

# **BRITISH MOTORING**

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**Free  
Stuff** see pages 31-45

## HIT THE ROAD: ENJOY A TSD RALLY!



**BIG HEALEY GUIDE**



**ELECTRICAL SYSTEMS EXPLAINED**



**DYNO TUNE YOUR CAR**





# CAR PEOPLE ARE CRAZY

BY ROBERT GOLDMAN

The other day, I drove up to see a buddy's new race car project and have lunch. He's one of these people I admire, but could never hope to duplicate. His house is perfectly manicured, each individual blade of grass measured and clipped to the ideal length. And the garage, wow, I feel as though I need to take off my shoes before entering.

Currently occupying the place of honor is an old Brabham BT-35 single-seater. It had been previously restored, but not to an "acceptable" standard, so is being re-restored before being allowed to touch the ground. Although currently out of favor owing to a stripped plastic gear in the distributor drive, the Brabham's garage mate is a gorgeous Cobra.

No, it's not a real Cobra. My friend, we'll call him Captain Anal because when he reads this editorial he's going to shoot me anyway, takes some twisted pride in displaying the car publicly. Although, when beset with gawking crowds, he immediately transitions to put upon by the gods mode while having to explain it is a Kirkham Motorsports kit, not a real Cobra.

It is, however, a really nice replica. The "Cap" loves things to be done right (did I mention the lawn?), so he has built a very correct example of an FIA-spec, small-block powered, alloy-bodied car. Of course, the suspension is vastly improved over original, and the motor sports an exotic fuel injection setup worth more than the cost of a complete engine rebuild in your average little British sports car.

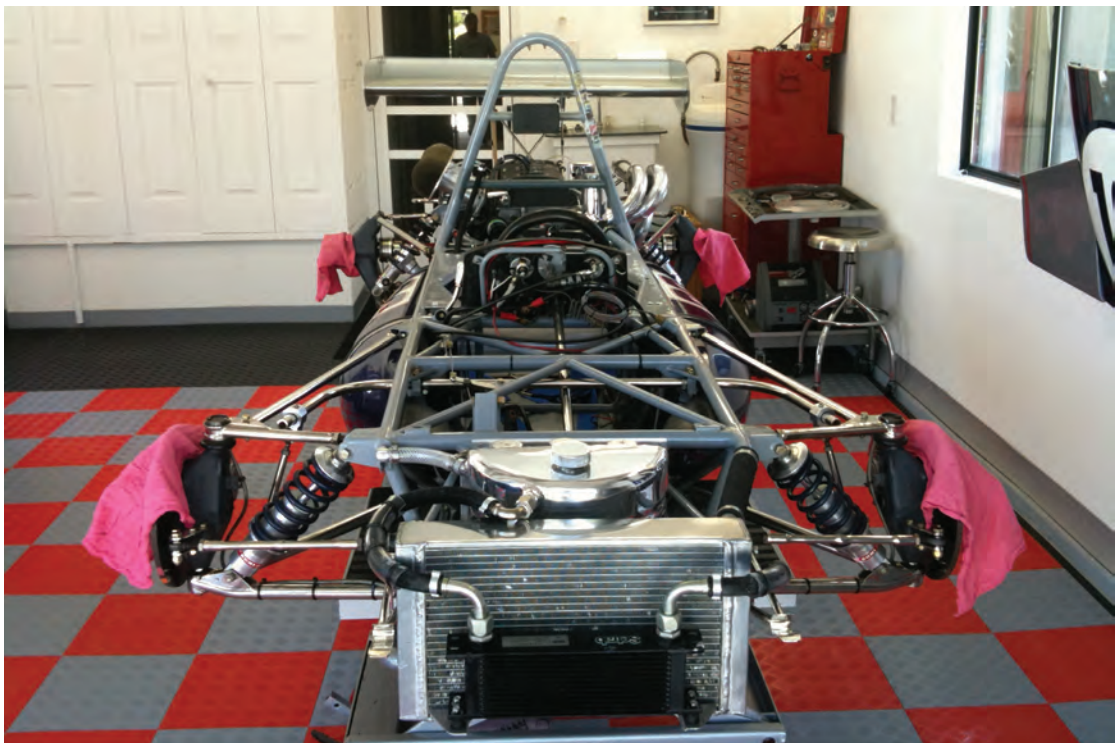
Back to the newly acquired Brabham, I assumed my best acolyte visage, and in hushed reverential tones asked the master an appropriate number of questions regarding the car. When in the temple of automobiledom, one may as well play the expected role. Except, of course, I never was one for role playing, so after a bit I had to change tack. "So, you fix

that plastic piece on your COObra yet?"

Good thing he didn't have any throwable tools close at hand. In spite of regularly exhibiting all the social maturity of a 15-year-old, there are still a few people willing to put up with me. In this case, not only did it mean the Captain was still willing to go to lunch, but he even offered to swap rides. A spotless Cobra in exchange for a bug-spattered TR4? Hmm, okay I'll take the deal.

Ever put a friend in the driver's seat of your British car? "Now don't pull on the interior door handle 'cause the screws are kinda stripped out. And you need to slam the passenger door or it pops open on right-hand turns. I just rebuilt the brakes, so it'll only take three pumps to get a firm pedal." Fortunately, Captain A has extensive experience with old cars, so he knows the routine.

Having recently trashed the mechanical condition of his car, and knowing from previous experience the machine actually runs and drives extremely well, I figured there was no point in inventing a litany of imaginary troubles to report at the end of our drive. Upon reaching the restaurant I climbed out and loudly proclaimed my admiration for the shiny polished Cobra. He got out of my TR4 and equally loudly reported, "This thing shakes and wobbles at speed like every other British car I've ever driven!" Touché. **BM**



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# BRITISH MOTORING

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## Wrap Up the Season at the Hilton Head Concours

Hilton Head Island, S.C., and Savannah, Ga., may not officially be known as twin cities, but each fall they co-host a spectacular automotive event, the Hilton Head Island Concours d'Elegance & Motoring Festival. Four separate events make up the weeklong affair, offering a little something for every taste.

The historic races take place at the Savannah Harbor Race Course, located on Hutchinson Island. It's right across the river from downtown Savannah. The show events are held at the Coastal Discovery Museum at Honey Horn on Hilton Head Island. Full event details can be found at [hhiconcours.com](http://hhiconcours.com).



### October 28-31: Savannah/Hilton Head Speed Classic

The weekend's card includes the full slate of HSR historic racing plus the Classic Motorsports Small Bore Cup, an endurance series for cars with less than 3.0 liters of displacement.

### November 6-7: Motoring Midway

Static displays are mixed with actual test drives—yes, you'll get to take a spin in vehicles provided by the show's sponsors.

### November 6: Car Club Jamboree

Car club members who attend the big show are invited to participate in the Car Club Jamboree. It's basically a giant automotive smorgasbord dedicated to all of our favorite makes and models.

### November 7: Hilton Head Island Concours d'Elegance

This is the weekend's headline act, a collection of 150 or so top-shelf classics. This year's show will celebrate the Jaguar E-type.

## Know Your Facts and Figures

Every car is a collection of facts, figures and measurements. The specifications that define your car can be found on the Moss Motors website. Head to [mossmotors.com](http://mossmotors.com) and click on Car Specifications.

The information is available for every vehicle serviced by Moss Motors. It covers everything from where to find vehicle identification numbers to tune-up specs and measurements. The site even includes the correct tire pressure settings.

## Building the Future

Wondering who will design the parts that our British classics need 20, 30 or 40 years from now? Collectors Foundation, a nonprofit organization founded by Hagerty Insurance, is working to pass on a love of classic cars to the next generation. The group awards grants in the form of scholarships, youth development programs and vocational high school programs. Donations can be made through the foundation's website, [collectorsfoundation.org](http://collectorsfoundation.org). Grant applications can also be sent through the site.



**Y**ou have questions and we have trunnions—we mean answers! Compliments, comments and castigations are all welcome at Motor Mail. Please send yours to [editor@mossmotors.com](mailto:editor@mossmotors.com) or via USPS to:

***British Motoring***  
Attn: Motor Mail  
440 Rutherford Street  
Goleta, CA 93117

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## When it comes to tires, “period correct” doesn’t have to mean old

I read with great interest the article entitled “Fresh Rubber,” especially the opening paragraphs concerning the effects of aging on tires. My '67 TR4A needed four new tires, so I called Coker and they supplied four new tires.

However, upon arrival the tire technician noticed some drying and cracking. By reading the build date code, it was discovered the tires were 10 years old! Coker was called and the company was quite good about sending a brand-new set of tires. The tire tech said the original set were totally unfit to be placed on the car and would have led to an accident. This story’s moral: check the build date of any tire you place on your vehicle.

Michael Robbins

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I’ve recently completed an MGA trailer. I have a heavily modified 1961 MGA and I found a '61 MGA on eBay from a field in Ohio.

The MGA was past salvage. When we tried to load it on a trailer, it literally broke in half. The passenger section was removed, and the front clip and rear end were joined; this was mounted on a Drexal axle, and we used the original steel wheels from the custom.

Going down the road, it looks like an original MGA. The custom has suicide doors, 4.3L V6, T-5 transmission, Mustang II front end, etc.

