



MG's EX186 Prototype: The Ultimate "Modified" MGA!

Owners: Joe and Cathy Gunderson
 City: Littleton, CO
 Model: prototype (based on an MGA Twin-Cam)
 Engine: MGA Twin-Cam
 Restoration by: owner

MG Builds a LeMans Prototype

MG's senior management had every intention of winning at LeMans in 1961. Their appetite for victory had been whetted by MG's last-minute three-car entry in the 1955 race. That race went very well indeed: the brand-new MGA model proved itself by placing twelfth overall and fifth in class. Not bad for a underdog and rookie team competing against more highly developed, powerful, and expensive cars!

John Thornley (MG's Managing Director) and Syd Enever (MG's Chief Designer) laid careful plans for developing a very special MGA-based "prototype" for the express purpose of winning LeMans outright.¹ They would utilize the then-new dual-overhead cam version of BMC's "B-Series" engine. Probably recognizing that their engine wouldn't give them a performance edge, because other cars would have a full liter more displacement, they planned to compensate with a specially built, lightweight, and extremely aerodynamic aluminum body. They also planned a highly developed chassis featuring DeDion-type rear suspension.²

"EX186" is the racecar that resulted from these plans. The car was built and test driven. By all accounts its performance was judged successful. For complicated reasons, the LeMans project was cancelled before EX186 was ever raced. This article will take a technical look at the design of EX186.

From even a cursory look, EX186 is clearly a development of the MGA. However, a closer look at design details might help us understand the MGB model better. EX186 and the MGB were designed concurrently and on the same drawing boards. In a presentation at "MG2006," Don Hayter (Chief Designer on the MGB project) indicated that the EX186's DeDion-type rear suspension was so well regarded that he felt it should have been used on production MGB's.

The other key fact to keep in mind as you consider EX186 is that it was a "skunkworks" project. MG wanted so badly to race... but MG was part of a bigger company that adamantly didn't want MG to race! EX186 was successfully kept completely secret from Deputy Chairman and Managing Director Sir Leonard Lord, and from all the rest of BMC management. MG managed to keep the secret from leaking even while all Austin Healey production moved into MG's factory at Abingdon, even while sourcing special components from other divisions and from key suppliers, and even while recruiting sponsors like Dunlop and Esso for the race team.

The very earliest engineering drawings for EX186 are dated 1955, and actual construction of EX186 primarily spanned 1958 and much of 1959. Whether or not additional cars on the same design were scheduled isn't clear, but EX186 was completed and was being race-tuned when the LeMans project was aborted. MG management decided to cancel the EX186 project before the car was ever raced. The final straw that broke the EX186 project was that Twin-Cam production was halted prematurely.

It was normal MG practice to destroy racing prototypes after retiring them, but someone at the MG factory creatively decided to dispatch EX186 to a U.S. dealership, invoiced as "auto parts". Not just any dealership either; EX186 was sent to Kjell Qvale at "British Motor Car Distributors" in San Francisco. Probably no MG dealership was more actively engaged in racing, but miraculously EX186 was never raced in California although Qvale would've been perfectly positioned to campaign the car in the active California roadracing scene, or to sell the car to someone who would.

Kjell Qvale kept EX186 safely stored from 1960 through 1966. After that it was sold, licensed, and driven on public roads for about two years until its engine required overhaul. At that time, overhaul costs were prohibitive and the car was removed from service and stored in a barn, on a walnut farm in Red Bluff CA. Luckily, the hand-built aluminum body survived intact. MG Enthusiasts Joe and Cathy Gunderson purchased the car in 1982 and they've been carefully restoring it as a long-term project. Tracking down missing original parts has been one of the special challenges of this unique restoration.



Specifications and Features

Note: the following specifications are "as currently configured" unless otherwise noted.

