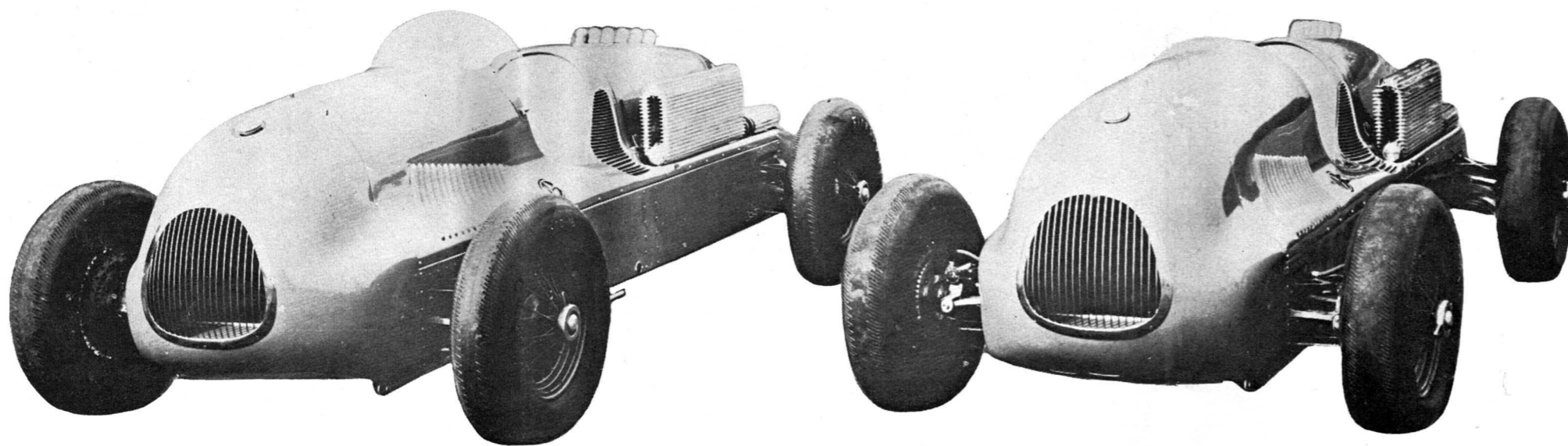


HARRY MILLER'S



CARS FROM MARS

Twenty years ahead of its day, the Gulf Miller was the hard luck car of all time.

By Griff Borgeson

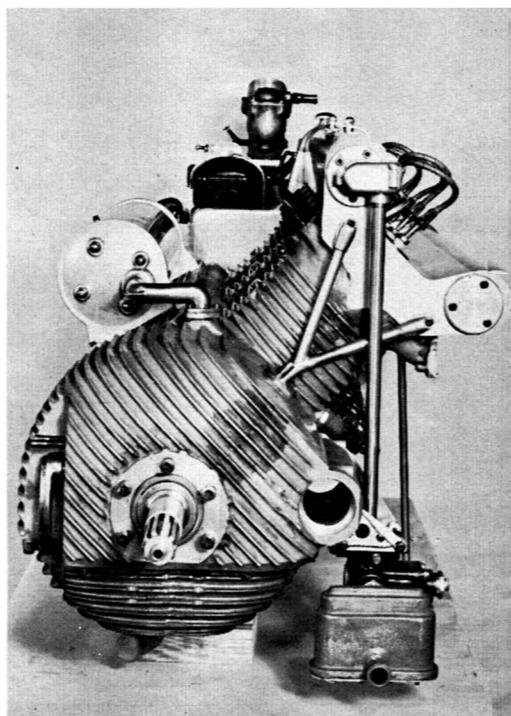
WHEN HARRY MILLER, one of the greatest race car engineers in history, went bankrupt in 1933 he left Los Angeles never to return. The Miller tradition and some of the firm's physical assets were salvaged by the quixotic Old Man's Sancho, hard-working and level-headed Fred Offenhauser. The erratic genius himself pushed east, in search of new fortunes and outlets for the torrent of ideas that poured from his restless mind.

Miller found the help he looked for because his fame was deservedly great, but he never found real success in the east. Everything he built turned to dust and his most brilliant conceptions were dogged by luck that was heartbreaking enough to kill a strong man. Part of his bad luck had a rational explanation. A famous engineering contemporary of Miller's says, "A combination of many talents was the key to Harry's success. He was not able to bring a job to completion by himself. He had plenty of ideas that sounded good on the surface but were unsound. The old boys, Offenhauser and Leo Goossen, weren't afraid to pound the drawing board and say 'Dammit, Harry, it just won't work.' The new men he worked with back east didn't have that judgment nor that insight into his character. They were awed by Miller's great reputation and they just yielded him."

