

In the mid-1960s Shelby American took a secretary's car and turned it into a formidable racer. It won from coast-to-coast and in the UK and Europe too. Today the Shelby GT350 is as competitive as ever and perhaps even more fun. BY COLIN COMER

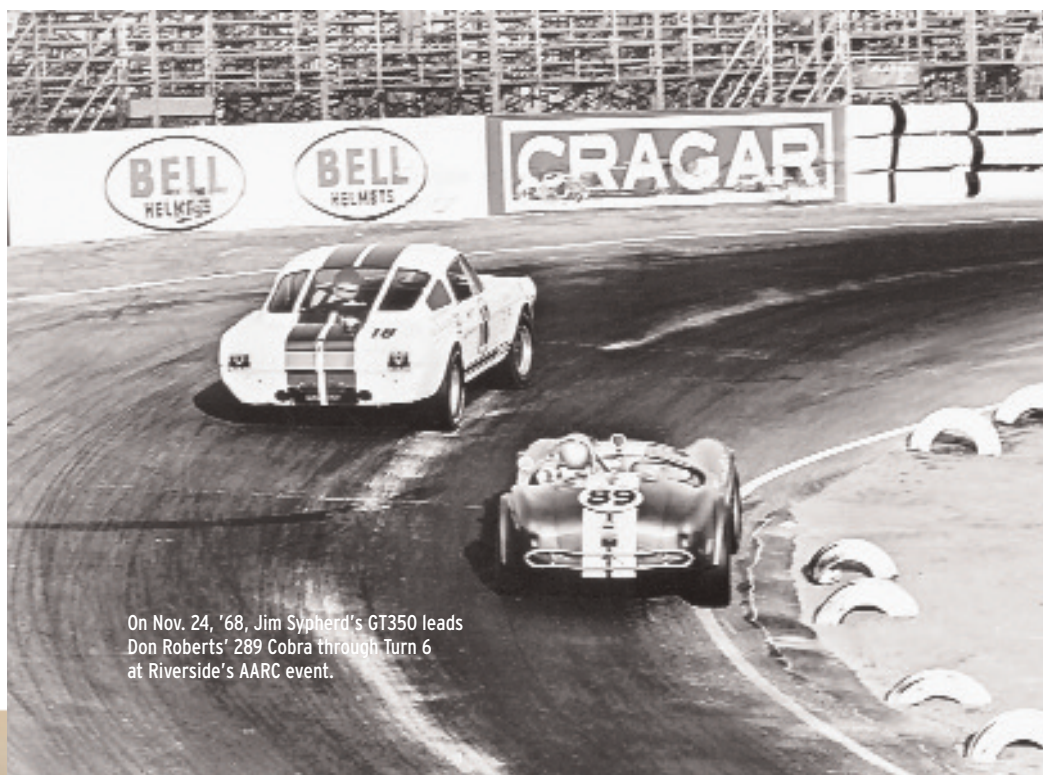


ONE TRICK PONY

Author Colin Comer races No. 51, his '66 GT350 65051, followed by Gary Moore in No. 98 at Infineon Raceway during the 2010 SAAC National Convention.



PHOTO T.J. GREWAL



On Nov. 24, '68, Jim Sypherd's GT350 leads Don Roberts' 289 Cobra through Turn 6 at Riverside's AARC event.

PHOTO: PETE LUDWIG

In 1964 Ford introduced the world to a new breed of pony—Pony Cars. Using the compact Falcon chassis, the new Ford Mustang was an overnight sensation. While Ford had predicted they wouldn't even sell 100,000 units in the first year, the new-for-1964 Mustang had people waiting in line to buy every one faster than Ford could build them. Within the first 18 months of production more than one million Mustangs had been sold. But Ford wasn't happy with huge sales alone. They were touting themselves as the "Total Performance" company, and the Mustang had a serious identity problem for this purpose. It was viewed as a toy, a secretary's car—a cute and novel device for mundane day-to-day use and nothing any red-blooded young performance car buyer would want. It was certainly not holding up its share of Ford's Total Performance image.

