

SHOCK VALUE

We Test Every Shock in RideTech's Arsenal Using NASA Black Box Technology.

By Mike Finnegan

Photography: Mike Finnegan and RideTech



> Our test car was a Pro Touring-style '70 Buick GSX powered by a TA Performance Stage 1 455 that pumps out 538 hp. We beat on this thing mercilessly, and the fuel-injected powerplant never whimpered. A belt-driven oil pump, a big PRC aluminum radiator with dual 11-inch fans, and a huge fuel tank with a generous sump made the Buick the perfect corner-carving test car. The engine spins a ZF six-speed hooked to a Moser 12-bolt with an Eaton TrueTrac and 4.11s. Stopping power comes from Wilwood discs and calipers, and the GSX rides on a complete RideTech Street Challenge air suspension system that includes tubular control arms and sway bars.

Ever wonder how a manufacturer builds a shock to elicit a great ride and handling characteristics when it's installed into a specific car? We assume lots of road testing is the key. RideTech showed us that was just part of the equation. The secret to its shock development comes from road testing, sure, but the company also employs a system developed by NASA that measures the frequency of movement felt by astronauts during space shuttle launches. A variant of that device now helps Ride-

Tech improve the valving of its shocks. The ride meter is a small box placed on the floor of a hot rod directly beneath the driver seat, and the data it records during a road test provides instant feedback that can turn into a smoother ride and faster lap times on the racetrack.

During the late '70s and early '80s, NASA subjected astronauts to a barrage of tests inside a roller coaster-type simulator. The simulator shook at frequencies ranging from 0 to 40 Hz (which is all you typically see

in an automobile on the street) with incremental changes and then asked the test subjects to report which frequencies made them feel ill or uncomfortable. An algorithm was created using this feedback, and it has been modified over the last 25 years and applied to OEM auto design as part of vehicle suspension development procedures that prevent passengers from barfing their brains out when running over potholes in new cars.

The recorded data consists of input from several linear ac-

celerometers built into the ride meter. One measures the vertical motion of the car, another keeps tabs on the horizontal positioning, and another measures any change in lateral direction. There are also two rotational accelerometers, one measuring pitch and the other roll. The box is active as the car is driven over a measured stretch of road that tests the car's suspension. Once the accelerometer data is recorded, software converts each data group (by accelerometer) to the frequency domain to apply

the NASA algorithm. The result is five distinct ride numbers, one for each axis of vehicle movement, that add up to the vehicle's total ride number. The lower the number the better the car purportedly rides.

RideTech offered HOT ROD an inside look at the testing it conducts to develop shock-valving parameters for its ShockWave air spring products using the ride meter. We rode along in the company's in-house Buick GSX test car during road testing and also made a ton of laps on an autocross track to see if RideTech's more expensive adjustable shocks work better than the cheaper ones. Because the conditions weren't controlled, and because we didn't have a professional driver behind the wheel, the lap times don't reveal much other than it's possible to go fast with all the shocks we tested. But the data

the ride meter gave us put into perspective the differences in shock design as we beat on the Buick with every shock in the RideTech arsenal, as well as a pair of competing coilovers.

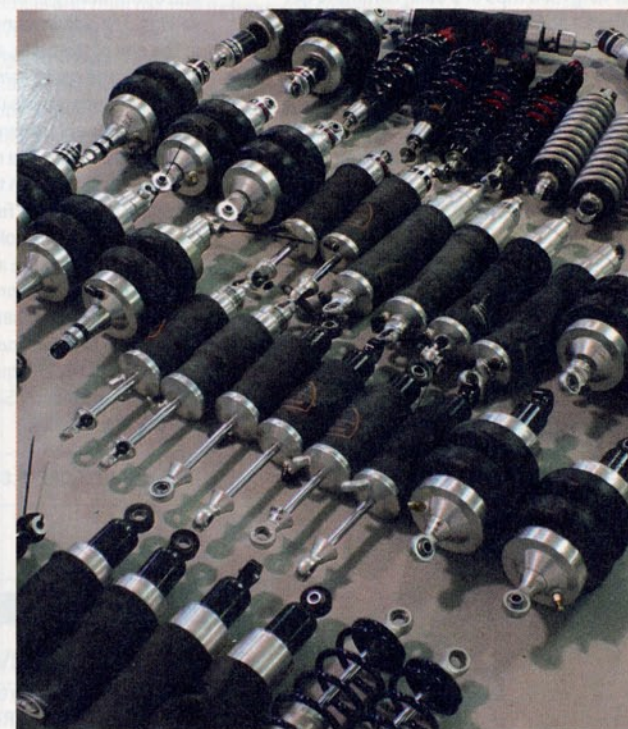
The short story is we found that all the shocks tested are suitable for the average street car that sees the occasional track day. Those of you who spend more effort chasing lap times than trophies will want to opt for the adjustable units. At the end of the day, your wallet, performance goals, and ego will likely dictate which shocks you purchase. But at least you know that any of these shocks will work well. You just have to decide if you want to make adjustments by crawling under your car, pushing a button, or not at all. And if the smoothest ride is your goal, you win, because you get to buy the least expensive stuff.



