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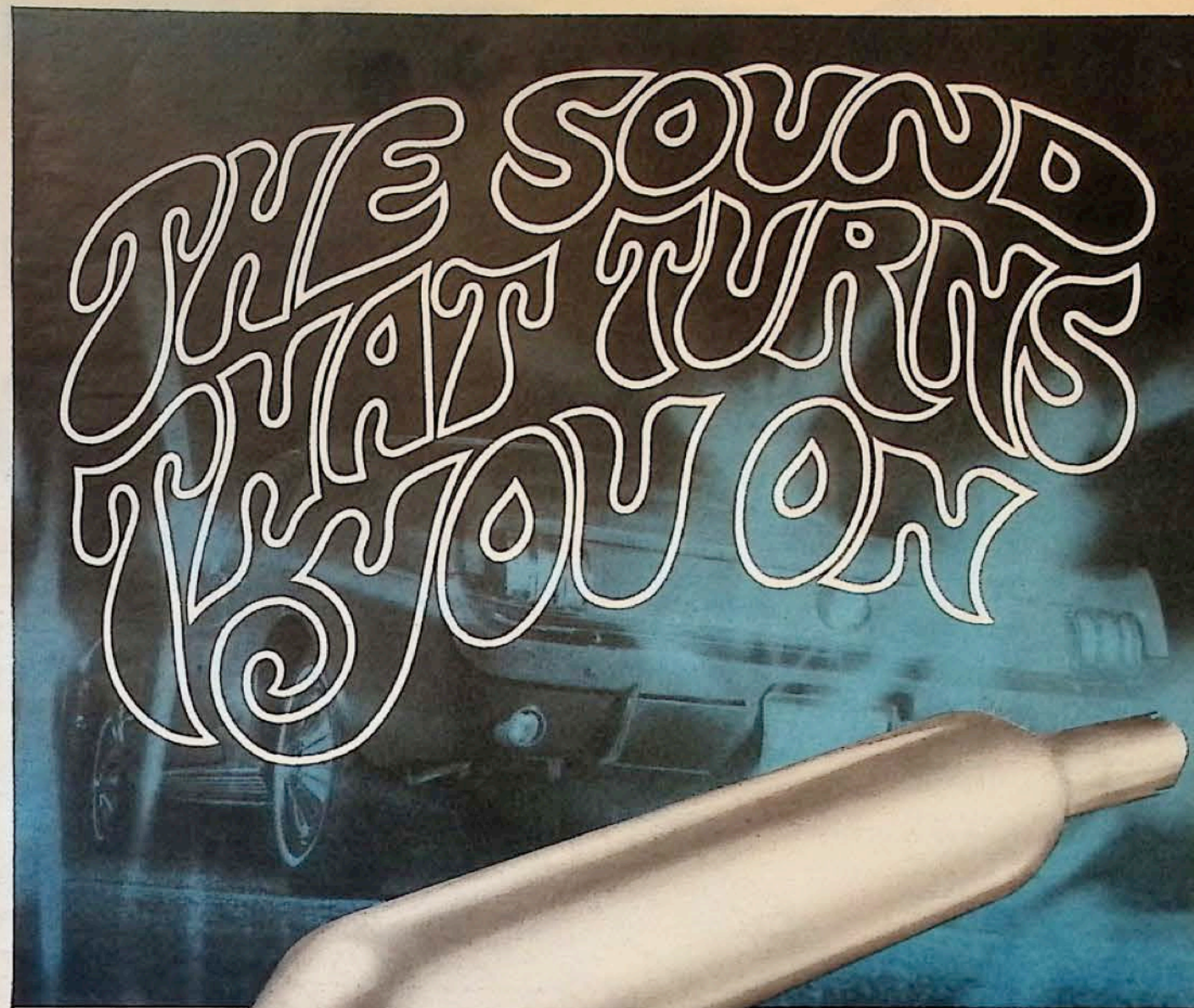
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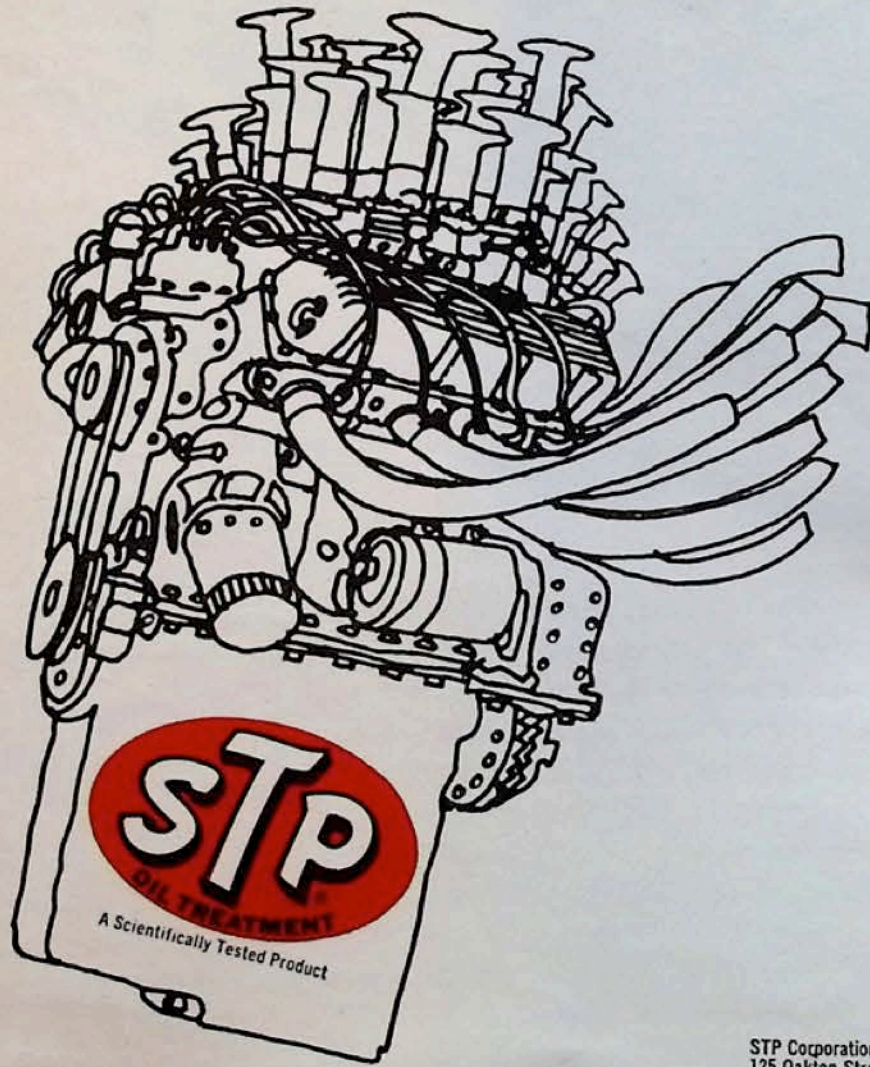
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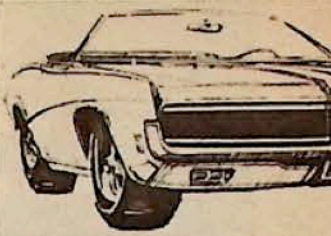
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JULY 1968
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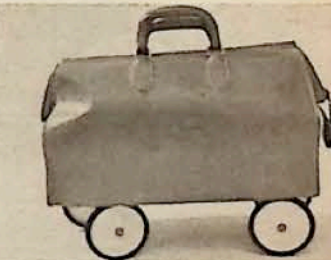
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PUBLISHER / Walter A. Woron
ART DIRECTOR / Tom Uhler
SPECIAL PROJECTS ED. / Ben Sussman
FEATURE EDITOR / Julian G. Schmidt
ROAD TEST EDITOR / Bill Sanders
TECHNICAL EDITOR / Eric Dahlquist
PRODUCTION EDITOR / Ellen Merlo
ASST. ART DIRECTOR / George Foon
EDITORIAL ASSTS. / Sonya Hayes,
Judy VanNoord