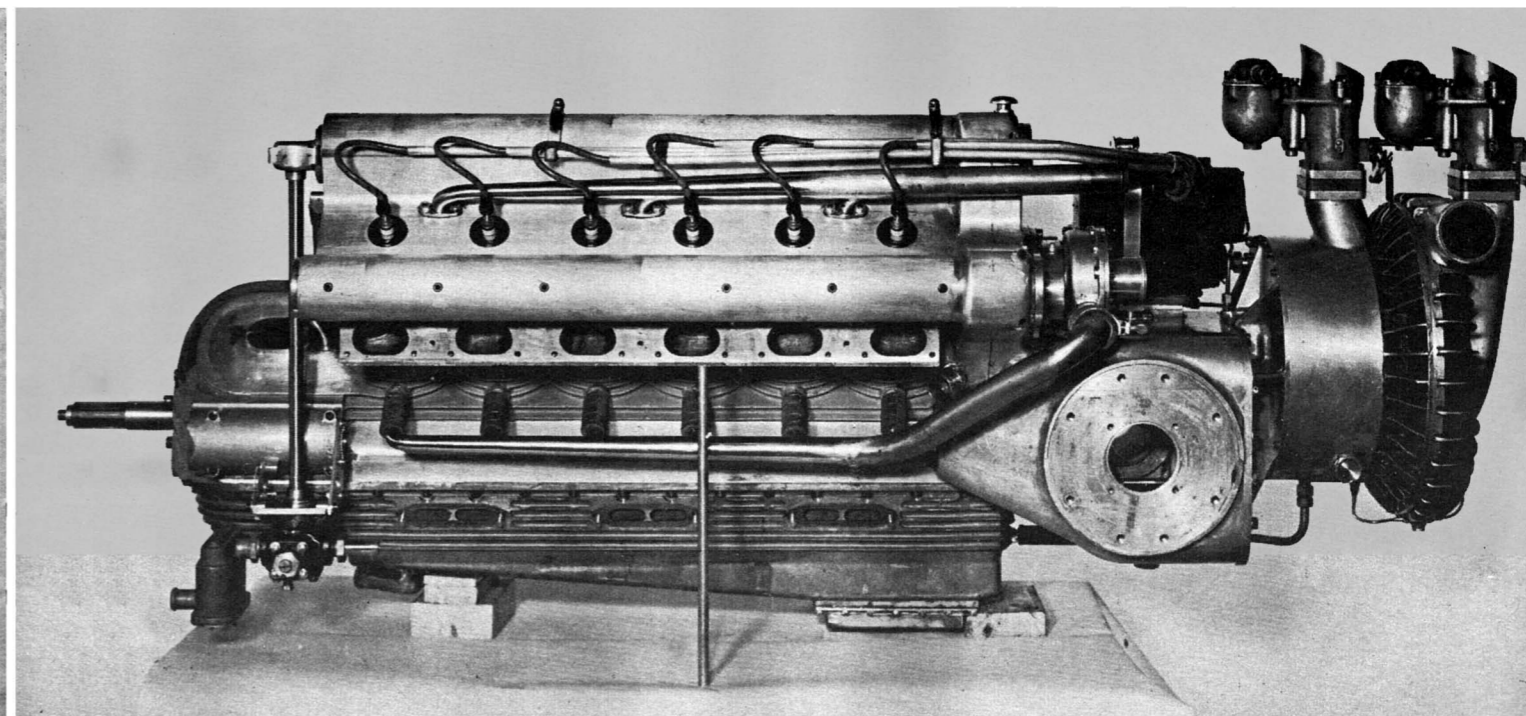
But this was not the case when Harry sang his swan song to the tune of the FIA formula that went into effect in 1938 and which still survives in essence at Indianapolis. This time he sold his conception—perhaps the most brilliant one of his life—to the Gulf Research & Development Co., a division of Gulf Oil. This time he had really big money and superb production facilities to work with, and he had the collaboration of highly trained engineers, diploma engineers, to screen his intuitions. The cars that resulted from this collaboration were fantastically advanced for their day. That they sparkled with originality and novelty no doubt had something to do with their troubles, but only with the small troubles. Miller, a confirmed mystic, would have been the first to point out that Fate, long his persecutor, really had it in for him.

The new international formula limited piston displacement to 274 cubic inches (4.5 liters) or 183 inches (3 liters) supercharged. It left fuel up to the user's option. Gulf R&D became interested in the possibility of a racing-car program that would demonstrate the quality of Gulf automotive products (the "laboratory-on-wheels" cliché had not been invented). In other words, Gulf was ready to go racing if the machine were available that could perform excellently using the company's then 80-octane No-Nox gasoline and Gulf-pride oil. Miller convinced his new patron

Despite 45° tilt, crankcase is split on horizontal plane, well below center line of shaft. Head is integral with block.



The rear-mounted engine, with a blower on its tail, follows aircraft practice with its nose power take-off. From the transmission up front, the driveshaft to the rear wheels passes closely alongside under the water gallery, terminating in differential casing.



that he had the package that could do just that. Except for his choice of engine location, anticipated by Dr. Porsche, it was pure Miller and it was so far ahead of its time that its design still is prophetic, 20 years later.

Remember the fuss that was caused in the early 1950's when some U.S. race car builders began offsetting their engines and inclining them at an angle? Their objects were to lower the center of gravity, lower the driver's position by offsetting the drive shaft, and to improve wheel-loading during cornering. Well, Miller designed his rear-mounted six in 1937 with a *built-in*, steep, 45 degree tilt.

Then there was the damnation of long piston strokes in the early '50's. Miller anticipated that in 1937 with a 3.5-in bore against a 3.125-in stroke. His Gulf six peaked at 6400 but would turn an easy 7000. Its finned cylinder block was an aluminum casting which included crankcase and integral cylinder head. Thin-wall cylinder liners were shrunk into the alloy casting and valve seats were bronze inserts. The housings for the dual overhead camshafts and the sump were of magnesium. The timing gear cover was cast aluminum and included the rear-axle differential housing.

The engine was installed off-center in the chassis for a number of reasons, including the layout of the drive shaft. Power flow was from the rear-mounted engine forward and inboard to the four-speed transmission near the front of the frame. From here the power was transmitted in two directions: (1) forward to the front differential and (2) back to the rear differential. The transmission included the front axle differential and transfer gears for the drive shaft which drove the front

and rear axles. Three overall axle ratios (3.91, 3.97, 4.66) were available by meshing any one of the three transfer gears on the front-and-rear-axle drive shaft with the transmission cluster gears. This was done by removing the cover on the transmission case and shifting the transfer gears manually.