> We rode shotgun in the Buick during the ride-quality testing, watching the output of a laptop. The Buick was driven at 35 mph over the same stretch of road in both directions with each set of shocks while the ride meter did its thing. The less the body moves over rough road, the lower the score and the better the ride, according to the meter.



> Testing commenced in and around Mid-American Air Center in Lawrenceville, Illinois. A vacant portion of the old airstrip served as the autocross track and was hard on tires. We shredded through a set of BFG KDW fronts halfway through testing on the half-mile course. The quarter-panels weren't happy about rock-spattering forays outside of the cones, but the RideTech guys just shrugged it off, worrying more about getting results than saving the GSX's paintjob.



> We tested two different sets of coilovers and cycled through four different series of RideTech ShockWave air springs. ShockWaves are unique because the damper is built into the air spring using a patented mount instead of being mounted separate from it. This saves mounting space and, in most cases, the unit will bolt into the factory mounting location.



BLACK SERIES

> The valving of RideTech's least expensive damper/air spring combo is purposely geared toward a soft and cushy ride. The steel body, twin-tube unit would be perfect for long road trips or a daily commute yet offers a surprising amount of control in the corners and over the rough stuff. With the Black Series dampers controlling the suspension, the Buick ran less than a second slower than the fastest average lap times with the more expensive dampers.

RIDE METER SCORE: 8.3



MASTER SERIES

> The Master Series damper is also a twin-tube design, but with an aluminum body and optional single- or double-adjustable valving. The adjustment knobs are located at the end of the body, and you'll have to get under the car to turn them. We tested the double-adjustable units and found the Master dampers transmitted more road feel to the cockpit. The ride was noticeably stiffer than it was with the Black Series dampers, and the car felt more stable and less mushy over potholes and uneven road. On the track, the ability to adjust the rebound and compression rate was a bonus, and the car seemed a bit more predictable in the corners. The Buick was almost a half second quicker around the track with the Master Series dampers versus the Black Series.

RIDE METER SCORE: 8.68



SELECT SERIES

> When we swapped in the steel-body Select Series dampers, we eagerly pushed the ride-adjustment button on the dash, and the Buick went from a firm yet comfortable ride to attack mode, with a no-nonsense demeanor and a grippy feel. There is a discernible difference in the ride quality even over smooth sections of road, and we were able to run over potholes faster without fear of the car bottoming out. On the autocross, the soft setting showed a 0.407-second average improvement over the base Black Series, and on the performance setting, the improvement was 0.915 second on average (though we only logged two passes instead of the three-pass average we had with the other shocks). Compared with the Master Series, the Selects were on par when set soft, but 0.458 better in the aggressive mode. However, due to human driving variances, we actually saw the best single lap time of the day on the Select Series on the soft setting.

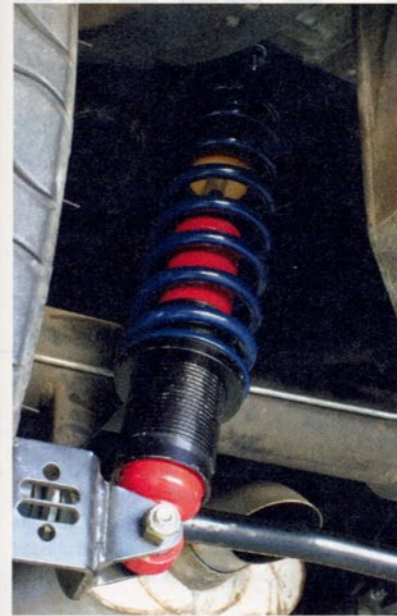
RIDE METER SCORE: 8.54



RIDETECH COILOVERS

> RideTech's coilover starts with a forged-aluminum body with a durable hard-coated finish, and a 5/8-inch-diameter shaft. Rebound adjustments are made with a 26-position knob, while the compression valving is fixed. These coilovers ride great and flat out work. While the difference in lap times was minimal, we did lay down the quickest average on these particular dampers. The Buick was very easy to maneuver coming in and out of corners, and finding the edge of traction yielded predictable results when powering through tighter sections of the course. On the road, the car felt slightly stiffer than the Black and Master Series units, but not stiffer than the Select Series on its firm setting.