- Engine:** MGA Twin-Cam 1588cid inline four cylinder (BMC B-series with a special aluminum head. Note: EX186 was probably originally fitted with an earlier 1489cc version of the engine, although this has not yet been confirmed. Details like compression ratio and cam profiles are also unknown.) The original oil pan has been installed; unlike a stock finned-aluminum Twin-Cam pan, EX186 features a specially fabricated steel pan with approximately 10 quart capacity.
- Induction:** dual Weber 42DCOE two-barrel, side-draft carburetors. (MG originally installed Weber DCO carburetors on EX186.)
- Ignition:** stock MG Twin-Cam.
- Cooling:** EX186 features a very thick core special aluminum radiator, marked "Morris". A matching aluminum oil cooler is bolted to the bottom of the radiator. The original aluminum coolant swirl tank is used for de-aeration. Apparently no coolant thermostat or restrictor plate has ever been fitted. No cooling fan is utilized. After passing through the radiator, airflow is divided and ducted into the front wheel wells. The shape of the wheel arches and the unique "eyebrow" fender flares were evidently engineered in part to manage and increase airflow out of the fender wells. Note: there's no airflow over the engine and in fact the engine compartment is essentially fully enclosed because EX186 features full belly pans.
- Exhaust:** custom header and stainless steel muffler built to the original MG engineering drawings. The header is essentially a tri-y design with very long primaries"; cylinders "1" and "4" are paired, as are cylinders "2" and "3". The primary collectors are just above the muffler, and the muffler functions as a secondary collector.
- Transmission:** (original) standard MGA 4-speed transmission with close-ratio ("factory option") gear set. Stock MGA-type slave cylinder, except modified with the bleeder in a different position. Shortened Austin Healey 100-6/3000 driveshaft.
- Front Suspension:** similar to stock Twin-Cam except with noticeably different upper control arms and with a different (all aluminum) steering rack. The front anti-sway bar appears to be a stock MGA part. The lower control arms have been lightened.
- Rear Suspension:** essentially a deDion type suspension, but with some details that are quite different from more familiar production-car deDion suspensions (Rover P5/P6, etc.) Specifically, in lieu of coil springs the EX186 suspension utilizes leaf springs. As in all deDion suspensions, the differential is rigidly mounted, and is connected to the hubs with jointed halfshafts. The two hubs are connected by a rigid beam which runs transversely behind the differential; the beam keeps the planes of the hubs parallel in all situations. The leaf springs are specially constructed and are shorter in length but noticeably softer-sprung than standard MGA (or MGB) springs. The design utilizes outboard brakes (with pinch-type, cable-operated emergency brake feature, similar to a regular Twin-Cam system) and knee-action shock absorbers. No Panhard rod or rear anti-sway bar is fitted.
- Brakes:** Dunlop four wheel disc brakes. Note: brake and clutch have separate Girling master cylinders, and the brake master cylinder has a remote reservoir.
- Wheels/Tires:** 15x5.5 Dunlop peg-drive knock-off steel wheels. Dunlop bias-ply historic racing tires. (Note: EX186 was apparently wearing three out of its four original Dunlop tires when the Gunderson's acquired it. The tread was nearly entirely worn off!)
- Chassis:** EX186's steel frame is obviously based on the standard MGA design, but all the dimensions are somewhat different, and the MGA's "goal post" was omitted. 94" wheelbase, 49" track. The floorboards are riveted to the bottom of the frame rails. The transmission tunnel is mounted above the floorboards, and is designed to be conveniently removable for service. A hinged access cover in the transmission tunnel facilitates checking and topping off transmission oil.
- Body:** hand-made all aluminum body constructed by "Midlands Sheet Metal". 14'5" overall length. Full, smooth, aluminum belly pan. Removeable bonnet (secured by two Dzus fasteners at rear). Removeable access panel for the cooling system. Removeable luggage compartment lid. New two-tone paint, carefully matched to the original colors. (Interior paint is still original.) Perspex three piece windscreen. (Note: the original center panel was cracked and required replacement, but the windshield extensions on the doors are still original!) Dual windshield wipers. Original Perspex headlamp covers.
- Weight:** 1870# (not quite dry)
- Fuel System:** original specially-constructed 26 gallon steel baffled fuel tank, complete with original specially-modified Lucas fuel level sensor. Two original Jaguar-type (dual-ended) SU fuel pumps. Interestingly, the fuel pumps are plumbed in parallel to the two respective Weber carburetors, without crossover. (If either pump failed, the car would have to stop for repair.)
- Electrical:** 12V positive ground electrical system. Lucas Generator. Jaguar 140 3-position voltage regulator, mounted on the passenger-side/cabin-side firewall. A modern Suzuki battery fits neatly in the original battery's location. All of the original wiring, switches, and instruments have been maintained. Two Lucas fuse blocks are mounted on the passenger-side/cabin-side of the firewall (giving this racecar twice as many fuses as a stock MGA), and interestingly all four headlamp filaments are separately fused. Regular MGA starter switch and headlamp switch.

- Lights:** Lucas "LeMans 24" model 7" round headlamps, as original. Interestingly, these lamps have replaceable bulb elements which can be accessed from the wheel wells. EX186 has always had clear position lights outboard of the headlamps. It also has taillamps with integral brake light function, and it also has license plate lamps, but no turn signal indicators have ever been fitted.
- Instruments:** (from left to right, as shown below) Jaeger fuel level gauge, Smiths oil temperature gauge, Jaeger dual oil pressure/coolant temperature gauge, Smiths chronometer ("tachometer") with tattletale, and Lucas amp gauge. The chronometer's function is especially interesting in that the needle rises and falls in discernable "ratchet" steps. The tattletale feature records the highest engine speed registered; it's reset by a button on the back. All instruments are illuminated for nighttime driving. EX186 has never had a speedometer.
- Interior:** original seats (constructed from steel tubing with aluminum pans), reupholstered in green vinyl to match the original. The headrest has been similarly reupholstered. The steel dashboard has been repainted in the original dark green color. The aluminum doors feature special aluminum hinges, but utilize standard MGA latches. (The doors fit properly; they open and close neatly.) The doors have cargo pockets built-in. A stock MGA steering wheel was utilized, albeit with the center removed.
- Other Notes:** LeMans rules required that all cars be fitted with a passenger seat and a spare tire, although they wouldn't be used in the race. Interestingly, MG used a bungee cord to hold the spare tire in place.