It has been said that no one ever got more out of a centrifugal supercharger than Harry Miller. For his Gulf engine he had an innovation. The ordinary blower of this type has a rotor which is finned on one side. Air is drawn in through an entry port where it meets the vanes of the rotor at its center, is flung outward and compressed against the blower case. In his new design, Miller used two entries, with two carburetors feeding a rotor with vanes on both its faces. With this he obtained 18 psi boost at 7000 rpm. Peak horsepower was 246 at 6400.

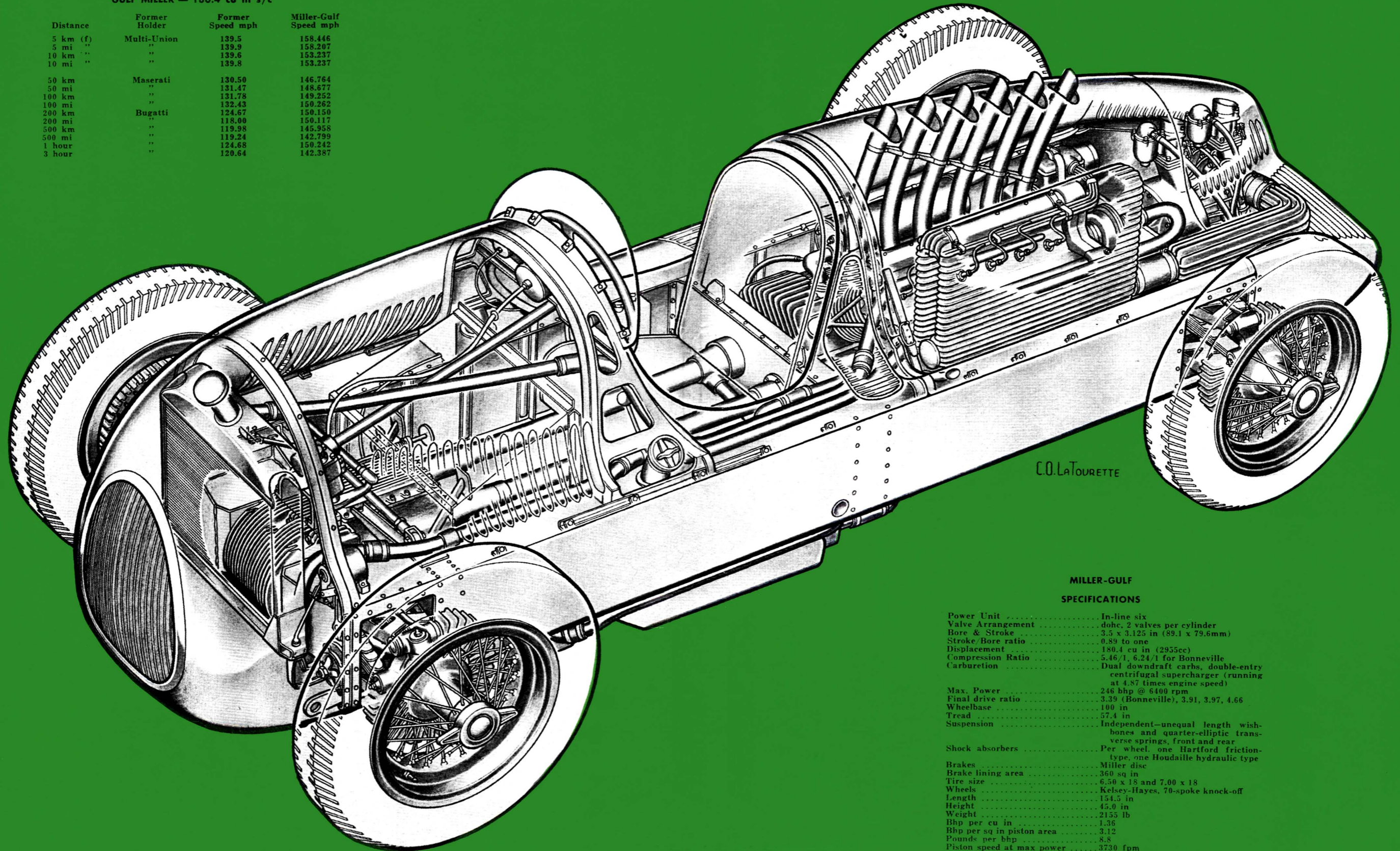
One of Miller's associates on this project recalls how, in the presence of a clutch of engineers, Miller estimated the proper diameter for the blower's intake bores out of thin air. Apalled, the scientifically-trained men on the job spent a long time calculating the ideal bore size. Need I say that they came up with the identical optimum dimension? This sort of thing was commonplace, as a result of which a Gulf R&D vice president made this interestingly-architected statement: "Harry Miller impressed his associates as a designer by his outstanding knack of designing racing cars by intuition and past experience, producing results which were comparable to those derived by others using technical methods."

As far back as 1932 Miller had seen and acted upon the possibilities for greater power transmission inherent in the four-

MILLER-GULF - 20 years too early?