RIDE METER SCORE: 7.92



KONI COILOVERS

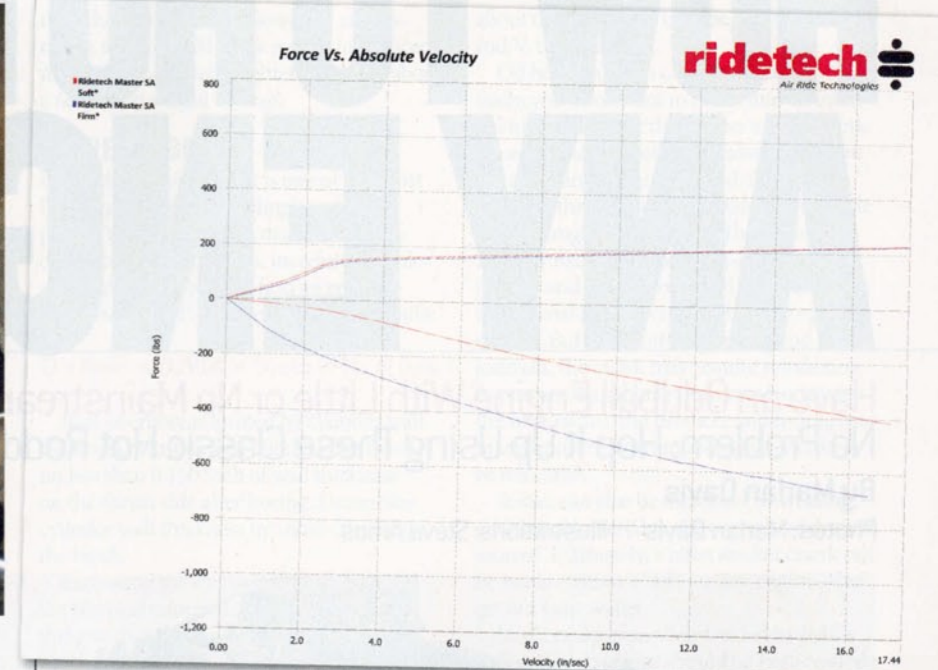
> We had to throw at least one competing shock into the mix to see how RideTech's stuff stacked up against the competition, so we bolted on a set of Koni's 30 Series dampers. These are a monotube design with a steel body and four rebound position settings. The ride quality was firm but not too aggressive on the open road. The car soaked up potholes well, and the road feel and noise transmitted to the cockpit were minimal. On the autocross, the car ripped around the corners and was very predictable and easy to drive. It turned in average lap times that were three tenths of a second quicker than the Select Series dampers.

RIDE METER SCORE: 7.17

DAMPER TYPE	LAP 1	LAP 2	LAP 3	AVERAGE LAP TIME	PRICE (PER PAIR)
RideTech Black Series	50.445	50.755	51.084	50.761	\$599.00
RideTech Master Series DA	50.629	49.375	50.909	50.304	\$900.00
RideTech Select Series (soft setting)	49.254	49.503	52.305	50.354	\$1,200.00
RideTech Select Series (firm setting)	49.827	49.866		49.846	\$1,200.00
Koni (coilover)	49.873	50.218	50.368	50.153	\$650.00
RideTech (coilover)	49.766	49.770	49.926	49.820	\$650.00

Runs were excluded if any cones were knocked over.

> Lap times are a good indicator of a car's performance, but we must remember that there's still a human behind the wheel and there are many variables that can influence how quickly a car goes around the track. Consistency is not easy to achieve, and the relatively short duration of our test course will not highlight the tendency of more expensive monotube shock designs to maintain their performance over a longer period of time versus twin-tube designs. **HRM**



> This graph shows the amount of force the RideTech Select Series shocks produce versus how quickly the shock cycles. The red line is the soft setting and the blue line is the firm setting with the rebound cranked all the way up. On the firm setting we see that the shock has a progressive rate from 0 to 16 inches per second of travel, and there's a lot of pressure initially as the tire hits a pothole and then the rate flattens out. Switch to the soft setting and we see an almost regressive rebound damping rate as the ride becomes more compliant and softer. The left side of the graph shows the force in pounds. Positive numbers on the force scale indicate the compression stroke, which does not change significantly because it is not adjustable. Negative numbers on the force scale indicate the rebound stroke, which is adjustable. The coilover exhibits up to 150 pounds more force as it extends during the rebound stroke on its firmest setting.

SOURCES

KONI NORTH AMERICA; Hebron, KY; 859/586-4100; Koni-NA.com
RIDETECH; Jasper, IN; 812/481-4787; RideTech.com