The Mustang needed teeth to survive. It needed to go racing. Ford tried in vain to get the Mustang homologated for SCCA B/Production competition with little success. It soon occurred to them that they had the best man for the job already in their camp—Carroll Shelby. With Shelby's connections within the SCCA, the road to homologation would undoubtedly be much smoother, not to mention faster. Somewhat reluctantly, in late July 1964 Shelby agreed to take on the project and get Ford's cute little secretary's car racing.

SCCA homologation of the Shelby Mustang for the 1965 racing season required 100 production versions ready for inspection by January 1, 1965. Important decisions about what kind of car they needed to build had to be made quickly. The SCCA mandated that a production car could have its suspension or engine modified for racing, but not both. This led



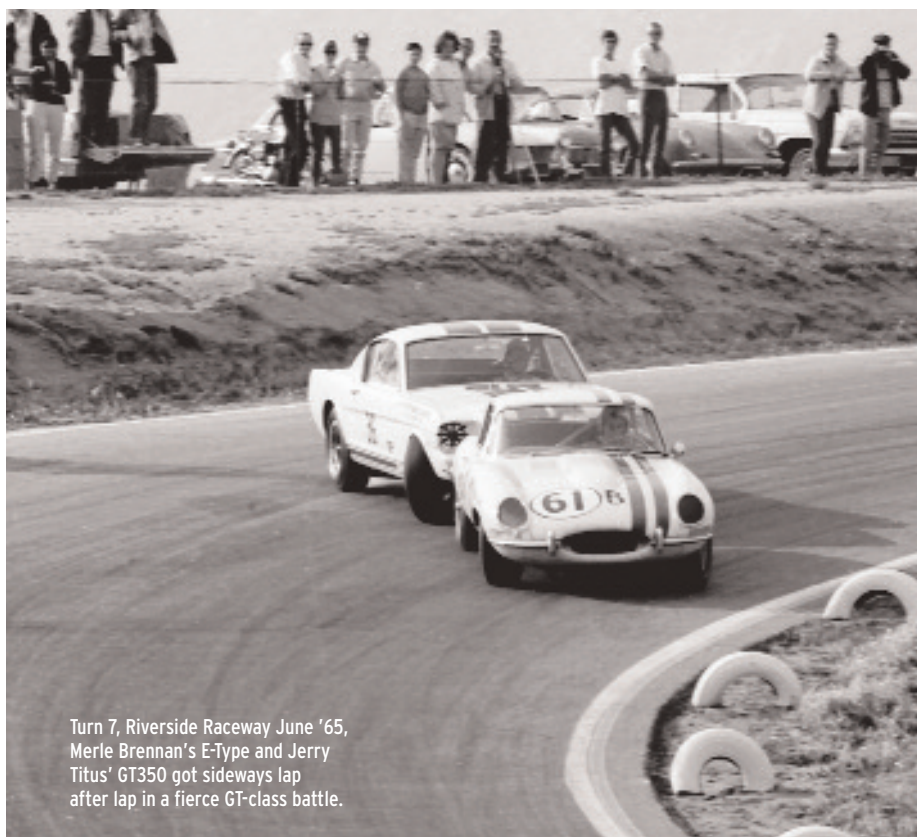
R Model 5R106 with its first owner Dick Jordan gets attention at Wilmot Hills in 1966.

PHOTO: COLIN COMER COLLECTION



In 1997, Sir Stirling Moss raced a '66 GT350 at the Monterey Historics.

PHOTO: KYLE BURT



Turn 7, Riverside Raceway June '65,
Merle Brennan's E-Type and Jerry
Titus' GT350 got sideways lap
after lap in a fierce GT-class battle.

PHOTO PETE LUONGO

car, the name won't matter, and if it is a bad car the name won't save it."