INTERNATIONAL RECORDS SET BY GULF MILLER — 180.4 cu in s/c

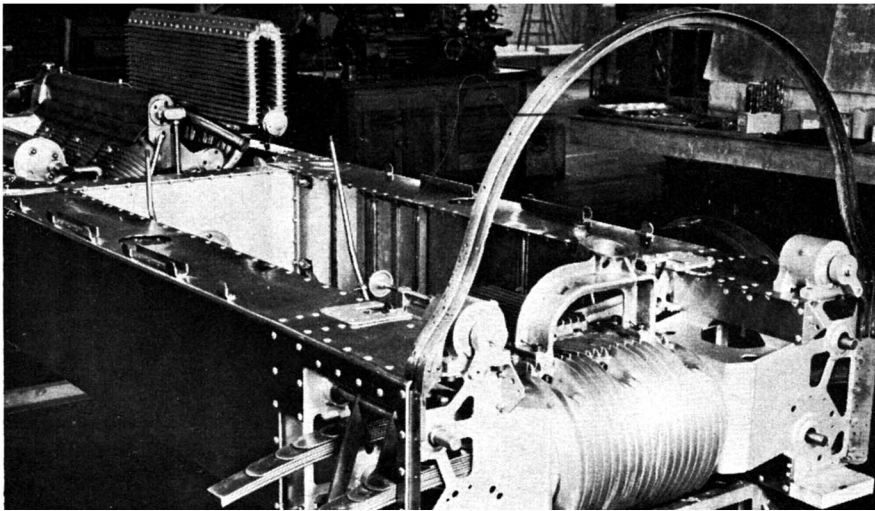
Distance	Former Holder	Former Speed mph	Miller-Gulf Speed mph
5 km (f)	Multi-Union	139.5	158.446
5 mi "	"	139.9	158.207
10 km "	"	139.6	153.237
10 mi "	"	139.8	153.237
50 km	Maserati	130.50	146.764
50 mi	"	131.47	148.677
100 km	"	131.78	149.252
100 mi	"	132.43	150.262
200 km	Bugatti	124.67	150.150
200 mi	"	118.90	150.117
500 km	"	118.98	145.958
500 mi	"	119.24	142.799
1 hour	"	124.68	150.242
3 hour	"	120.64	142.387



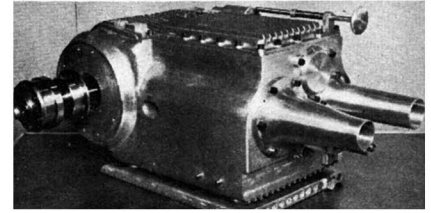
C.O. LA TOURETTE

MILLER-GULF SPECIFICATIONS

Power Unit	In-line six
Valve Arrangement	dohc, 2 valves per cylinder
Bore & Stroke	3.5 x 3.125 in (89.1 x 79.6mm)
Stroke/Bore ratio	0.89 to one
Displacement	180.4 cu in (2955cc)
Compression Ratio	5.46/1, 6.24/1 for Bonneville
Carburetion	Dual downdraft carbs, double-entry centrifugal supercharger (running at 4.87 times engine speed)
Max. Power	246 bhp @ 6400 rpm
Final drive ratio	3.39 (Bonneville), 3.91, 3.97, 4.66
Wheelbase	100 in
Tread	57.4 in
Suspension	Independent—unequal length wishbones and quarter-elliptic transverse springs, front and rear
Shock absorbers	Per wheel, one Hartford friction-type, one Houdaille hydraulic type
Brakes	Miller disc
Brake lining area	360 sq in
Tire size	6.50 x 18 and 7.00 x 18
Wheels	Kelsey-Hayes, 70-spoke knock-off
Length	154.5 in
Height	45.0 in
Weight	2155 lb
Bhp per cu in	1.36
Bhp per sq in piston area	3.12
Pounds per bhp	8.8
Piston speed at max power	3730 fpm
Brake lining area per ton	354 sq in
Mph per 1000 rpm	25.3 with 3.39 gears



Left, though rear-engined, Miller's Gulf car had gearbox integral with one of its two final drives at front of frame. Below,



engine's torque enters rear side of gearbox through boss at right. Rear wheels' share leaves by left one. Universal joints at front transmit torque to front wheels.

wheel drive principle. He built two such cars for the Indianapolis race that year but they never got properly off the ground. I recently asked famous race-car builder Frank Kurtis for his thoughts on the merits of four-wheel drive. "At present," he said, "cost prohibits such experiments. But with all the horsepower that's available now, you could go much faster if you could apply it to four wheels instead of to only two." Miller saw it coming a long time ago.

We could go on for pages citing Miller's anticipations, his foresight. The side fuel tanks on the Lancia-Ferraris? Miller used them on his Gulf cars. They were separated, baffled, and connected by equalizing tubes so that weight distribution over the chassis remained constant, regardless of the fuel load. Disc brakes are a big thing today. These he had too. They were his own design and imitated a conventional automobile's clutch and pressure-plate assembly. Wheel suspension, of course, was independent all around.

In every detail the Gulf cars were things of beauty. They had to be. Says his contemporary, Ed Winfield, "Miller was the originator, in the American automotive

field of doing an artistic job on his machinery. He was more artist than engineer. The one thing that he insisted upon was having everything well proportioned and well finished even at the cost of quality." But the Gulf people saw to it that in the cars that Miller built for them on their premises no engineering sacrifice was made in the interest of the appearance of perfection. And Miller saw to it that his creations were beautiful. In his mind form and function were inseparable; the excellence of both were insured if the excellence of one was achieved. Study the appearance of any Miller engine (he was an engine-man primarily) to see his passion in practice.

Four cars in all were built at Gulf R&D's laboratory in Harmarville, Penna. The first car was rushed to Indianapolis in 1938 for Ralph Hepburn to drive. The bugs weren't out; it "was completed too late to qualify."