Jeb Blanchard

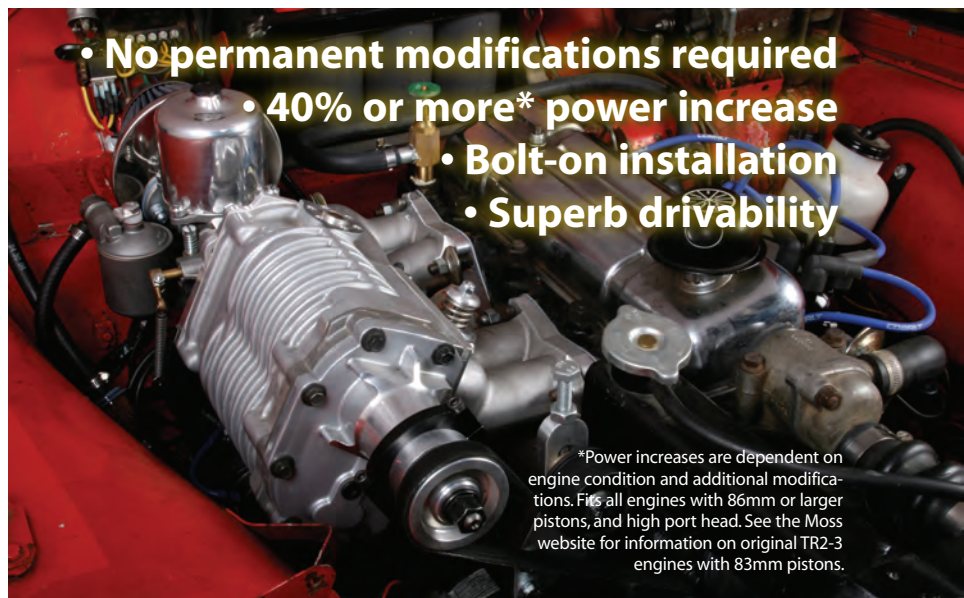


## TR2-4A Supercharger Kits – Coming Soon!

Using the same Eaton supercharger technology available on modern cars, Moss Motors' TR2-4A supercharger kit offers power increases of 40 percent or more.\* Supercharging gives your TR gobs of low-end torque, which makes passing easier and reduces the need to downshift when you want to go. Installed on a fresh stock engine, the supercharger kit offers kick-in-the-backside power without unduly stressing the engine, and offers superb drivability. The vacuum-operated bypass assembly ensures minimal impact on fuel mileage when cruising, but offers instant boost when the need arises.

Want to be the baddest kid on the block? A boost upgrade kit is available. Combined with additional engine modifications, you can have race engine power, but with a big broad torque curve and none of the "peakiness" of a wild race camshaft.

Designed for bolt-on installation using common hand tools, the Moss supercharger kit requires no permanent modifications to your classic. The kit includes everything necessary for the installation, including a new SU HD8 carburetor, water pump, serpentine belt pulleys, and alternator conversion kit. The alternator conversion is required owing to space considerations under the hood.



- No permanent modifications required
- 40% or more\* power increase
- Bolt-on installation
- Superb drivability

\*Power increases are dependent on engine condition and additional modifications. Fits all engines with 86mm or larger pistons, and high port head. See the Moss website for information on original TR2-3 engines with 83mm pistons.

<b>TR2-3B Supercharger Kit</b>	<b>150-128</b>
<b>TR4-4A Supercharger Kit</b>	<b>150-138</b>
<b>Big Boost Kit</b>	<b>150-129</b>

## E-Z On Convertible Tops

When your British sportscar is in serious need of weather protection, but you'd rather spend more money on something fun like a supercharger this top is for you. Sourced from a leading replacement top company, these tops are made from precision patterns on state-of-the-art equipment. Choose from leather-grain vinyl or Stayfast canvas material.



### MGB

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<b>1971-'80 Folding Frame / Fixed Window - Black Vinyl</b>	<b>250-220</b>	<b>229.95</b>
<b>1971-'80 Folding Frame / Zippered Window - Black Vinyl</b>	<b>250-225</b>	<b>309.95</b>
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<b>1962-'70 Stow-Away Frame / Zippered Window - Black Stayfast Canvas</b>	<b>250-250</b>	<b>599.95</b>
<b>1962-'70 Stow-Away Frame / Zippered Window - Tan Stayfast Canvas</b>	<b>250-255</b>	<b>599.95</b>
<b>1971-'80 Folding Frame / Zippered Window - Black Stayfast Canvas</b>	<b>250-260</b>	<b>599.95</b>
<b>1971-'80 Folding Frame / Zippered Window - Tan Stayfast Canvas</b>	<b>250-265</b>	<b>599.95</b>

### Sprite/Midget

<b>1969 on (6 studs) - Black Vinyl</b>	<b>250-425</b>	<b>279.95</b>
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### TR250-6

<b>Black Stayfast</b>	<b>250-535</b>	<b>559.95</b>
<b>Tan Stayfast</b>	<b>250-540</b>	<b>559.95</b>

## Austin-Healey BJ8 Big Brake Kit

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<b>Big Brake Kit - BJ8 (C)26705-on</b>	<b>586-725</b>	<b>\$789.95</b>
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## MGB HushMat Sound Deadening

Use this kit to apply HushMat to the floor ahead of the seats, the footwell and the center console area of your MGB to reduce noise and heat transfer to the interior cabin of your car. Hold conversations at normal speaking volume with dramatically reduced interior sound levels. HushMat reduces heat transfer into the cabin by 40 percent. Remain comfortable in warmer



weather with a cooler center console and no burning "hot foot" from the underfloor exhaust. Hushmat, engineered originally for OEM use, sticks quickly and easily into place, is easy to cut and won't come unstuck in hot or cold climates. Includes instructions and templates.

**MGB 1962-'80 HushMat**      **409-012**      **\$89.95**

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spacers are available so you can use the lift with different cars. Optional

casters can be attached to the lift so the vehicle can be moved while its wheels are off the ground. For more information visit [mossmotors.com](http://mossmotors.com).

**223-028 Kit for TR250-6, TR3-4, MGB & GT, MGT, Sprite/ Midget, and all Healeys**

**223-027 Kit for MGA**

**223-029 Kit for TR7-8, Spitfire, Classic Mini, and Jag XKE**

**223-030 Kit for Jag XJ, Stag, Miata, new Mini, and other modern cars**

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<b>EZcarlift™ Spacers - 38"-50"</b>	<b>223-032</b>	<b>99.95</b>
<b>EZcarlift™ Spacers - 50"-62"</b>	<b>223-033</b>	<b>99.95</b>
<b>EZcarlift™ Casters - Set of 4</b>	<b>223-035</b>	<b>329.95</b>

## Stainless Steel Exhausts by Tourist Trophy for MGA and MGT

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- Muffler packing is a combination of stainless steel wool and fiberglass for a classic sportscar sound that is throaty under acceleration but never intrusive while cruising
- Stainless Steel used for inner core and perforated tubing
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- Uses all the original hangers and supports
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**MGA Stainless Steel Exhaust**      **454-879**      **\$329.95**

**MG TD-TF Stainless Steel Exhaust**      **454-538**      **349.95**

## Midget Steering Rack

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## ARRIVE ON TIME



David S. Wallens photo

### Give Your British Classic a Workout at a TSD Road Rally

BY DAVID S. WALLENS

PHOTOGRAPHY BY THE AUTHOR

Participating in some kind of motorsports usually requires specialized equipment ranging from special tires to a fully prepared race car. There is a way, however, to compete without any car prep: enter a road rally.

This is an event held on public roads in which a driver and a navigator must follow a set of instructions to complete a course as close to a predetermined time as possible. Of course, they do not know what that time is until they reach the end of the stage (one leg of the event), so only by precisely following the directions can teams score a perfect time. They also need to stay on course, as getting lost can greatly derail an otherwise well-run event.

Rallies like this—called TSD (Time, Speed, Distance) events by most organizers—take place all around the country on any given weekend. You may have passed one in progress and never known it since participants simply mind their own business while traveling along. Road rallies have been known to penalize traffic law infractions.

TSD rally contestants follow a course and

average speed laid out by the rallymaster, hoping to arrive at predetermined check points at the correct moments. Penalty points are assessed for arriving early or late, as this type of motorsport rewards consistency, timekeeping skills, math and teamwork.

The designated speeds are almost always at or below the posted limits, although they don't always consider physics. For example, the rally instructions might specify that teams accelerate from 25 mph to 50 mph at a certain point along the route. The teams are responsible for figuring out exactly when to start accelerating so they maintain the average speed specified by the route instructions.

Likewise, the instructions might give teams 15 seconds to pause for a stop sign. Each team must figure out precisely when to accelerate away from that stop sign,

Teams line up at the start of a timed stage; each car gets a specific starting time. Drivers need a navigator who is organized, good at math calculations and a team player.



David S. Wallens photo



however, as few if any cars can instantly go from a standstill to cruising speed.

Not all of the ground covered during the route is scored. In addition to the timed stages—the ones where teams are penalized for arriving early or late—most rallies usually start with a calibration leg. This gives teams a chance to compare their speedometer to the official one. Finally, unscored transit stages are sometimes used to move teams from one timed stage to the next.

Some clubs run what is called a gimmick rally, which may take the form of a scavenger hunt or poker run. These events usually do not require the sophisticated timekeeping skills of a TSD rally but still reward teamwork, map skills and a bit of ingenuity.