One Trick Pony

The Mustang, in stock form, was a less-than-inspiring track car. But with simple modifications it became quite competent. By December 1964 Shelby had recruited Chuck Cantwell away from GM to be the GT350 project manager. Cantwell recalls by the time he arrived at Shelby American that the basic suspension design for this new race car had already been developed after track testing various components on Mustang notchback coupes with Ken Miles at the wheel. The rest of the details for the GT350 fell into place after further development work and track testing, much of which was done by Cantwell, an SCCA racer himself, after being shown Willow Springs from the passenger seat of the first R Model with Ken Miles at the wheel. How does a day in your office compare to Cantwell's days at Shelby? Bob Bondurant also joined Miles and Cantwell in the role of track test pilot.

The result of all this testing was Ford building the base Mustangs that would be converted to GT350s with Shelby's specifications. These "knock-down" units were assembled at Ford's San Jose plant. They were fitted with K-Code 271hp, 289cid engines; Borg-Warner aluminum T-10M 4-speed transmissions; Ford's heavy duty 9-in. rear axle with 3.89:1 gears; 11.3-in. four-piston Kelsey Hayes front disc brakes with semi-metallic pads; huge Galaxie wagon 10x2.5-in. rear drum brakes with special sintered metallic segmented shoes; and 15x5.5-in. heavy-duty Kelsey-Hayes stamped steel wheels, the same ones fitted to Ford police cars and station

to Shelby's decision to use the new 2+2 Fastback Mustang with Ford's excellent K-Code, 271hp solid-lifter 289 engines as his starting point. Shelby American would modify the suspension and chassis but leave the stock K-Code alone with the exception of bolt-on parts. This would be the street version, and for the race version they would just have to lighten the car up a little and modify the engine to race specs. This decision made perfect sense, as Ford would have to warranty the street version, and with stock Ford running gear it was no

more of a liability than a standard Hi-Po Mustang.

This new Shelby Mustang needed a name. According to Shelby, nobody could agree on one, and in one of many meetings held on the subject Shelby turned to SAI chief engineer Phil Remington and asked him what the distance between the race and production shops at Shelby American were. Remington's response was "about three hundred and fifty feet" to which Shelby said, "That's what we'll call it—GT350." Shelby reasoned, "if it is a good

5R107 was sold new to Jochen
Neerpasch in Germany. The car
had many wins in Germany, Italy,
Austria, Netherlands and
Czechoslovakia from 1967-80.



PHOTO COLIN CONNER



The engine compartment of 5R107, showing the fresh air plenum and stamped steel rocker covers with tall breather tubes, as fitted to R Model 350s.

PHOTO COLIN COMER

wagons. No hoods were fitted, and the entire rear seat assembly was deleted. Radios were not installed, and in their place were radio delete plates.

While the “Street” and “Competition” (or R-Model) versions of the GT350 were quite similar, we’ll focus on the specifications of the Competition cars, of which 36 were originally produced by Shelby.

The Right Stuff

Once at Shelby American, the front suspension upper control arms were lowered 1-in. simply by drilling two new mounting holes per side. Although labor-intensive to do, it corrected the absurd camber gain of the stock Mustang setup, as well as pre-loaded the springs—effectively raising the spring rate as well as lowering the car. While Shelby is often given credit for this important tweak, it was actually Klaus Arning, a Ford engineer, who came up with the idea as part of an IRS system he was investigating for the Mustang. The IRS obviously never made it, but Shelby made good use of Arning’s modified front suspension geometry.