In 1939 three cars were entered in the 500. One crashed in practice, cracked one of its pontoon fuel tanks, and burned to total wreckage. One did not qualify because its driver quit after losing control in a turn at high speed. The third car

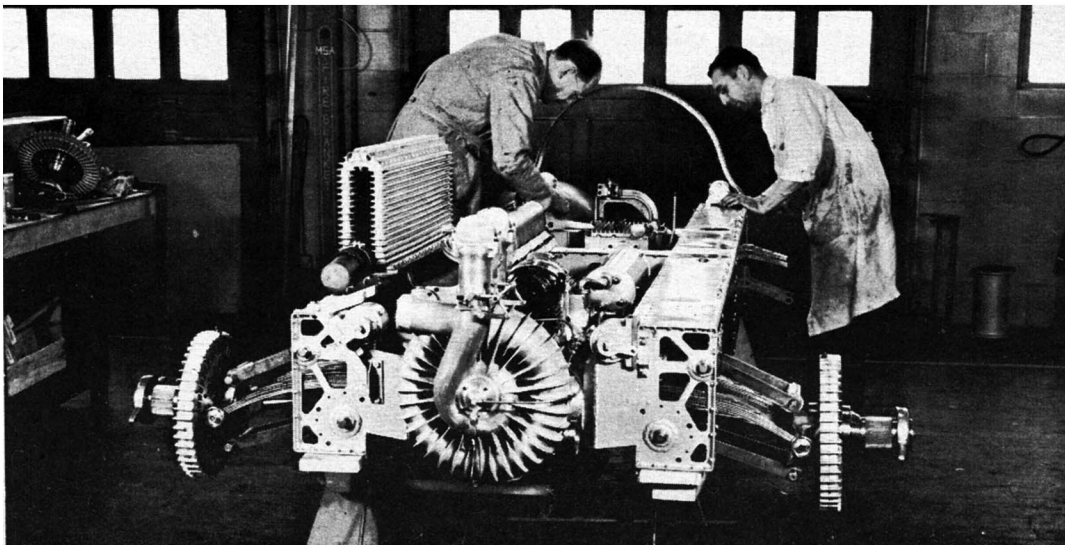
qualified for the race at the then-good speed of 125.8 mph, driven by George Bailey. He stayed in the contest for 47 laps, then retired with a broken valve-spring retainer.

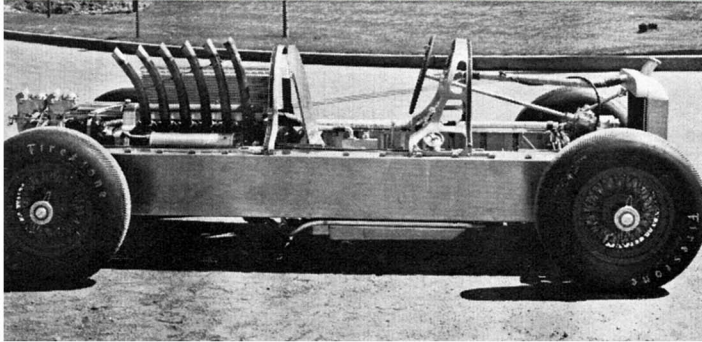
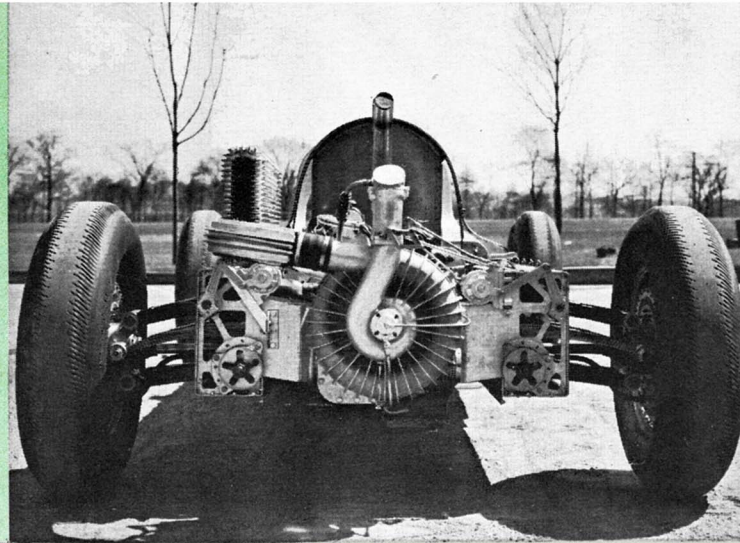
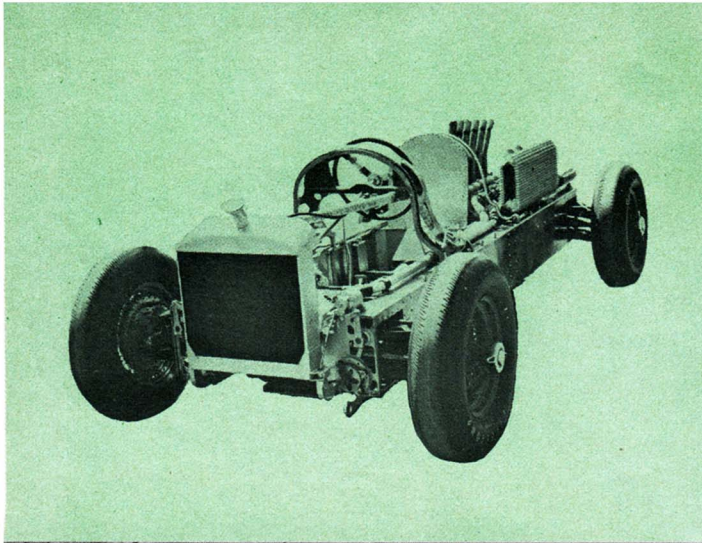
In 1940 two cars were entered. One was wrecked and then further destroyed by fire when its side-mounted fuel tanks also ruptured and leaked what the French so rightly call *combustible*. The AA "suggested" that the remaining car be withdrawn because of the amply-demonstrated fire hazard of the unorthodox fuel tanks.