Road rallying requires very little if any equipment to get involved. Teams are usually divided into classes depending

## What you need:

- A comfortable, street-legal car
- A working odometer, pencil, note pad
- A team partner
- Basic math skills

## Find An Event

Several groups, both rally groups and traditional sports car clubs, host TSD rally events. Even if a club isn't dedicated to a British marque, they might allow visitors to participate in their TSD rally.

- Sports Car Club of America: [www.scca.com](http://www.scca.com)
- TSDRoadRally.com: [www.tsdroadrally.com](http://www.tsdroadrally.com)
- Vintage Car Rally Association: [www.vintagecarrally.com](http://www.vintagecarrally.com)
- Local sports car and marque clubs

on what timing equipment they are using—those using rally computers and timers are in one class, and those with less sophisticated equipment (pencils and paper) are in another.

Show up at your first event with a decent stopwatch, working odometer, pencils and paper, and a bag lunch, and you should be okay. Talk to other competitors to see how they do it. Some events are run at night, so you may want to invest in a quality map light and some auxiliary driving lights to make it easier to read the signs.

Road rallies are just another fun way to play with cars—plus it's a bit nostalgic, as it's how many enthusiasts first got involved in motorsports. Because a TSD rally tests and rewards teamwork, it can be a good

relationship gauge or builder for those considering marriage or other partnership. **BM**

## TSD Rally Preparation

*While road rally events don't place severe stresses on vehicles, they are often all-day affairs. In other words, cars must be ready to face a day—or maybe even more—out on the roads. Here's a checklist:*

**Tires:** Are they safe and free from defects? Do you have a good spare?

**Brakes:** More than once you'll probably have to come to a short stop. How are the fluid, lines, pads, shoes and master cylinder?

**Weather protection:** Most rallies are held rain or shine. How are your top, window seals and side glass?

**Lights:** You'll be sharing the road with the public, so good lights and signals are paramount.

**Seats:** How comfortable are your seats? Is now a good time to recover them or replace the foam?

**Battery:** The day will be broken up into sections. Can your battery handle multiple restarts?

**Engine:** If the car is not running smoothly or has some quirks, perhaps it's time for a real tune-up.

**Body:** If any missing seals are allowing the engine's heat and fumes to enter the cockpit, replace them now.

**Oil and gas:** Start the day with a full tank of gas, and make sure the oil level is correct.

**Suspension:** If things are clunking around or just acting weird, might as well make the fixes before heading off.

**Windows:** Are the windows filthy, or do they offer a nice, clear view of the world?



**Speedometer and odometer:** You'll have to calibrate yours against the rallymaster's, but non-working equipment will leave you high and dry.

**Safety:** Each club has its own specifics, but some require teams to carry safety flares, a tow rope and a fire extinguisher.

**Rally gear:** Don't forget to bring pencils, note paper, a clip board, and a working watch or clock. You don't need a fancy timepiece, and you usually have a chance to calibrate yours to the official rally time.

**Snacks and water:** You might not have time to grab a snack while on the road, so pack some snacks and something to drink. Remember, no one wants to ride along with a crab.

# Keeping Your British Car Safe, Reliable and Fun



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# AUSTIN-HEALEY 3000: AN OBJECT OF LUST AND ENVY

David S. Wallens photo



Become an educated buyer, spend time behind the wheel, network with club members, and get an inspection before you buy this highly collectible car.

BY KATHLEEN M. MANGAN

The Austin-Healey 3000 was designed by a racing legend, Donald M. Healey, and it embodies everything he wanted in an automobile: gutsy power that could win rallies, a sturdy chassis and mechanicals, and bold, curvaceous styling. For half a century this car has been the object of lust and envy. Top-quality cars have brought six figures at auction in recent years.

Healey was a bomber pilot in World War I, and afterwards applied his mechanical abilities to cars and racing. He scored the first overall win by a British driver at the 1931 Monte Carlo Rally. He became chief engineer at Triumph and developed the Dolomite roadster.

After World War II, Healey formed his own company with Riley engines powering his first models. Nash mechanicals and Farina bodies were featured on the Nash Healey made from 1950-'54. But this racer yearned for a faster car.

In 1951 Healey started working on the prototype for the Austin-Healey with his son, Geoffrey. He designed the chassis around the Austin A90 2660cc four-cylinder engine, and penned his design concepts, which were formalized by Gerry Coker. When they tested the prototype at Jabbeke Motorway in Belgium, it reached 111 mph, so they called it the Healey Hundred.

The car was a sensation at the 1952 Earl's Court International Motor Show, and Leonard Lord, chief of BMC/Austin, immediately contracted to build the car, calling it the Austin-Healey 100. It won awards at international car

shows, the World's Fair and a variety of prestigious endurance races, including class wins at Sebring. Plus it broke many stock car land speed records.

## The 3000 Evolves From the 100 Six

After a variety of model changes to the 100, including replacing the four-cylinder engine with a six-cylinder in 1956, a model name change came along in 1959. The Austin-Healey 3000 was little more than a 100 Six with a bigger engine (2912cc) and better front brakes. There were no outward changes other than badges, but the 3000 was 5 mph faster and reached 100 mph five seconds quicker than the 100 Six. Its rating at 124 bhp at 4,600 rpm and 162 lbs-ft of torque at 2,700 rpm set its reputation and further appeal.

The 3000 proved well suited to long-distance rallies, easily cresting the alpine passes. It chalked up 40 overall wins at major rallies under the leadership of Marcus Chambers, head of BMC's competition department. Pat Moss (Stirling's sister) scored an overall win in the Leige-Rome-Leige Rally in 1960. It was the only British car to ever win this rally twice.

There were yearly upgrades for the 3000, with more significant changes happening in 1961 with the Mark II model and in 1963 with the Mark III model (see specifics in the sidebar). The changes improved the basic model without changing its character.

BMC's money troubles forced them to sell to British Leyland in January 1968, and production on the 3000 ceased

just two months later. About 90 percent of the 42,917 Austin-Healey 3000s made during the 10 years of production were sold in America.

### Drive One First

Michael Grant, Product Manager at Moss and longtime Healey enthusiast, owns a BJ8. He had some advice for prospective buyers.

“The experience of driving one may not meet your expectations,” says Grant. The lack of power steering, plus the lack of power brakes on early cars, may make it harder to drive than you’re used to, he explains. Overdrive makes a huge difference on the freeway. He adds that the low-slung look is not just a look—the car sits low and the exhaust

system scrapes on what seems like insignificant bumps.

Interior space is also an issue—the roomiest Healey is cramped if you’re tall or large, says Grant. The BJ8 with rollup windows and the nice interior is more cramped than early cars with side curtains. The short doors and small cockpit make it hard for some to get in and out.

If you’re determined to buy one, buy the best car you can afford, advises Grant. “A car that was restored several years ago and has been maintained by someone who cared and knew what they were doing will be a much better buy at \$40,000 than a \$15,000 project car. A great deal often turns into a four-wheeled money pit,” he says.



Austin-Healey 3000 Popular Replacement Parts		
249-930	\$169.95	Trunk Liner Kit, Black
248-080	\$899.95	Panel Kit, Black
247-510	\$1,095.00	Leather Front Seat Kit, Black
021-683	\$159.95	Heatshield Kit
300-395	\$645.95	Everflex Vinyl Convertible Top, Black
581-101	\$69.95	Brake Master Cylinder
370-888	\$949.95	New SU Carb Set
610-257	\$229.95	Exhaust System
021-583	\$119.95	Leaf Spring
858-010	\$1,249.95	Front Fender, R/H
661-980	\$144.95	Front Wheel Hub, R/H

The 3000 interior has a lovely elliptical instrument panel and finish detail, but can be tight on space and toasty hot. The six-cylinder engine fits nicely in the long engine compartment; the two-carburetor set-up is easier to keep in tune than the three-carb set-up. Moss’s new badge bar is great for mounting driving lights, as well as club badges.



## Insider’s Info:

For many enthusiasts, it is the deep exhaust note that makes this car stand out.

The Austin-Healey 3000 Mark I was rated at 124 bhp; the Mark III was rated at 148 bhp.

Austin-Healey 3000s in excellent condition sell at auction between \$45,000 and \$85,000. The Mark III BJ8 Phase 2 commands the highest prices.

Each body panel was stamped with the car’s serial number, so you can easily determine originality.

Production numbers are 13,650 Mark I; 5,450 Mark II; 6,113 Mark II convertibles; and 17,704 Mark III. Total production was 42,917.

Jensen Motors made the bodywork for the Austin-Healey 3000.

The two-tone paint was a factory option.

There are two Austin-Healey clubs, and most owners belong to both. The Austin-Healey Club of America hosts Conclave each year, publishes Healey Marque magazine and has an active website, healeyclub.org. The Austin Healey Club USA hosts the Healey Rendezvous, publishes Austin-Healey magazine and has a website with vast technical information for members, healey.org.

The British Motor Industry Heritage Trust offers official Heritage Certificates validating your car’s serial number, providing the production date, and presenting the original build specifications from production records. heritage-motor-centre.co.uk/exhibitions/archive-services

Production of the Big Healey officially ceased on December 21, 1967 with the completion of #43205. One more (#43206) was completed on March 14, 1968. It is not unusual to find cars built in '67 but not sold until '68 titled as a '68.

