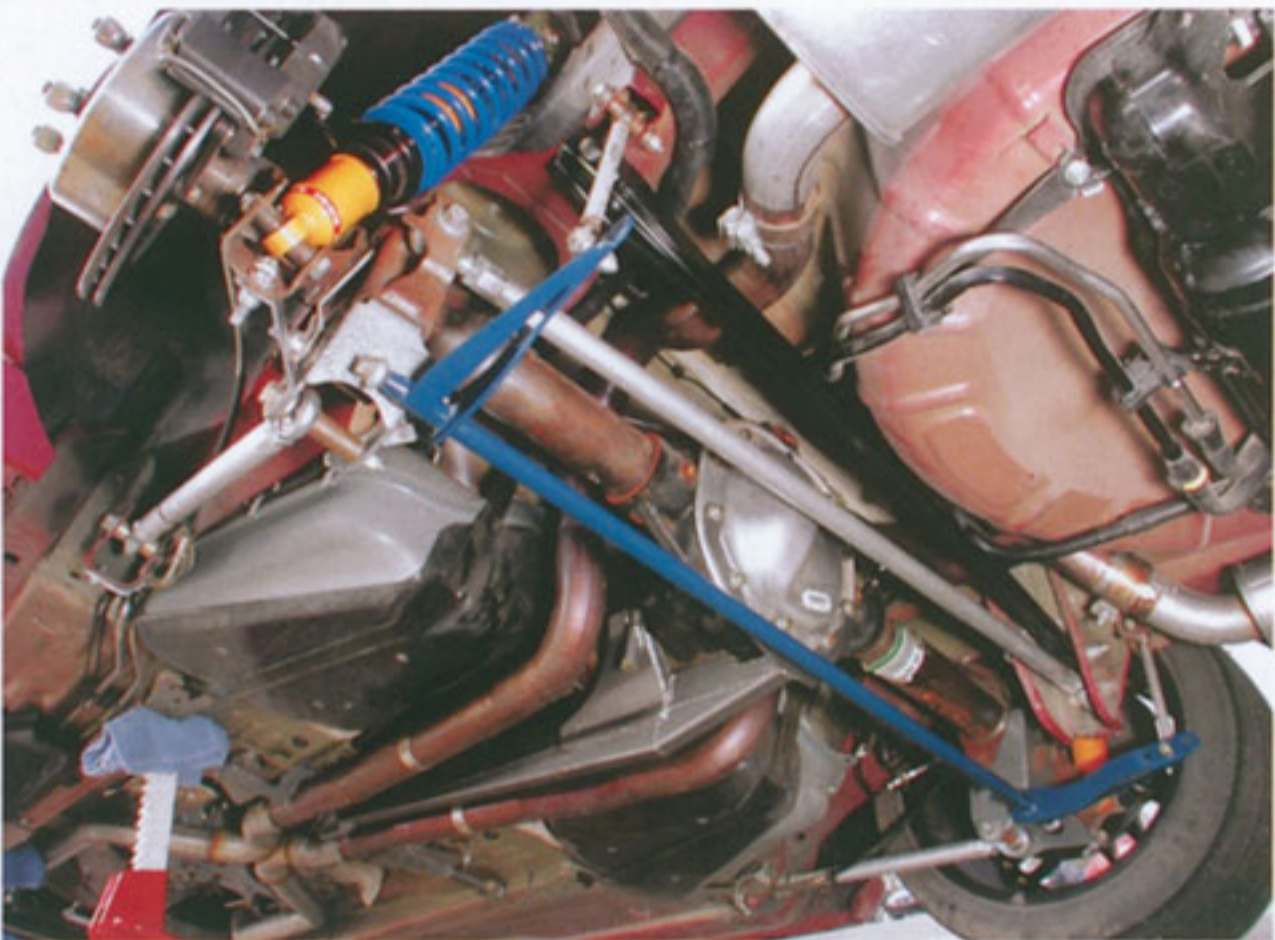
▲ Similar to the lower A-arm, the upper A-arm is fabricated from readily available parts where possible. Also shown here is the plate assembly the upper A-arm attaches to and the much-stronger-than-stock Griggs upper ball joint.



▲ Pointing the camera up toward the otherwise-unused shock tower gives a light case of vertigo, but it allows inspection of the upper A-arm mounting brace. The entire frontend kit is a bolt-in affair.



▲ When a racer says big tires will fit, he's not saying they won't occasionally show their love-of-chassis somewhere, as this close-up of the front sway bar reveals. The Griggs sway bar is adjustable, designed for exceptional freedom of movement, and it's hollow for weight reduction.