For 1941 the two remaining Gulf cars were slightly redesigned and wore stainless-steel enclosures around their fuel tanks. They were entered in the big race and they qualified but Fate, impatient with all this dallying, got rough. At 7 a.m. of the morning of the 500 George Barringer's crew began fuelling his Gulf Miller. The accepted although tenuous theory of what followed was that the gasoline's heavy fumes settled on the ground and spread to another garage two doors away. A blowtorch was in use there and there was a tremendous *boom* and, in an instant, Barringer's car was down in flames. It was a total loss. Half of one of the long Indy

(Continued on page 50)

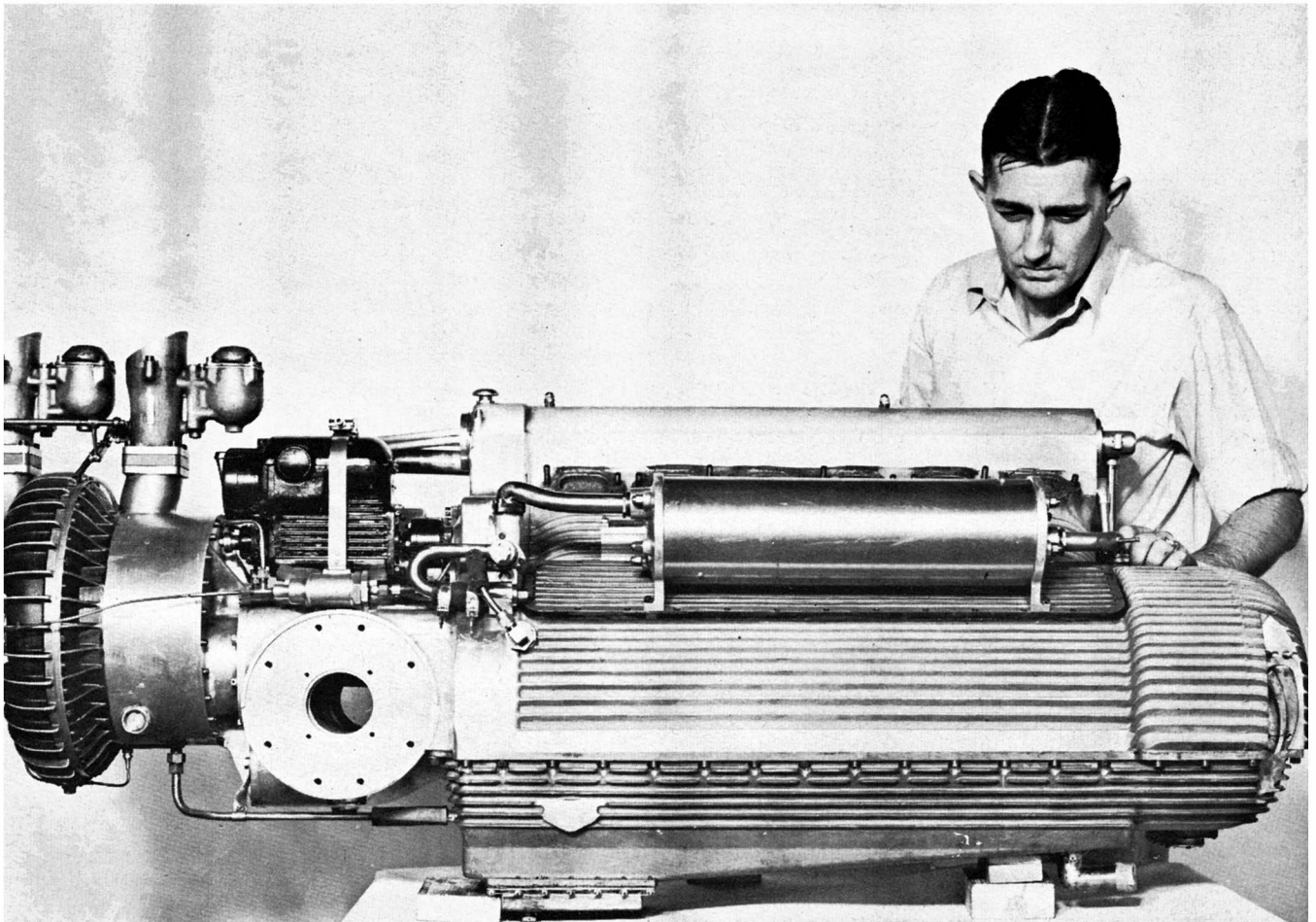
Deep, deep frame rails provide necessary torsional stiffness for all-independent, four-wheel drive.

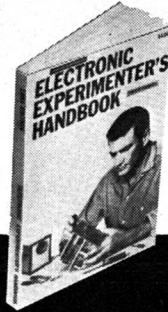




Miller was far and away ahead of recent Indy cars in tilting engine 45° and setting it very low in chassis. Finned casting alongside it is intercooler between twin-faced centrifugal blower and intake ports. Each wheel has two shock absorbers, friction one on lower wishbone pivot, hydraulic one operated by interesting array of cranks and levers.

Miller's 3 liter supercharged six deserves careful scrutiny.





60

NEW PROJECTS FOR
"DO-IT-YOURSELFERS"

in the NEW EDITION of the
**ELECTRONIC
EXPERIMENTER'S
HANDBOOK**

IMPORTANT NEWS: The new 1958 Edition of the *Electronic Experimenter's Handbook* is now on sale. If you like to build useful, profitable electronic devices, pick up a copy of the new Handbook now.

60 Devices . . . Nearly 200 pages
. . . a Practical "File" of Electronics
Ideas and Information

FOR YOUR HI-FI. Presence control. Hi-fi crossover. Filter. Electrostatic speaker system. Mixer equalizer. Spare amplifier. \$5 coax. 3-way speaker system. Junior hi-fi. Crossover with brilliance.

RECEIVERS. Shirt pocket transistor superhet. Vokar receiver. Superegen unit. Miniature VHF ear. Junkbox BC receiver. Etched circuit two-tuber.