The Healeys developed a successor to the 3000 Mark III, re-engineering it to meet American safety standards, and adding a four-liter Rolls-Royce engine and automatic gearbox. It was lighter and better handling. Only two prototypes were constructed before BMC cancelled the project due to financial trouble.

While making a purchase, be particularly careful inspecting bodywork for rust, says Grant. Check the front suspension by looking for unusual tire wear, doing a road test, and getting an inspection by a club member or professional. A car that has been in an accident will often have front-end alignment problems, and the front suspension has no camber adjustment to address it. Correcting frame alignment problems can be expensive. Be sure to make the sale dependent on an inspection by a Healey specialist with a good reputation, he adds.

**Parts to Enhance Maintenance and Safety**

Practical modifications and upgrades can make the cars easier to maintain, and in some cases, safer, says Grant. Spin-on oil filter conversions do a much better job of filtering the oil (Moss recommends a K&N filter) and make it easier to change the oil.

If the car has not been converted to run on unleaded fuel, install hardened valve seats and use Stellite-faced exhaust valves, says Grant. A gear reduction starter weighs less and takes less juice to turn over the engine. Slotted and drilled brake rotors with EBC brake pads improve braking with reduced brake dust. A sealed battery weighs less, takes up less room, and won't rot the trunk lining.

Brighter headlights are a simple upgrade—Moss offers three types of H4 Halogen lamps, says Grant. Driving lights are a traditional accessory, and Moss has a new badge bar for mounting these as well as club badges.

If the cooling system is stock and seems to run hot, consider having the radiator re-cored if you've ruled out the other causes of overheating, suggests Grant. With a thicker

radiator core and a Texas Kooler fan you can control the engine temperature.

**Healey-Hot-Foot**

"Healeys are notorious for being hot cars, not just to look at, but to drive," says Grant. "The Healey-hot-foot is not a reference to someone who drives fast." Check the condition of the engine compartment-to-cockpit sealing, and replace any grommets that are missing. Replace the heat shields if damaged, and consider re-insulating the cockpit with material under the carpet. Check the heat shield between the cockpit floor and the muffler(s) under the driver's seat, he advises.

Grant encourages owners to consider other recently introduced parts from Moss too. Polyurethane gearbox restraint bushings help keep that 700-lb. monster from creeping forward under heavy braking, which can be tough on the fan and radiator, he says. Teflon throttle shaft bushings boost performance by giving you back all the throttle travel the car had when it was new. Moss also has excellent reproductions of the original aluminum master cylinders, making it possible to replace the cast iron replacement cylinder many

**Austin-Healey 3000 Model Changes:**

<b>1959:</b>	Austin-Healey 3000 is introduced with a two-seat version (BN7) and four-seat version (BT7). It features a larger, 2912cc engine, front disc brakes, revised gear ratios and a better radiator.
<b>1960:</b>	Revised front spring rates.
<b>1961:</b>	The Mark II is introduced with triple SU HS4 carburetors, new camshaft, optional power-assisted brakes and new gearbox with center gear lever. Grille bars were changed from horizontal to vertical.
<b>1962:</b>	The BJ7 convertible is introduced featuring twin SU HS6 carburetors, wind-up windows, wraparound windshield with pivoting wing windows, and attached fold-away soft top offering better weather protection.
<b>1963:</b>	The Mark III is introduced with twin HD8 carburetors, new camshaft and valve springs, standard power brakes, dual exhaust, walnut burl wood dash panel, center console and key-operated starter. Wire wheels become standard on American cars.
<b>1964:</b>	The Mark III Phase II BJ8 is launched with push-button door handles, coarser threads on wire wheel hubs, revised exhaust system, bigger carbs, and re-profiled rear chassis members that allow more ground clearance. The Panhard rod is replaced by twin rear radius arms, and six-leaf rear springs are added.
<b>1965:</b>	Separate amber front and rear turn signals are added.
<b>1966:</b>	New crank pulley with built-in damper.
<b>1967:</b>	High-impact glass featured on American cars.
<b>1968:</b>	Production ceases in March.

cars currently have.

Unless you're really fond of wire wheels, consider spline-drive alloy wheels, says Grant, adding that wider wheels make a huge difference. "You can easily upgrade the performance of the car by investing in the best tires you can buy for your kind of driving," he says. Fine tune the camber with the adjustable A-arm bushings. If more adjustment is needed, you can replace the shock mounting plates with adjustable mounts, but this is a more serious modification.

Performance with the HDB carbs and the late BJ8 cam will satisfy all but the most demanding owners, but for those that want more, Healey specialists can provide increased power and torque. **BM**



The family resemblance between the 100 (with windshield folded down) and the later 6-cylinder (with hard top) is clear. The classic good looks will get you a thumbs-up from people you pass, but it is the driving that will put a smile on your face.

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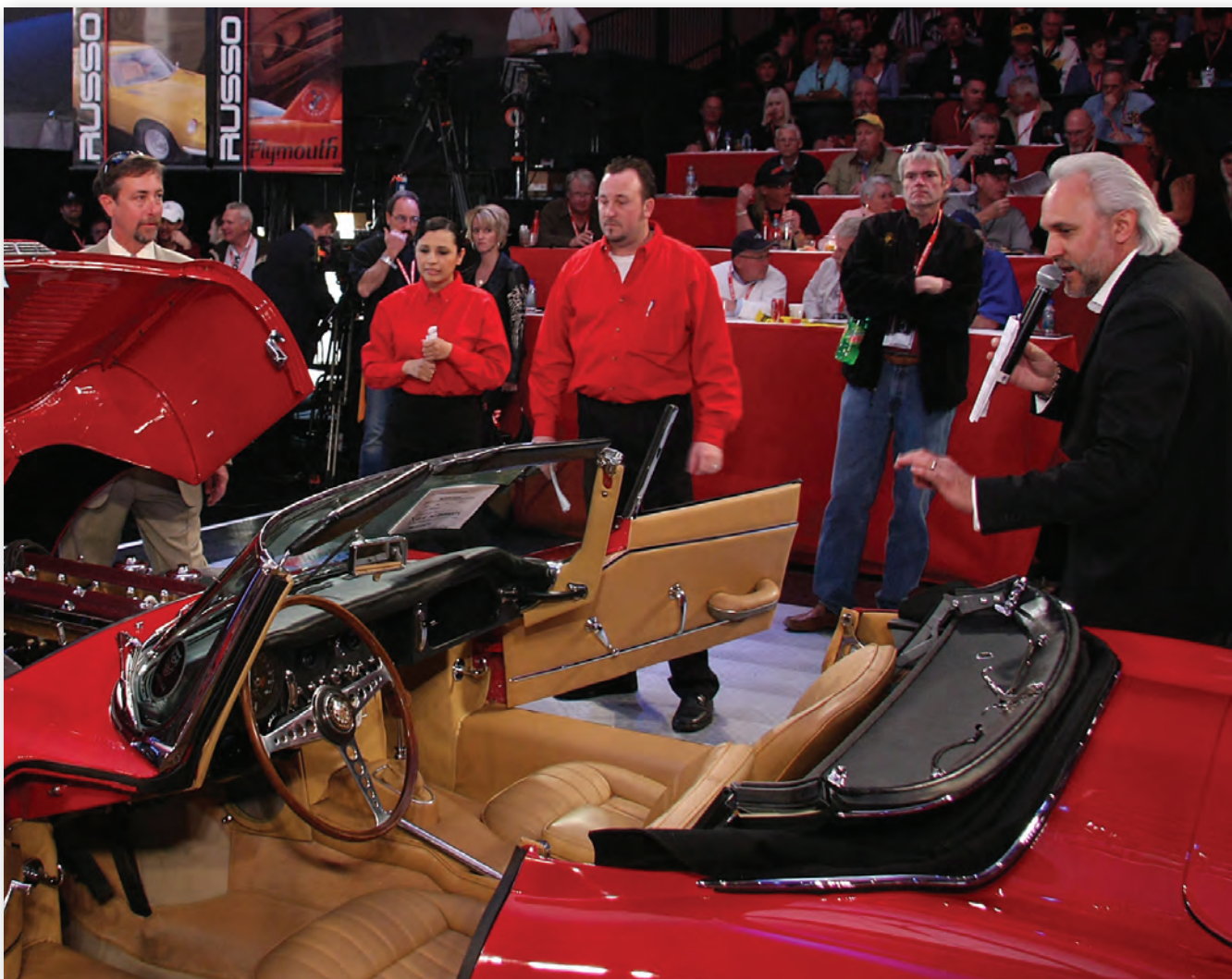
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# DREW ALCAZAR:

Auctioning cars to enjoy on the road, track, show field or in your living room

BY KATHLEEN M. MANGAN



Drew Alcazar is such a car nut that he has one on display in his living room. He admits he's been crazy about automobiles since he was old enough to push a Matchbox car. As the owner of Russo and Steele Collector Automobile Auctions, he now gets to sample just about everything ever made.

He grew up on a Colorado dude ranch, but for him, horsepower came in cubic inches rather than on four hooves, he says. At age 15 and-a-half, he pestered his dad into cosigning a loan on a 1970 Mustang Mach 1. "It was like pouring gas on a fire," he adds.