A special quick-ratio pitman arm for the steering box and corresponding idler arm sped and firmed up the standard Mustang’s

PHOTO COLIN COMER COLLECTION



Dick Jordan gets around a Corvette in 5R106 in Aug. '67 at Wilmot Hills in Wisconsin.

reflexes. A 1-in. diameter front ant-roll bar replaced the smaller diameter Mustang bar. A tubular bar, named the “Monte Carlo Bar,” was fabricated and mounted across the engine bay, connecting both shock towers and stiffening the chassis. A one-piece, forged steel brace replaced the standard two-piece stamped steel brace that tied the cowl panel to the rear of the shock towers for further rigidity, effectively triangulating the chassis in this flex-prone area. This part had been previously used on all export Mustangs, hence the name “Export Brace.” Koni shock absorbers were installed on all four corners, with aircraft cables wrapped around the rear axle tubes just inboard of the brakes on both sides and connected to an eye bolt directly above on the chassis to limit droop and keep the Koni shocks from over-extending.

To control rear axle tramp, Traction Master override traction bars were installed. This was an involved process that required the rear axle to be removed, brackets welded on, and then holes cut

into the floor of the car where another set of brackets needed to be installed for the forward mount of the traction bars. To cover all of this, a fiberglass rear parcel shelf took the place of the Mustang’s rear seat. The stock Mustang steering wheel was replaced by a flat, 3-spoke polished aluminum one with a wood rim.

Small-Block Magic

Under the hood, Shelby installed a balanced and blueprinted, dyno-tested Competition-spec 289cid engine that was rated at 350hp. It utilized the standard GT350 “tri-y” design tubular exhaust headers connected to straight pipes, which exited just in front of the rear tires. Early R Models received an extended capacity Aviad oil pan, while later ones retained the standard GT350 finned aluminum “COBRA” lettered oil pan. Custom radiators made from larger Galaxie units by Modine were fitted, along with a large remote oil cooler. To fuel all of this, a 32-gallon fuel tank was created by literally

welding the bottoms of two standard Mustang tanks together. Per SCCA requirements a 4-point roll bar was fitted.

While the rear axles were out to install the traction bars, Shelby installed Detroit Locker “No-Spin” differentials. The battery was relocated from the engine compartment to the right side of the trunk, to get weight off the nose and into the rear of the car, which improved balance. Lightweight fiberglass hoods with a small scoop to get fresh air into the engine, with quick-release hood pins, were installed. Other weight-cutting procedures such as eliminating bumpers, the entire heater assembly, the use of Plexiglas windows, the removal of the rear quarter vents and door panels, a fiberglass front apron and hood, a gutted interior, and other such measures made the Competition version GT350 a fit and trim race car.

Rolling stock consisted of 15x7-in. magnesium American Racing wheels with Goodyear 600-15 Blue Streak tires, which also required cutting out and radiusing the



PHOTO COLIN COVER

A SAAC convention at any track will bring out a plethora of B-Production Shelybs.

rear wheel openings and also slightly flaring the front fenders for tire clearance. The stock Mustang padded dash and glove box were removed, and a custom gauge panel with six “CS” branded Stewart-Warner gauges was installed. Other competition car tweaks could be seen throughout these factory Competition cars, and it was a well-thought-out and engineered package.

The Shelby GT350 literally took the racing world by storm—just as Ford had hoped and intended. In 1965, GT350 R Models won five out of six regional SCCA championships. At the 1965 ARRC National race, fully 10 out of the 14 B/Production cars entered were R Models. By the end of the race, Jerry Titus had won the 1965 B/Production National Championship in 5R001. The Mustang now not only had teeth, it now had fangs. Privateers who didn’t want to shell out the \$5,995 price of a new R-Model quickly employed Shelby’s formula to their own GT350s and Mustangs, often buying parts and gaining advice directly from Shelby American.