FOR YOUR HOME. Invisible light door opener. Electronic brain to control house lights. DC supply for AC/DC motors. Power transistor for pocket radios. Light-operated relay. Transistorized intercom. Radio intercom. Electronic Christmas bells.

FOR YOUR DARKROOM. Audio photometer. Transistor slave flash unit. "Varistrobe." Light distributor. Darkroom timer. Enlarger exposure meter.

FOR YOUR HAM SHACK. Simple shortwave receiver. VHF explorer's receiver. 70-watt transmitter. Double your Heathkit AT-1 output. Code practice set. Antenna tuner. Transistor 10-meter receiver.

FOR YOUR WORKSHOP. Economy tube tester. Heat-controlled solder stand. Economy signal generator. Simple oscilloscope calibrator. \$14 signal tracer. Transistor checker. Capaci meter. Low-cost multi-tester. Transistorized signal tracer.

FOR THE KIDS. IQ tester. Electronic worm digger. Model spaceship. Game computer. Transistorized phonograph amplifier.

SPECIAL PROJECTS. Solar battery experiments. Electronic anemometer. Picture tube rejuvenator. Detectorscope. Simplified etched circuits. Geiger gun. Frost sentinel. Vibrato for an electric guitar.

**NOW ON SALE
Only \$1**

Pick up your copy today at your
newsstand or radio parts store



ZIFF-DAVIS PUBLISHING CO.,
64 East Lake St., Chicago 1, Ill.

MILLER-GULF

(Continued from page 37)

garage buildings was gutted and the cash customers were lucky to get to see a race at all. The other Gulf Miller, driven by Al Miller (no relation) stayed in the race for all of 22 laps, then dropped out with a locked shifting mechanism.

This left one of the four original cars extant. It was sold to Barringer who raced it at Indy in 1946 under the name of Tucker Torpedo Special, in honor of his patron who later made fame when he tried to crack the car-manufacturing field. Barringer lasted for 27 laps before he was forced to retire by the failure of yet another five-cent item, a transmission thrust washer. Barringer lost his life in a racing accident later that year in Atlanta, but not in a Gulf car.

In 1947 the last of the Gulf Millers was entered in the Indy 500 by Preston Tucker under the name of the Tucker Partner Special. Name drivers sought luckier mounts and rookie Charles van Acker did his best. Once again the 30-lap barrier proved insurmountable and van Acker spun and crashed on the 24th round. That was the end of the Gulf cars at Indy.

These cars were hounded by annoyances that usually were petty and always were decisive. But they were phenomenal machines with an immense potential that hostile fate prevented coming to fruition. But there was one historic occasion when things went right and some of this barely-tapped potential was revealed.

It was in 1940, after the Indianapolis race—meaning after two crashes and a bad spin-out by these cars—that Barringer took one of them to Bonneville. His objective was simple and sound: to make an exhaustive study of this very unorthodox car's handling qualities on the world's safest high-speed course. As you can imagine, the combination of rear engine, plus drive to all four wheels, plus lack of differential piloting problems. Barringer learned the answers. He established the fact that the Gulf Miller configuration behaved much like a front-wheel drive vehicle. When the rear end would begin to let go in a turn the car could be pulled right out of the impending spin by just punching the throttle. Barringer felt this to be an advantage over normal rear-wheel drive, where all you can do to correct a spin is steer like mad . . . and hope. Also, the front-drive "pulling out" effect was even quicker with all four wheels being driven. Nevertheless, it was a very tricky car to drive because, on sudden closing of the throttle it wanted to swap ends and to stay out of trouble the driver had to culti-



PLASTIC CAR KITS

\$1.95 each, 3 for \$5.49 or 6 for \$10.75

Made in England—Heavy plastic—6½ inches to scale—easily assembled with parts, racing numbers and cement provided.

READY NOW



G.P. Mercedes Benz (W1 96)



G. P. Vanwall



Cooper 500 MK IX



G.P. Connaught



"D" Type Jaguar



Aston Martin DB 3S



G. P. Ferrari



G. P. Maserati



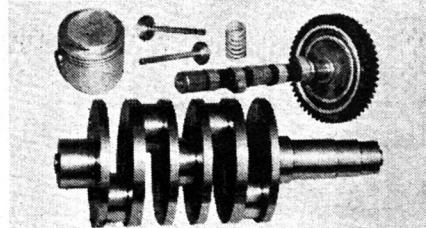
Lotus MK XI

Send Remittance To Dept. 5-58
R. GORDON & CO., INC., 32 E. 59th St., N. Y. 22
ASK FOR OUR FREE CATALOGUE OF
MOTOR BOOKS AND MAGAZINES

VW STROKER KIT



another WEBER TOOL CO. first!



This Volkswagen Stroker Kit was developed for street or race use—not just a welded crank but a precision machined billet. With stock bore, ¼" stroke = 79 cu. in., \$199.50. ½" stroke = 86.5 cu. in., \$237.50. Kit includes pistons, rings, rods (exch.), inserts, cam (reground for street or race, exch.) Also cams for VW, Porsche, Austin Healey, Jaguar and other foreign cars. For further information write dept. S.1.

WEBER TOOL CO.

2990 Ramona Blvd. Los Angeles 33, California

CORVETTE SUN VISOR—No holes to drill, adjustable @ \$7.95, \$15.00 pr. Translucent Natural Chamois, @ \$12.95, \$25.00 pr. ppd.

WASHABLE PLACE MATS—Pink pellow silver outline of the famous tracks Riverside, Road America, Watkins Glen, Sebring. Set \$5.25 ppd.

CORVETTE QUICK STEERING KIT—Magnaflex parts ratio 12.5:1, \$49.50 ppd. Heavy Duty Suspension Kit. Write for prices. A must for real roadability.