Six months later, Alcazar's parents reeled him in by selling the car and granting him the keys to his great-grandfather's 1963 four-door Ford Galaxy, which he promptly took apart in his high school auto shop to see how it worked.

He got into the high school drag racing series

at Bandimere Speedway, racing a 1967 Pontiac Firebird and always wanting it to go faster than it did. He blew it up and rebuilt it on a regular basis.

Through high school and college Alcazar was buying cars, fixing them up, and selling them. Then he decided to tackle what he calls "a robust project:" a 1969 Mach 1 with a 428 Cobra Jet engine. It won the Mustang Club of America Grand National Show two years in a row.

He left it in Colorado when he moved to California to focus on playing guitar and becoming a rock star. He says when he got sick of eating cold tuna from a can and sleeping on people's floors, he got a real job in a Mustang parts shop.

When Alcazar sold the Mach 1 in the mid '80s to the owner of the Los Angeles Times, Otis Chandler, it set a world record for that particular model: \$27,500. That money funded the opening

**Real car enthusiasts appreciate the Russo and Steele exclusive approach so they can network with other car enthusiasts, as well as the auction-in-the-round format. Here Drew Alcazar gets plenty of interest in this pristine red 1967 Jaguar E-type Series I 4.2.**

of his restoration shop, Concours Restorations in Ontario, California.

Alcazar closed his shop in 1995, and joined Barrett-Jackson Auction Company to help Craig Jackson when his brother Brian passed away. After five years as general manager building the business, he departed to consider his next career challenge.

“Many of my car friends called and talked about the old days of car auctions, before the fashion shows and hot dogs on a stick,” explains Alcazar. “It gave me the impetus to develop an enthusiast-based auction focused on the cars. I didn’t know if it would work—eBay was cutting into classic car sales and it seemed like big extravaganzas were required to sell cars by auction. But I believe that buying a collector car is an emotional, visceral experience. Real enthusiasts want to make personal connections with the cars and with fellow enthusiasts.”

Based on this gut feel, Alcazar developed his auction-in-the-round concept, with the cars at ground level and the seating elevated in a 360-degree viewing experience. The company caters to American muscle cars, European sports cars, hot rods and customs.

“We typically present some seven-figure flag bearers at the auctions, but we tend to offer more accessible midlevel collectible cars that don’t require an attorney or estate planner

to purchase,” he explains. “Our European sports cars are production models like Jaguar E-types and 120s, Austin-Healeys, and Ferrari Daytonas and 330 GTCs, rather than one-off or custom-coach cars.”

The first auction in 2001 featured

150 cars over two evenings. Today they’ll do 700 cars over several days. The company holds two auctions per year: Scottsdale in January and Monterey in August. “The response has been pretty gratifying,” says Alcazar. “Enthusiasts recognize the genuine nature of the event.”

But can an enthusiast really have a collector car as a living room showpiece? “The Mustang Boss 429 is 100 percent unrestored with original paint, tires, interior, everything, and the list of awards is too long to list,” Alcazar admits. “I’m a car idiot, my wife is the cool one for letting me do it.” His wife, Josephine, is an enthusiast too; her first car was a Jaguar E-type. They worked together at Barrett-Jackson, and they started their auction company together.

Alcazar’s advice to collector car buyers: “Realize that this is genuinely

a hobby. Buy a car because you get a charge out of it, not because you think it’s a better investment than your 401k. Don’t worry about its worth, what others think or what the judges say. If you never sell the car, what difference does it make? The ultimate return on your investment is the enjoyment you get from it.” **BM**

Alcazar is involved in every aspect of collector cars: he goes vintage racing, participates in Concours d’Elegance, does road rallies and attends national conventions. He also continues to restore the cars in his own collection.



**“What’s great about the market now is that there are many cars available that people spent a lot of money on restoring a few years ago when the market was flying high,” says Alcazar. “No way can you buy a car and restore it for the same amount of money. So you can capitalize on that.”**

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## DON'T FEAR THE DYNO

### Fall in Love With Dyno Tuning in 9 Easy Steps

BY CARL HEIDEMAN • PHOTOGRAPHY BY THE AUTHOR

Modern technology is changing how we interact with classic cars, and sometimes we can't help but laugh. After all, these situations can get pretty anachronistic.

More and more, we rely on high-tech tools to keep our classics in tune. Static timing has been replaced by dynamic timing; reading spark plugs has been replaced by tailpipe sniffers; and the holy grail of tuning tools—the dynamometer—is generally within reach of any enthusiast.

While classic car owners and shops have quickly adopted most digital tools, the dynamometer still seems steeped in controversy and confusion. “Will it blow up my engine?” is a common question.

We've made thousands of dyno pulls, solving scores of problems and eking out lots of power along the way. We still haven't blown up a single engine on the dyno. In fact, these sessions have saved many engines from an untimely demise by allowing us to catch and identify problems in a controlled environment.

#### 1: No Fear

It's human nature to fear what we don't understand, and the dyno is no exception. Like most fears, however, this one can be erased by knowledge.

First off, there are two basic types of automotive dynamometer, the engine dyno and the chassis dyno. Think of it this way: the engine dyno tests engines that are removed from the car—the flywheel is bolted to the dyno—while the chassis dyno allows the engine to remain inside the car. With the chassis dyno, the car is strapped down so that the entire drive-line spins the machine's rollers.

There are also different dyno designs. Some use a water brake and a torque arm to measure torque. Others use an electric current (eddy current) to measure torque. Still others

use math to calculate the acceleration of a known mass and derive horsepower and torque from there.

Once the torque at every single rpm point is recorded, the dyno's computer can compute a corresponding horsepower figure. This info is displayed on a computer screen, and print-outs are just a keystroke away.

While each design has its pluses and minuses, the chassis dyno has become much more common among the general population for the simple reason that the engine doesn't have to be removed for testing. In fact, we have a bold statement about the subject: A chassis dyno session is one of the easiest and least expensive ways to put the finishing touches on a tune-up, solve a tricky drivability problem, or both.

#### 2: A Chicken in Every Pot and a Chassis Dyno on Every Corner

While dial-back timing lights and wideband oxygen meters have been making their way into many people's toolboxes, few of us have the space or cash to install a chassis dyno.

Maybe it's a stretch to say that there's a chassis dyno shop on every corner, but most people have one within an hour or two of home. Better yet, medium to large metropolitan areas tend to have multiple dyno shops.

How do you find one? Ask around. The local racers know whose shops are so equipped. Most of the dyno manufacturers also list their customers online. As far as cost, expect to pay about a hundred dollars for a baseline session.

#### 3: Don't Get Started With the Last Step

Once people overcome their fear of the dyno, they seem to experience another phenomenon: they want to jump on the dyno too soon. As much as we value our dyno sessions, we usually save them for last in the tuning and diagnostic process.



**Dyno shops secure the car to the ground with the same tie-down straps used on trailers. Know where your car's mounting points are located, and don't forget that the exhaust will get hot and the drive wheels will be moving very fast. You don't want a strap melting or getting wrapped up on an axle during a run.**

Okay, there's one time when we break that rule. Sometimes we baseline a new project just to get a starting point, but we consider that a luxury and not a necessity.

#### **4: Be Prepared**

If the dyno is our final step, how do we get prepared? We start by making sure our engine and driveline are in good shape.

Our drive wheels are going to hit some fairly high speeds while on the dyno, so we want to inspect everything involved. Tires, brakes, suspension, U-joints and so on all need to be in good shape.

Next, we completely tune the engine. Finally, we make a plan for our trip to the dyno shop, and ready the tools and supplies that we'll need to execute that plan.

#### **5: Tune-Up Time**

Now it's time to tune our engine. First, we ensure that the engine's internal components are in good shape and adjusted properly. We start with a compression and oil pressure check. Assuming these go well, we begin a full tune-up by retorquing the cylinder head—or heads—and doing a valve adjustment.

Then, if there are any emissions controls on the car, we simply check that they're functioning properly. Most of our classics have little more than a PCV system and maybe some evaporative loss equipment. However, you should leave these pieces in place; they don't harm drivability and will keep things less stinky.

Next, it's the ignition system's turn. The points, plug, wires, cap and rotor must all be in good shape and ready for action. If applicable, the dwell should be within spec.

Ignition timing is critical. Not only do we check the setting

at idle and at about 4000 rpm, but we also ensure that the advance curve is correct for our engine. Once we're sure the ignition system is up to snuff, we move on to the induction side. We find and fix any vacuum leaks, then make sure the carburetors are clean and not worn out. After that, we jump into jetting and other adjustments.

Around this point, we realize that a dyno is going to be really helpful. Think about this: when performing a textbook tune-up, you're mainly adjusting the ignition and carburetors while the engine is idling. Since the car is stationary, revving the engine doesn't really place it under any load.

Here's the kicker: since you spend much more time driving than idling, wouldn't it be great to be able to make adjustments under load? That's where the dyno shines and really helps with carburetor setup. At this point, we just try to get things close. If the car is bone stock, that's pretty easy: set it up with the stock parts.

Keep in mind that a lot of cars have received some questionable work thanks to previous caretakers. If you see a stock carb on there, don't assume that the jetting is as delivered—check to make sure. If the car has been modified, it's time to either make some good guesses or contact an expert for advice.

A good tune-up is always followed by a nice drive. We take the car out and put it through its paces. It should idle well, accelerate smoothly, and cruise steadily. If it doesn't, we go back and recheck our tune until it does—nine times out of 10, we find we can solve any drivability problems before we go to the dyno.