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Dual Weber 42DCOE two-barrel, side-draft carburetors. EX186 was never equipped with S.U. carburetors.



Foreground: the original aluminum coolant swirl tank is used for de-aeration.
Center: a modern Suzuki battery fits neatly in the original battery's location.



Smooth aluminum panels the full length and width of the bottom of the car minimized aerodynamic drag. Known as "bellypans", these panels are easily removeable for access to engine and suspension. (Here, and in the next three photos, bellypans have been temporarily removed for our inspection.)



EX186's front suspension is similar to a stock MGA Twin-Cam. Differences include an all-aluminum steering rack, noticeably different upper control arms, and lightened lower control arms.



The rigid transverse beam of a deDion rear suspension keeps the rear wheels parallel in all situations. Compared to a stock MGA, the rear springs are relatively soft. No rear anti-sway bar is employed.



From the rear, with bellypan removed, you can see the fuel tank and twin S.U. fuel pumps. (You can also see eight of the Dzus fastener receptor springs that would secure the bellypan.)



Left to right: Jaeger fuel level gauge, Smiths oil temperature gauge, Jaeger dual oil pressure/coolant temperature gauge, Smiths chronometer ("tachometer") with tattletale, and Lucas amp gauge.



EX186 is a well-crafted car. The custom aluminum doors feature special aluminum hinges, but they utilize standard MGA latches. The doors fit properly, and open and close quite neatly.



A stock MGA steering wheel was utilized, albeit with the center removed.



EX186 is shown here with its original Perspex headlamp covers, not reproductions.



Custom stainless steel muffler built to the original MG engineering drawings.



LeMans rules required that all cars be fitted with a spare tire. EX186's was located under this cover.



15x5.5 Dunlop peg-drive knock-off steel wheels. Dunlop bias-ply historic racing tires.



Endurance racing requires large capacity fuel tanks. EX186 still has its original specially-constructed 26 gallon steel baffled fuel tank, complete with original specially-modified Lucas fuel level sensor.



The original center section of EX186's Perspex three piece windscreen was cracked and required replacement, but the windshield extensions on the doors are still original!



When MG tested EX186 on public roads, it wore British registration plate number "451 MO".



Notes:

- (1) In researching the history of his car, Joe Gunderson spoke to several former MG employees who made it quite clear that MG aspired to win LeMans outright, not just finish first within their class. Could EX186 have been that competitive? Historically, LeMans rewards disciplined teams that drive reliable cars very consistently, lap after lap. Few successful teams win by racing all out; instead, teams win by maintaining a fast but consistent pace. If overall victory was indeed their goal, MG had to have been betting much faster cars would fail before them because EX186 would have a very large disadvantage in power. The MG Twin-Cam engine can only be enlarged to approximately two liters displacement, so it would have been racing against engines fully fifty percent larger. Even at that, it's a comparatively long stroke / small bore engine. It would have had a substantial technical disadvantage in total piston area and in piston speed. (Large piston area is favorable for making power. High piston speed is associated with durability problems.) Through the mid-fifties, some racing organizations followed handicapping systems whereby a smaller-engined car might be given certain allowances, such as being allowed to run a supercharger or being given a "head start" in terms of laps. LeMans rules didn't aide smaller cars. Through 1958, LeMans classed cars by displacement. Starting in 1959, LeMans added classes for non-production "prototype" cars such as EX186. The 1959 LeMans race was dominated by two Aston Martin prototypes with 3-liter inline six engines; they completed 323 and 322 laps respectively. The next four finishers were all Ferrari 250's with marvelous 3-liter V12 engines. The fastest two liter car at LeMans in 1959 was an AC Ace with a Bristol inline six engine; it completed 273 laps to finish seventh overall, fully fifty laps off the winning pace. The only MG that raced at LeMans in 1959 was Ted Lund's MGA, which completed 185 laps. Had MG won outright at LeMans with MG EX186, it would have been one of the biggest upsets in all of racing history.
- (2) Although a deDion suspension utilizing leaf springs would have been quite uncommon for MG, this configuration was de rigueur for top-flight international racing in the 1950's. Until Lotus introduced their "Type 16" in 1958, coil springs and independent rear suspension were extremely unusual features in purpose-built racecars. However, technology was changing especially quickly in this era. By the early 1960's, racecars with deDion rear suspensions were generally uncompetitive against racecars with unequal/unparallel wishbone independent rear suspension systems.

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