Fine Tuning

According to Chuck Cantwell, the GT350 was “a simple, fundamental race car. We added lots of caster to the front suspension, around four degrees or so, to keep the cars going straight under braking. Otherwise the significant weight transfer to the front under hard braking would wind out the standard one degree of caster and they’d

dart around. We ran a little toe-in and maybe a degree to a degree and a half of negative camber. There was nothing exotic, just standard Mustang GT springs front and rear with the standard GT350 Koni shocks that we adjusted tight. If we needed more spring rate up front we’d trim some coils. We ran Goodyear stock car tires and played with tire pressures a little. Ferodo DS11 was the hot brake pad compound of the day and they worked great. Castrol Amber or Delco 550 heavy-duty brake fluid solved any brake fluid boiling issues. Our engines were all built in-house and dyno tested, they ran really well and were very reliable. They made 330 to 350 horsepower max. We made little tweaks as we went along and learned things, like deeper groove pulleys to keep the fan belts on, beefing up the clutch pedal cross shaft, but I have to say we just didn’t have reliability issues. It was a good package, an excellent-repeatable formula. We shipped cars to customers that were exactly the same as what we ran. The GT350s won everywhere; most SCCA Divisional Champions were in GT350s. They were great race cars.”

East vs West—The Modern Formula

Okay, so this formula worked great in 1965, but how does it work 47 years later? As evidenced by current vintage racing grids, apparently quite well. Let’s explore what it means to race a 1965/1966 GT350 in vintage B/Production competition today.

First, let’s address the elephant in the

room. GT350s are a lot faster now than they were 45 years ago. Even the most strictly prepared, “Era Correct” examples with an average weekend warrior vintage shoe behind the wheel would be running up front if transported through time and dropped on a race grid in 1965. The simple fact is that we’ve had a long time to figure these cars out, but more importantly, the bits and pieces that go into engines today are capable of handling more compression, more rpm and more power. Ignition systems are better. Tires are stickier. Shocks are better. Synthetic fluids free up horsepower and let stuff move better. More time is spent perfecting spring rates, engine and chassis tuning. We have seats and harnesses that can make drivers more comfortable and hold them in place better. And there is nothing wrong with using 45 years of technology to make safer, more reliable race cars if the worst that happens is they get a little faster.

Now, to further split the atom, let’s talk about different levels of “vintage legal” preparation, especially as it pertains to B/Production cars like the 1965/66 Shelby GT350. Between the various vintage racing organizations, most participants view them either as a “West Coast” or an “East Coast” club when it comes to car prep rules.

As a general rule, the West Coast clubs are considered the more letter of the law, era-correct groups—such as the HMSA, which sanctions the Monterey Reunion. The East Coast gang, and yes, I suppose I chose the word “gang” somewhat

PHOTO: RICK KOPEC/SAAC



SAAC founding member Rick Kopec in his former R Model, 5R098 at Lime Rock Park. Kopec vintage raced 5R098 from 1989 through 2007. No other R-Model has been raced for that many years by the same driver.



Dick Jordan has a first race in his new R Model 5R106 at Road America, Sept, 1965.

PHOTO COLIN CONNER COLLECTION

intentionally, typically has a more, um, “open” interpretation of the rules of what is era-correct. Obviously there is no right or wrong way to go vintage racing; the key to all of this is to go have fun and get as many closely-matched cars on the grid as possible. And in a competitive sport like racing, as soon as a rulebook is printed I guarantee there are car owners analyzing every word to find their own Mark Donohue-style “Unfair Advantage” in true Walter Mitty style.

A Beady-Eyed Look at the Rulebooks

The following car preparation rules by racing organization are broad generalizations, presented to show the key differences between them. Complete rules are easily accessed online through the various club websites, and I strongly recommend speaking to competitors in any given group for real racer’s insight.

On the West Coast, the HMSA leads the charge of strictly period-spec cars. Their cutoff year for class G4, the production car

class in which a GT350 would run is now 1966. All exterior trim (less bumpers), lights, and interior must remain in place. No lightening measures not allowed in period are allowed now. The drivetrain and braking systems must be of the original specification and type as when the car was originally homologated. That’s the biggie, as there are no roller cams or rocker arms permitted, no aftermarket engine blocks or heads, no dry sump oiling unless it was originally fitted, no increased engine displacement, no Tilton or similar style clutches, no dog ring or clutchless transmissions allowed, no gear ratio changes, etc. Wheels can only be up to .5” wider than stock, and a suitable vintage tire has to be run but only in the hardest compound available. Additionally, to run in this historic B/Production group, the car in question must adhere to the year of manufacture FIA/SCCA rules, be within 7% of the minimum required weight, have documented period race history, and be era-correct in appearance and (obviously) mechanical specification. This is as close as we have to re-creating true period competition with these cars.