Remember that the dyno session is usually reserved for fine-tuning, and that these drivability problems can almost

always be resolved beforehand. You could even consider bringing in a pro for some help. If you absolutely cannot find the problems with conventional tuning, exercise your last resort and use the dyno as your diagnostic tool.

## 6: Plan the Trip

While quick lube joints don't require appointments, we've yet to see dyno shops offer drop-in service. You're going to need to schedule the dyno session. And while you're thinking about future plans, why not come up with some dyno time goals?

We try to keep each dyno session pretty short, an hour or less. We usually have a couple objectives in mind, like maximizing the timing, setting the jetting, or testing a part or two.

If you intend to diagnose a drivability problem, set the jetting, and test seven or eight parts in a single session, you're asking for trouble in our book. Keep things simple and you'll get quick rewards. Make things complicated and you'll come back frustrated.

Once we decide on our goals, we make sure that we have the tools and parts needed to do the work—we're assuming that the shop will let us work on our own car, but it pays to confirm this beforehand. If we follow our tuning example, we bring the following tools: basic screwdrivers, wrenches, pliers, a dial-back timing light, and tools needed to change the carburetor needles or jets. We also bring some needles or jets that are both richer and leaner than those in our current setup. A set of plugs and plug wires will come in handy if something goes wrong along the way.

To be really prepared, we often rehearse the job before going to the dyno. This helps us make sure that we have all of the needed tools. Plus, it can highlight any minor inconveniences that may crop up, for example, do the new parts require a different screw or nut?

**Timing adjustments are a great way to find free horsepower. On the flip side of the coin, improper timing can hamper performance or even harm an engine.**



## 7: On the Rollers

Now that we're tuned and prepared, it's time to take that big trip on the rollers.

We usually arrive at the dyno shop about 15 minutes ahead of our appointment. We let someone on staff know that we're there, then get our car and tools prepped for the session.

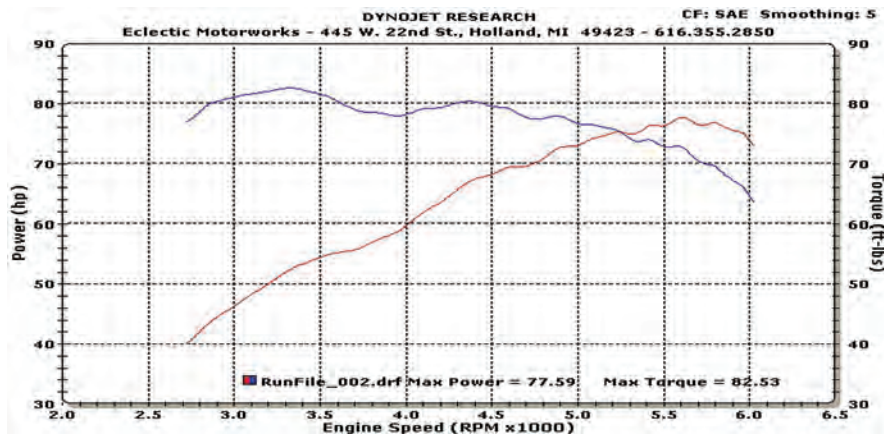
Once the operator is ready for us, we explain our plan for the day. If we're fine-tuning the car, for example, we say that we want to dial in the timing and get the jetting right before heading home. The operator can usually then determine how many pulls we need. In this case, probably 10 to 15.

The operator then instructs us on how to get the car on the rollers. Some shops have in-ground rollers; others feature above-ground equipment that requires the car to be raised into position via a four-post lift. Either way, we do exactly as instructed—we may be told to drive onto the rollers ourselves, or the staff may do it for us. We also let the operator strap down the car without interference or suggestions, unless they ask, of course.

Next, the operator typically asks us to slowly run the car on the rollers to check the tie-down straps and blocks one last time. Assuming everything is secure, it's time for some more connections.

At the very least, an inductive pickup goes on a plug wire to measure rpm. We always add a wideband oxygen pickup. If a car already has an oxygen sensor bung in its exhaust, that can be used. Otherwise, we stick a probe in the tailpipe or weld on a second bung beforehand.

Once the car is tied down and hooked up, it's ready to roll. The protocol usually goes like this, but make sure to always follow the operator's instructions:



A healthy dyno curve is a beautiful thing. Armed with a baseline, you'll be able to judge the effectiveness of future modifications.

- Ease the car into first gear to get the rollers spinning.
- Carefully accelerate to the gear you're going to use for the pulls, usually third.
- Drop down to your starting rpm, the point where you want to start collecting data.
- Upon getting the "go" signal from the operator, put the accelerator to the floor.
- Once you hit the target rpm—the place where you want to stop collecting data, usually at or near redline—let off on the accelerator and disengage the clutch. Some operators have you turn off the engine.
- Now let the dyno use its own brakes to slow down the drive wheels. Never use your car's brakes while on the rollers; the dyno's large mass can burn them up.
- Once the dyno has come to a stop, hop out and check the results on its monitor.
- Make plans and changes for the next pull and repeat until done.

While most of the available chassis dynos feature the traditional roller, there is one variety that works differently. The Dynapack chassis dynamometers forgo the rollers for devices that are bolted to the car's hubs.

Whatever the dyno make and model, we usually start our procedure with two back-to-back baseline pulls to make sure that everything is running correctly. We also want to make sure that the car is running consistently. If the baselines don't repeat, we may be in for trouble. Consistency is key when testing.

With our baselines established, we follow our planned course of action. In the case of our tune-up, we adjust the timing first. Generally we deviate a few degrees in either direction of the factory setting, looking for the sweet spot that gives us the best power. Once we've done that, we do the same thing with our jetting.

The dyno session really pays off when working with jetting: the decreased power and less-than-ideal air-fuel curves immediately show up on the dyno's screen. Armed with that information and a little knowledge of our induction system, we can quickly adjust the jetting and get the power where it should be.

The fine-tuning can sometimes add another 5 or 10 percent more power to our tally. That can sometimes make a half-second difference in zero-to-60 times and a second or more at the track. When we test parts on the dyno, not only

do we discover whether they're working as promised, but we get the fine-tune optimized for them, too.

## 8: Cool, But Will I Blow Up My Engine?

Even though the dyno places the engine under load, odds are strong that nothing will break. If something does come apart, it probably would have eventually happened on the street or track.

Also, consider the alternative testing methods, like timed zero-to-60 runs. First, you have to find a safe, long straight, not a trivial task, especially if legality is a concern, too.

Then there's the mechanical strain. When you dump the clutch, some components take quite a beating. The clutch probably has to slip a bit, while the gearbox, driveshaft and rear axle take quite a shock. The rear suspension probably winds up a bit, and the tires feel some pain. Every time you shift gears, these shocks are repeated. Not only is safety a pretty big concern with this type of testing, but it places a lot of strain on the whole car.

Now consider how the dyno does its job. The drivetrain is already in motion before the data collecting begins. Nothing is shocked or jolted from a standstill. The clutch isn't hammered, and the tires don't have to claw for traction. A dyno pull feels like a 10-second drive up a steep hill. How many times have you blown up your engine doing that?

The dyno run is more consistent, after all, your driving skills don't come into play. It's also more precise, as it can measure horsepower to the hundredth decimal point and correct for the day's atmospheric conditions.

## 9: Try It, You'll Like It

A dyno is one of those tools that opens up your eyes and changes the way you do things. It's kind of like a timing light: once you learn how to use it, you'll never do static ignition timing again. The dyno is just that useful.

In addition to optimizing your car, you'll get the bragging rights that come with it—you'll know exactly what kind of power the car is making and where. Information like that allows you to enjoy your classic just a little bit more. And that's the point. Like we said, don't fear the dyno. **BM**

*This story originally appeared in Classic Motorsports magazine. To request a free copy of the latest issue, visit [classicismotorsports.net](http://classicismotorsports.net). Carl Heideman, the author, regularly hosts Tuning for Speed seminars. Learn more at [eclecticmotorworks.com](http://eclecticmotorworks.com).*

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# GENERATORS & REGULATORS

## A Magnetizing Primer

BY MICHAEL GRANT, MOSS TECHNICAL SERVICES

Most people first learn about generators the hard way: at night in the middle of nowhere. They purchased an “English sports car needing minor electrical work” from the classified ads.

The man who sold the car was honest—the car was English and it did need electrical work. After standing over the open engine compartment and alternately thumping the generator, the control box and the flashlight, the new owner concludes that although flashlights improve with thumping, generators and control boxes do not.

The best way to come to grips with old electrics is by gaining an understanding of what makes them work. Contrary to popular belief, the operation of a Lucas generator is not based on some magic incantation. It’s based on five fundamental properties of electricity and magnetism:

- 1) Electric current in a coiled wire creates a magnetic field.
- 2) Wrapping the coil of wire around a soft iron core intensifies the magnetic field.
- 3) The strength of the magnetic field varies with the current in the wire.
- 4) Rotating a loop of wire in a magnetic field induces a voltage in that loop of wire.
- 5) The strength of the induced voltage depends on the strength of the magnetic field and the rotation speed of the wire loop.