▲ While Fox and SN-95 Mustangs need immediate attention to their rear suspension, the S197's three-link rear is workable, and Griggs offers parts for those looking to retain it. For ultimate control, however, "the torque arm is still best," says Bruce, "and our S197 demonstrator was so equipped." It also had a Griggs adjustable Panhard bar, as the better-yet Watt's link was held up at the time due to a temporary lack of TA differential covers.

including brake hats. If you want the ultimate in low ride height and suspension geometry, the spindle is a must. General street performance cars will do well with the SN-95 spindle in the standard kit and save three grand in the bargain. Racers will have a tough time winning without it.

Griggs offers its front suspension in three levels: Ultimate Street Performance, Autocross/Open Track, and World Challenge/American Iron. The first two are similar, differing mainly in quiet rubber versus noisier rod-end attachments. They're also close in price at the mid-\$6,000 range, including everything in front suspension: coilover shocks, arms, bars, front cradle, and so on. These kits use the SN-95 spindle, with the billet Griggs spindle optional. The pure race World Challenge/American Iron front suspension comes only with the billet spindles and rod-end bearings, explaining its \$9,320 price.

## REAR SUSPENSION

Griggs' complaints about the Mustang's rear three-link design include too-short links, which quickly derange forward bite when compressed, along with a migrating instant center. In other words, rear traction changes with throttle application, leading to instability. Rubber bushing compliance is naturally an issue with this stock suspension, which is part of the wheelhop problem. Griggs also thinks the stock lower shock mounts are too weak, especially if coilovers are fitted. If the car is lowered, the antisquat and other beneficial geometry is lost.

The Griggs rear suspension solutions begin with an adjustable aluminum Panhard bar, which is an optional steel bar with quieter rubber bushings. For even better lateral axle control, Griggs' existing Watt's link can be fitted to the new car using a bolt-in mounting and TA differential cover. It's an extra-cost option for those wanting the ultimate in lateral axle control.

To correct the lower control arm geometry, brackets are provided to lower the arm's attach points on the rear axle. These brackets also pick up the end links from the free-moving Griggs rear sway bar. Once the brackets have been fitted, Griggs' Koni-based coilover shocks and springs can be fitted.

The lower control arms are replaced with stiffer Griggs steel and urethane bushing units for street applications, or aluminum and Teflon bushing parts for open-tracking and racing.

Griggs says the new Mustang will still experience wheelhop with all the parts in place, the trouble being the compliance in the three-link bushings. They offer an adjustable, harder-bushed three-link replacement arm to cure that issue. Be advised that for the ultimate in precise control at the limit, the company's torque arm is the way to go.

As with the front suspension, everything in the Griggs rear S197 suspension bolts in with two exceptions: the lower shock

brackets and part of the torque arm's forward mounting bracket (crossmember). Both of these points can be bolted in during installation, then carefully driven to a local muffler shop or anywhere else they can be welded in place. Griggs also advises a slight modification to the H-section clamps in the exhaust system is necessary for torque arm installation.

So there's a general overview of the Griggs S197 suspension. There are more options regarding shocks, spring rates, bushing types, and other details. See the newly redesigned Griggs Web site for more details. When ready, call Griggs and discuss your goals for your particular car, then order the parts.

## GRIGGS' SUGGESTION

When it comes to which parts should go on in what order, there isn't much to be said about the frontend. It's either all or nothing, as all of those parts depend on each other.

The rear suspension is more flexible. Griggs suggests beginning with the company's lower control arms and brackets, then adding the coilover shocks and the company's brackets. This will give superior dampening and adjustable ride height, along with more precision from the lower arms.

Next, fit the Panhard bar and sway bar. This would give a more balanced roll couple (roll resistance between the front and rear axles) and correct the roll center for ride height lowering. You may be happy at this point, so the final step may be to simply fit the better bushed three-link pieces.

For the tops in handling, however, the final stage would be to replace the Panhard bar with the Watt's link, remove the three-link, and add the torque arm. Just fit the Watt's link and eliminate the Panhard bar from the get-go if you believe that's where you'll eventually finish. The same goes with the torque arm. Griggs has upgrades on its rear sway bar when you reach this level.

General options are double-adjustable Koni shocks (\$700), solid engine mounts (no charge) on the front cradle, and precision steering racks (price not set at press time).

We've already gushed about the fun all this gear brings, so at this point we'll let the photos and captions tell the rest of the story. That, and you're sure to hear some great word-of-mouth things from early adopters in your area.

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## SOURCE

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