So what to do if you live on the West Coast and have a GT350 that doesn’t fit in

PHOTO CHARLES TERRY



Turn 3 at Road America shows typical race action that takes place when a full grid of GT350s get the green flag.

with the HMSA's preparation guidelines? Don't despair, you can still race. For example, VARA is much more lenient towards more heavily-modified machinery, so as long as you are okay with running in an appropriate group with similarly-prepared cars you are welcome. The VARA B/P rules allow a 302cid engine up to .060" overbore as long as you maintain the stock stroke, cast-iron heads, a permitted dual plane intake manifold, a flat-tappet camshaft, OEM brakes, and a stock-style oiling system. You can run roller-tipped rocker arms in the name of longevity, though. Like HMSA, however, no dog ring or Jerico-style gearboxes are allowed.

Now, if you have a real hot rod that doesn't fit with either of these clubs, HSR-West may contain your best new racing buddies. "Over prepared" cars are welcomed, these guys like to run and the rules show it. The engine needs to be of original material and type, displacement is open, wheels can be up to 1.5" wider than original, and other racier stuff is allowed. As long as you announce your engine displacement and are classed accordingly you should be good to go.

RMVR also has a more relaxed set of rules for B/P cars; they use 1967 SCCA general class rules as a basic guide for their B/P group but also have a few "B/P Plus" groups that allow more modifications. B/P-1 and B/P-2 use up to 1972 SCCA GCR, as does B/P-3 but in this class even a few more transgressions are allowed.

Cowboys on the Ponies

Now, you'd think all of the cowboys were in the West, but moving East we find a lot more of them behind the wheel of GT350s. The SVRA's Group 6 B/P rules are what most "East Coast" cars are built to, which also very closely matches the VSCDA's car preparation rules. Both use 1967 SCCA general class rules like other organizations, and are very good about holding competitors to task on them. For 65/66 GT350s, the rules are straightforward. The engine has to be of the same type, displacement, and materials as original, but up to a .060" overbore is allowed. Aftermarket cast-iron blocks (such as a Ford Racing Boss 302 block) are allowed as long as displacement does not exceed 295cid. Aftermarket cast-iron cylinder heads are allowed as long as stock valve angles are retained. Factory or Edelbrock Performer dual-plane intake manifolds are required, as is a Holley or equivalent single four-barrel carburetor, just like every other club. No crank trigger ignitions allowed, although MSD spark boxes and similar are.

Valvetrain is "free" so you can run a roller cam and roller rockers. Dry sump oiling systems are allowed. Brake systems need to be of OE manufacture and era-correct, though aftermarket two-piece rotors are allowed, which means Lincoln front brake calipers squeezing 11.3" and larger 10" x 2.25" Ford rear drums are the hot setup. Minimum car weight per the 1967 GCR is enforced, which is 2650 lbs.,

but here is where the math comes in. You can run a Jerico, Tex, Richmond or similar T-10 or Ford Top Loader replacement, dog-ring style 4-speed gearbox as long as the 1st gear ratio is 2.20:1 or numerically higher but you need to add 150 lbs to the minimum weight. Remove the headlights? Add another 20 lbs. Remove the charging system? That's a 25-lb. penalty. No passenger seat? 20 lbs.

As you can see, the SVRA and VSCDA try to keep things fair. Just like any other group they also have a list of approved era-correct tires you can run (namely Goodyear Blue Streaks and Hoosier Street TD in appropriate 15-in. sizes), as well as other finer points to the rules. And just like every other club, spring rates, shock valving, sway bars, and the like are all "free" as long as they are of original type and mounting position and location, i.e., you can't move suspension pickup points or install coil-over shocks with remote reservoirs like an F1 car.