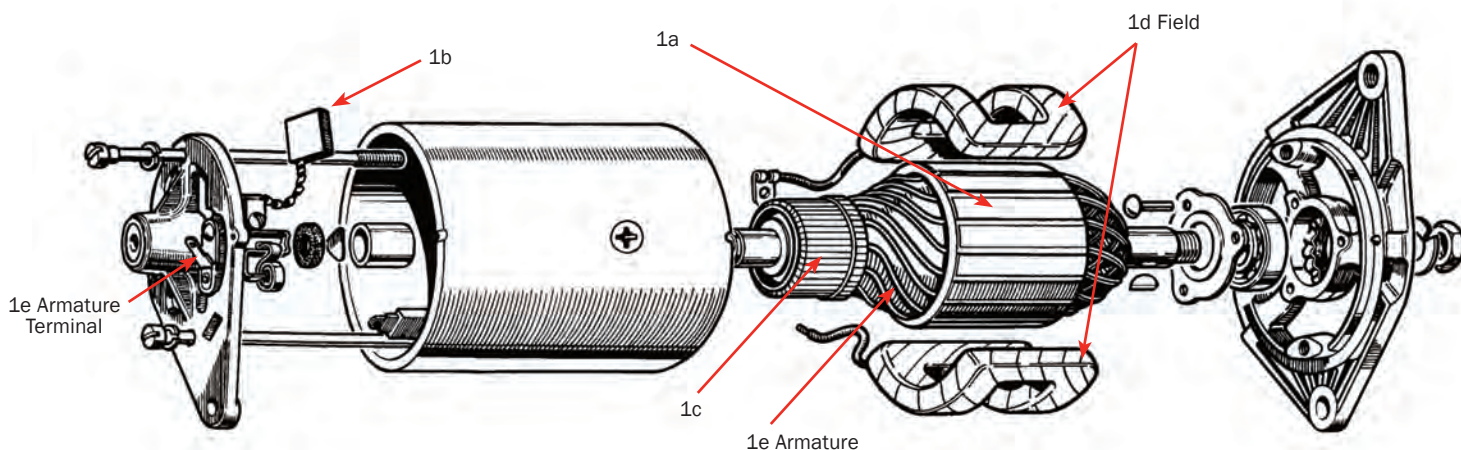
### Generator Basics

A generator is composed of five parts. The armature (1a) is made up of coils of wire wrapped around an iron core, and it is this armature that rotates when the generator pulley is turned. The brushes (1b) are the spring-loaded contacts that transfer current from the armature to the electrical system. The brushes actually rest against a segmented ring at one end of the armature called the commutator (1c). Inside the generator body are the field coils or field windings (1d). These consist of fine copper wire wrapped around the field poles, which are essentially pieces of soft iron.

It is the current in the field coils or windings that produces the magnetic field in which the armature rotates.

When the engine is turning over, the armature (1a) is spun by the fan belt. In the presence of a magnetic field generated by the field coils (1d), a voltage is induced (created) in the armature windings. When the voltage in the armature windings (1e) is greater than the rest of the system, current will flow from the armature windings (1e) through the commutator (1c), through the brushes (1b), finally arriving at the armature terminal (1e) of the generator (usually marked “D”). The current then flows through the wire running to the “D” terminal of the control box or voltage regulator.

**The electrical system operates on the properties of various metals and the principles of magnetism. It is the most scientifically advanced system in your car, but this step-by-step guide lays it all out.**



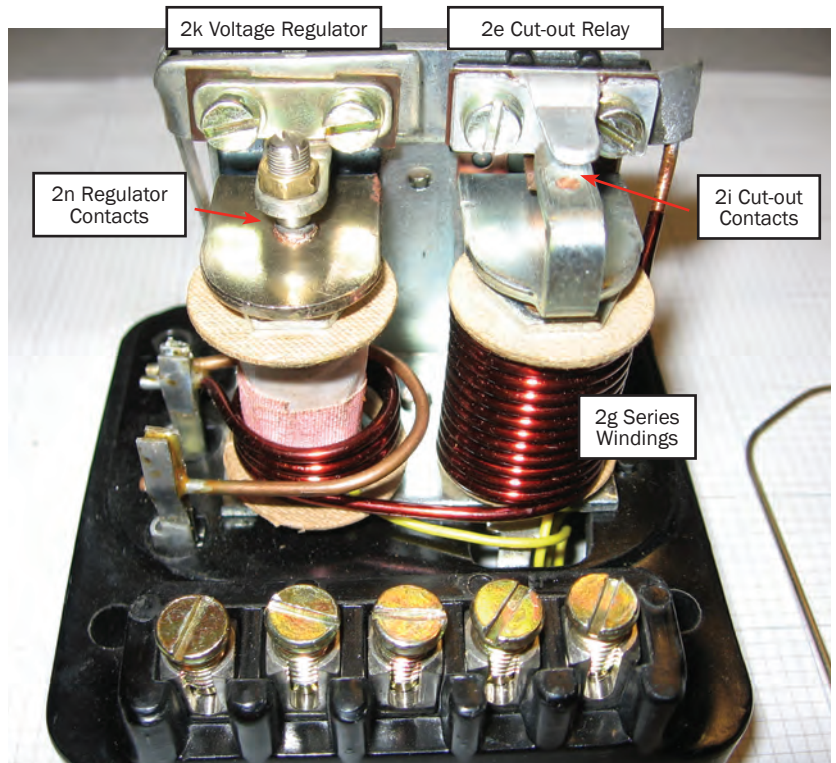
## Control Box

The control box has two main parts: the cut-out relay (2e) and the voltage regulator (2k). The cut-out relay prevents electrical current from flowing out of the battery to the generator when the generator's output voltage is lower than the battery voltage. The voltage regulator strengthens or weakens the magnetic field in the generator according to the needs of the battery or other electrical system components. Remember, the stronger the magnetic field, the greater the voltage induced in the spinning armature.

The cut-out relay (2e) consists of an iron core with two layers of wires wound around the core. The inner wrapping of wire is called the "shunt windings" and the outer wrapping is called the "series windings." The shunt windings, which are hidden under the series windings, are connected between the armature terminal "D" on the generator and a ground terminal (usually marked "E") on the control box.

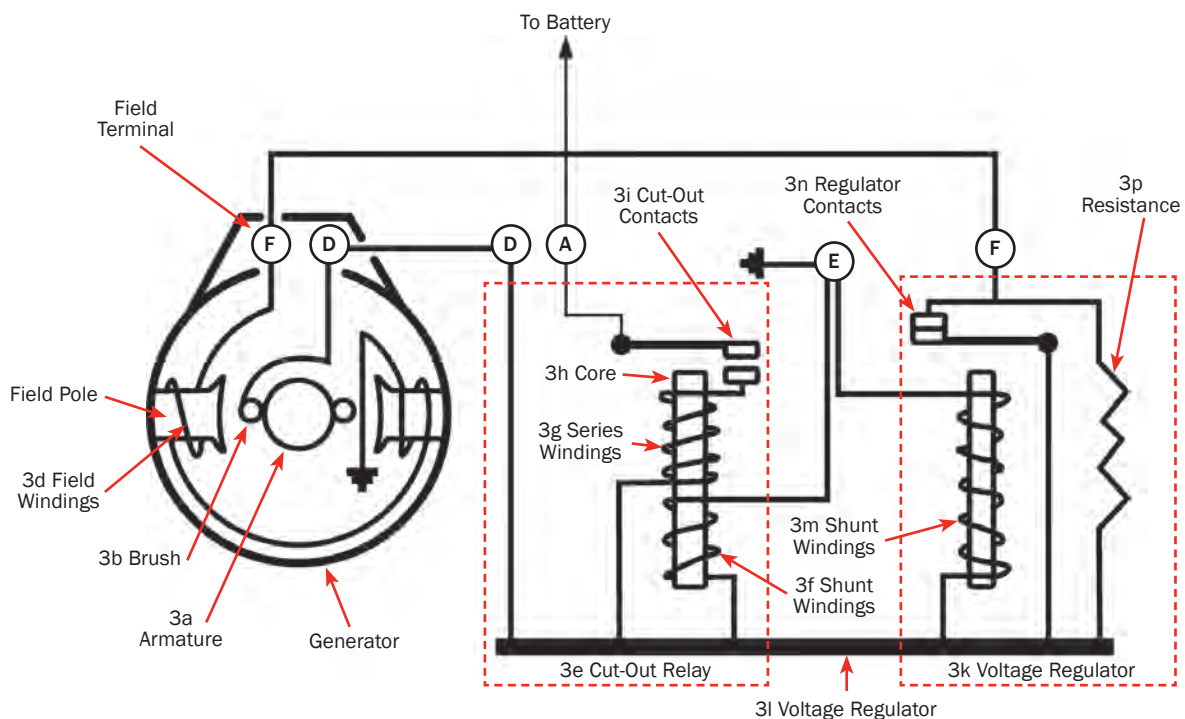
This means that the internal generator voltage is always impressed upon the shunt windings. In general, all the generator output current passes through the series windings (2g) before going to the electrical system.

Fixed above the cut-out core is a spring arm with a contact (2i, 3i) that is connected to the series windings (2g, 3g) of the cut-out core. Output current from the generator can only pass on to the electrical system and the battery when the cut-out contact arms (3i) are touching. Spring tension normally holds the contacts apart so there can be no current flow in either direction.