CORVETTE RACING STRIPES—\$5.25 ppd. State year, race, numbers & light covers. State year. Colors white, black, red, cream.

RAJ RACING ENTERPRISES

P.O. Box 242 South Sioux City, Nebraska

WELDING SPECIALISTS

Aluminum and magnesium castings
Heli-arc and acetylene—Oil pans—
Heads—transmission housings

BILLMAR INC.

1200 San Fernando Rd. Los Angeles 65, Calif.
Phone—CA. 5-4128

vate an exceptionally sensitive throttle foot.

With these characteristics pinned down, Barringer had the answers to the car's few but fairly crucial behavioral peculiarities and, since it was running faultlessly and fast, he decided to attempt some international records. It was in July, a bad, slushy month on the Salt, but car and driver were there and the AAA was called. The original plan was to knock over the Class D (up to 3 liters or 183 cubic inches) sprint records which were held by Britain's Staniland at just under 140 mph. Barringer boosted these by as much as 18 mph (158.446 for the flying 5 km) with such ease that there was no point in not going after a passel of distance records too, with the result that he mashed ten of these by massive margins.

These performances by a 3-liter open-wheeled race car running on 80-octane pump gas and on a mushy surface proved that the hated-by-some, beloved-by-many Old Man had lost nothing of his touch as a designer of pure bred racing machinery. But Harry Miller's later years were inexorably jinxed and even his best efforts bore little fruit.

Miller helped to jinx himself in many ways. One was his inability to sustain his interest in a project once the basic problems had been overcome. He was a pure-research man, a dreamer, a man who lived for nothing but technological challenge. Characteristically, he lost interest in the Gulf-car project when it was just nicely underway. He called in Eddie Offutt, an engineer with a racing background as long as his own, and said to him in effect, "Here's what I have in mind for these cars. You finish it."

Miller bolted from Gulf in '39 and soon opened a small engineering and machine shop in Detroit. Offutt joined him there later and several years ago told me of the Big Gamble (the then-current one, that is) that Miller was staking his last cent on, at the time of his death in 1943. For years Miller had predicted that the coming thing was sports cars. He had designed one with volume production in mind and had much of it built in prototype form, the rest of it drawn in detail. It was a low, good-looking front-drive coupe on a 110-in wheelbase. It weighed about 1700 lbs and was powered by a 100-bhp six-cylinder dohc engine. The power unit was mounted transversely across the frame, ahead of the front wheels and tilted backwards at a 45 degree angle. Practically everything was unsprung weight and the odd location of the engine was chosen to put weight where it would be transferred to the driving wheels during acceleration. As usual, Miller was too far ahead of himself and of his times. And in invention, timing often is more important than idea.

A few months ago I called on the owner of a Detroit engineering firm. I was moved to see, proudly displayed in his office, a big photo of the Old Man. We talked about Miller for the rest of the day and into the late night hours. Finally he said, "Remember the old Gulf cars? The last of them is sitting in a boathouse down on the Detroit River. It's kind of rusty now and its legal status is a mess. But I'm trying hard to get it. God, but I want to see that car preserved. It was the finest thing Harry ever did."

—Griff Borgeson



There's STILL time to Review the world's fastest cars!

In *The Autocar* 'INTERNATIONAL SPORTS AND RACING CARS' NUMBER · 28 March 1958

From the racetracks and turnpikes of the world, the sleekest and fastest products of the automotive industry have been gathered between the covers of THE AUTOCAR.

And, for the benefit of late subscribers, a stock of this brimful-of-information, *International Sports and Racing Cars* number (published on 28 March) has been set aside.

Production sports cars and competition cars of all classes are surveyed by a team of experts . . . a team that includes Technical Editor Harry Mundy—designer of the Coventry Climax engines that power the Cooper-Climax and Lotus-Climax cars, and head of the design team on the original V-16 B.R.M. design; and Sports Editor Peter Garnier, co-driver to Stirling Moss in last year's Tour de France.

They bring you the latest details . . . the most complete and accurate data . . . the clearest, drawings and brightest pictures of the world's current sports and racing cars.

There are detailed technical descriptions; minute examinations of engines, chassis, suspensions, etc.; brilliant engineering drawings; a first-hand Road Performance Test . . . and a host of other features.

Make sure of your copy today! Complete and mail the coupon below and you'll get this exciting, enlarged, world-covering

"International Sports and Racing Cars" number and a weekly feast of reading, including . . .

- More than 30 detailed and impartial Road Performance Tests each year.
- A regular "New Cars Described" feature with complete information—and many renowned engineering drawings—of the world's latest cars.
- Accurate and impartial reports of the global automotive news.
- Prompt, first-hand accounts of all the important races and rallies on the international calendar—including Le Mans, Indianapolis, Sebring, Monte Carlo, etc. (These often reach overseas readers within two weeks of the event!)
- Maintenance and tuning tips.
- Frequent special issues—including three giant Earls Court Show Numbers in the Fall—totalling about 1,000 pages!

All this can be yours—every week—by mailing the coupon below . . . TODAY. And note the attractive three-year subscription offer bringing you three years' readership (156 weekly issues) for the price of 2 years.

Enter your order . . . now!

CLIP AND MAIL THIS COUPON NOW!

To: Robert Bentley, Inc., 8 Ellery Street, Cambridge 38, Massachusetts.

YES: I should like to read THE AUTOCAR—starting with the "Sports and Racing Cars" number. Enter my order for:

- 1 Year (52 issues) \$11 3 years (156 issues) \$22
- Enclosed is \$..... Bill me later.

NAME
(Please Print)

ADDRESS.....

City..... Zone..... State.....

ACSCI. 58