Then vs Now

So if you've paid attention this far, the takeaway is that outside of the Monterey Reunion and a few other events there is a fair amount of wiggle room with these little vintage race GT350s. So let's compare a current state-of-the art East Coast GT350 with a GT350R that was put in a time capsule in 1965 and not touched since. We'll call them "SVRA" and "1965" for less confusion.

Brian Kennedy in his '66 GT350 6S094 at Road America, 2011. Brian has raced this car since 1997 and is a true sportsman. He tows it to the races, camps at the track, is his own pit crew, and when the weekend is over he loads it up and tows it home.



PHOTO CHARLES TERRY

The SVRA car has a big compression 295cid engine with good parts that can live at 8,000 rpm or beyond. It should make around 500-535 real horsepower. It will have a transmission you can shift without the clutch, finely-tuned suspension, brakes with carbon Kevlar linings and super ducting that can last through a one-hour enduro without going away. The wheels are 8.5 in. wide all the way around, the shocks are likely about \$3000 worth of Penske's best tube shock technology. Some cars have dry-sump oiling to make the engines last, and in the last few years we have seen power steering going on the front-running

cars to help the drivers steer these things with fatter tires on 8.5-in. wide wheels and up to 7 degrees of caster. Hey, the cars are not the only thing vintage out there now!

All the modern safety equipment is there, including a stout cage and side-impact bars. A fresh set of medium-compound Goodyears or super-sticky S compound Hoosiers gets mounted a couple of times a weekend. Reading between the lines one can see where this newfound speed comes from. It isn't because the cars are lighter, because they are not. It is from the extra 150+hp, the stickier rubber, the quicker shifting of a dog-ring 'box, the

tougher brakes—but mostly from that rpm limit that was unheard of in 1965. In a few lap sprint race the 1965 car wouldn't give up much in braking or handling, but exiting a corner the lack of horsepower would be evident. And by the end of a long straight the 6,500rpm limit of 1965's flat tappet, stamped-steel rocker 289 with its heavy rotating assembly would really be a limiting factor, accelerating the car slower and limiting its effective top speed greatly.

For example, Chuck Cantwell remembers Bob Johnson, the 1965 B/Production SCCA champ in his R Model, having good lap times at Road America of around 2:45 or so with a top speed of around 150mph up the front straight. Today, the fastest 1965/66 GT350s (with far from professional drivers) routinely lap Road America in the low-2:30's. The fastest are encroaching on mid-2:20's. Even the mid-pack cars with far less aggressive drivers and less horsepower easily run in the mid-2:30's. Chalk it up to better handling and braking cars with a lot more power and terminal speeds at the end of the front straight of around 160mph.

From the Driver's Seat

I've raced my 1966 GT350 in "East Coast" SVRA/ VSCDA configuration for seven years now. Truth be told, the cars are an absolute handful. They slip, slide, and keep a driver on his or her toes like nobody's business. As an old Formula Ford racer, for the first few years in this big-bore car I thought I must have been doing something wrong as the car just never seemed "hooked up." So I asked one of the resident hot-shoe Mustang racers what his car was like on the track, thinking I would get some words of wisdom that I could apply to my car setup. I envisioned quickly getting myself a pro ride when I got the GT350 hooked up and lapped the field. The hot-shoe's answer? "Man, I'm just scared the whole time. It feels like the car is trying to kill me! But when I finish a session and the lap times are good? That's when I know the car is right."

From that day on I have really enjoyed racing a GT350. All that slipping and sliding combined with 8,000 rpm small block Ford music is wonderful once you understand the nature of the beast. It is certainly something every racer needs to experience at some point in their career. A good GT350 is a tough, tossable, and historically significant vintage race car. Regardless of the level of tune or sanctioning body that best suits your ideals and choice of venues, it is all about the fun. And what fun it is! 