## Cut-Out Relay at High/Low RPMs

When the armature in the generator is spinning fast enough (about 1000 generator RPM or 750 engine RPM), the current in the shunt windings (3g) of the cut-out relay will generate a magnetic field strong enough to overcome the natural spring tension of the contact arm (3d). It snaps down, bringing the two contacts together. Current now flows through the series windings (3e), across the contacts and out the arm (3d), finally reaching the output terminal (usually "A") on the control box. From there, it goes on to the ammeter (if



fitted) and then to the battery.

This current now flowing through the series windings (3e) actually intensifies the magnetic field around the core (3f) of the cut-out relay, and this in turn holds the arm down even more firmly, pressing the contacts (3d) together. The point when the contacts close is usually adjusted so that the internal voltage of the regulator is about 12.7 to 13 volts.

When the engine slows to idle, the armature slows down as well. This means that the voltage induced in the spinning armature drops. Lower voltage reduces the strength of the magnetic field holding the series winding's contacts (3d) closed. Eventually, the weakened magnetic field can no longer hold against the arm's spring tension and the contacts open. (The way the contacts open is more complex, but this description covers it.) This immediately stops all current flow to or from the generator. The point that the contacts open (around 8.5 to 11 volts) is known as the drop-off point.

If the series winding contacts in the cut-out relay did not open at low generator output, the higher battery voltage would flow back through the control box, through the wiring harness and into the armature's fine wire windings in the generator. The reverse current flow would melt the windings and destroy the generator. You can see why the control box is so important.

## Voltage Regulator

The other half of the control box, the voltage regulator (2b, 3b), limits the voltage in the charging system to a safe value by controlling the internal voltage of the generator. The voltage regulator, like the cut-out, has a shunt winding (3h) made up of many turns of fine wire wrapped around a soft iron core. Suspended above the regulator core are a pair of contact points (3i) similar to the cut-out relay. However, these points are normally closed, rather than open. When the points are closed, the output current from the "D" terminal on the generator goes through the regulator frame (3l), then through the regulator contacts (3n) to the field terminal on the control box (usually "F"). From this field terminal, the current flows to the field terminal ("F") on the generator and then through the field windings (3d) around the field poles of the generator. The current in the field windings (3d) creates the magnetic field around the armature (3a). The armature spinning inside this magnetic field generates the electric current that feeds the battery and the rest of the electrical system.

The function of the voltage regulator is to break this connection.

When the generator is spinning slowly, generator output voltage is low. This means that the current in the regulator shunt windings (3m) is weak, and the magnetic field created by this weak current is unable to overcome the spring tension in the arm holding the regulator contact points (3n) closed. As the generator spins faster, the output voltage increases. This results in increased current flowing into the voltage regulator through the "D" terminal. The increased current continues, flowing through the regulator shunt windings (3m), through the regulator contacts (3n), out through the "F" terminal on the voltage regulator and back through the field windings in the generator.

Since there is a direct connection through the regulator contacts (3n), current in the field windings (3d) increases as the generator spins faster. Consequently, the magnetic field (in which the armature spins) created by the increased current in the field windings (3d) is also increasing. Because the magnetic field is stronger, the induced voltage in the armature increases. As the output voltage from the generator continues to increase, the current in the shunt windings (3m) of the regulator also increases, which increases the strength of the magnetic field trying to pull the regulator contacts (3i) apart.

When the generator output is high enough, the strength of the magnetic field generated by the current in the regulator shunt windings (3m) finally overcomes the natural tension of the contact arm, resulting in the separation of the regulator contacts (3i). The direct connection between the armature terminal "D" of the generator and the field terminal "F" of the control box is broken.

## Backdoor Current

Although the direct connection has been severed, there is still a way for the current from the generator to return to the field windings. This second path is through a short piece of resistance wire (3p) connecting the regulator frame (3l) to the "F" terminal on the voltage regulator. Output current from the generator can still get to the field windings in the generator, but the built-in resistance of the wire reduces the current passing through the field windings (3d), which reduces the strength of the magnetic field the armature spins in. The voltage induced by the magnetic field in the armature windings falls, so generator output falls as well. With reduced generator output, the current in the shunt windings (3m) of the regulator is also reduced, and the magnetic field produced by the current in the shunt windings is likewise reduced. When the strength of the magnetic field is no longer enough to hold the regulator contacts (3n) apart against the spring tension in the arm, they snap back together. Direct contact between the generator output and the field windings is restored.

Since current is no longer flowing through the resistance wire, the current in the field windings of the generator is increased, which strengthens the magnetic field inside the generator. The induced voltage in the armature increases, and the generator output also increases. As generator output increases, current in the shunt windings (3m) of the regulator increases once again until the magnetic field is strong enough to pull the regulator contacts apart. As before, with the direct connection broken, the current to the field windings is reduced by the passage of current through the resistance wire (3p). The strength of the magnetic field in the generator falls, so the generator output falls.

The cycle described here takes place so quickly that the contact points seem to vibrate.

With this knowledge of the electrical system, you'll be able to entertain your companions with a profound dissertation on the fundamental properties of electricity and magnetism that make thumping on the generator and control box useless. Once the magnetism has leaked out, there is nothing anyone can do. **BM**



## THE ZIG ZAG TR5

In 1974, Craig Simon of Stanley, Kansas, acquired a 1968 TR5 for \$400 as a college student in Munich, Germany while his father was stationed in Europe. The original owner had purchased it in Belgium. A college kid with a sports car in a country with no speed limits on the highways is a dangerous combination.

Simon found this out during a snowstorm when he was returning from a road trip to Oslo, Norway with his roommate in the TR5. They hit driving snow near Frankfurt and slowed to 40 mph, and soon noticed there were no other cars on the autobahn. They cracked jokes about the Germans apparently being afraid of a little snow.

Simon's roommate recalled being on a swerving school bus during a rare snowstorm in Georgia and seeing the wavy dark tire lines on the white snowy road behind the bus. Simon thought that sounded like fun, and began to weave across the lanes leaving their own set of wavy lines. They were laughing and having fun until they saw the flashing police lights in the rearview mirror.

The officer informed them that the autobahn was closed. To make matters worse, the taillights on the Triumph were out. But the officer took pity on the college guys, told them to open the hood, found a blown fuse, replaced it and confirmed that the taillights were working. Instead of a ticket, he told the guys to get off at the next exit.

As the officer walked away, he paused, turned and added: "And no ziggy zaggy!"

Simon drove the TR5 all over Europe, and when he returned to the States in 1977, he shipped the car back too. He parked the car in 1983, planning to restore it himself. After two decades his wife said, "If you want to drive that car again before you die, let someone else restore it." Last year he completed a six-year restoration and is once again enjoying the ride.

Simon thanks the key people involved in the restoration: Eric Vetter and Clarence Estle of Vettors Collision; Georges Imports for fuel injection work; and Craig Vaughn for transmission work and advice. **BM**



**Craig Simon's TR5 was a daily driver and logged thousands of miles in all weather conditions. Now after a lengthy restoration, snowflakes will no longer cover—or touch—the lustrous paint job. The car still sports the original dashboard plaque proclaiming: "Do not lower windows at speeds in excess of 120mph." which is why he bought the car in the first place.**

## COMING EVENTS

**Oct 7-10:** Triumphest, Del Mar, CA (just north of San Diego), [www.triumphest.com](http://www.triumphest.com)

**Oct 9:** Annual Nashville British Car Club Show, Centennial Park in downtown Nashville, TN, [www.nashvillebritishcarclub.org](http://www.nashvillebritishcarclub.org), Ray McCrary, 615-331-0169

**Oct 9:** 14th Annual Brits at the Village, Peddler's Village, Lahaska, PA, [www.phillyMGclub.com](http://www.phillyMGclub.com), Bill Hixson, 215-932-0295, [MGBV6T5@phillyMGclub.com](mailto:MGBV6T5@phillyMGclub.com)

**Oct 9-10:** British Car Roundup and Clovis Antique & Collectable Show, Clovis, CA, 559-352-7968, [www.valleybritish.org](http://www.valleybritish.org)

**Oct 9-11:** Six Pack Trials, Oxford, OH, [www.6-pack.org](http://www.6-pack.org)

**Oct 10:** 15th Annual Hunt Country Classic Car Show, Willoughby Farm, Middleburg, VA, [www.mgcarclubdc.com](http://www.mgcarclubdc.com)

**Oct 13-16:** Mini 51, Erwin, TN, [www.classicminis.org/mini51.htm](http://www.classicminis.org/mini51.htm)

**Oct 16-23:** Penrite Mainland Classic Tour, Dunedin, New Zealand, ++64 3 4770800, [mainland.classic@ihug.co.nz](mailto:mainland.classic@ihug.co.nz), [www.mainlandclassic.co.nz](http://www.mainlandclassic.co.nz)

**Oct 21-24:** 35th Annual Fall GOF 2010 by the Texas MG Register, Palestine, TX, Russell Read, 972-291-4543, [www.tmgr.org](http://www.tmgr.org)

**Oct 30:** 12th Annual Brits at the Battleship Car Show, NC Battleship Park, Wilmington, NC, [www.bmccf.org](http://www.bmccf.org)

**Oct 30:** Brit Bash, Vero Beach, FL, [britbash@comcast.net](mailto:britbash@comcast.net)

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