CONTRIBUTING EDITORS

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Ralph Stein / VINTAGE CARS
Griffith Borgeson / EUROPE
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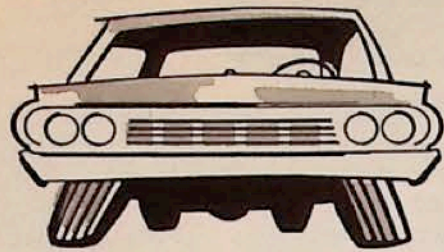
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OPINION & COMMENT

from the publisher

DURING THE PAST FEW MONTHS various comments have been made and opinions voiced by readers—and others—on a number of subjects and we've felt, "Well, we'll eventually get around to writing about them..." But, something always seemed to interfere with our good intentions. That could go on forever—like a clear day—but just so it doesn't, here are a few things to cloud your mind.

SMOG: (An appropriate one to start off with, no?) Recently a reader wrote: "Everyone talks about the smog problem being created mainly or entirely by cars, but living near an airport I see all kinds of junk come belching from those jets on takeoff. I'll bet that the pollution they create is equal to what 50 or more cars pour out all day long! What about it?"

Thinking that this reader might really have a strong point, we checked with the Los Angeles Air Pollution Control Board. We found that the average tonnage of pollutant dumped into the atmosphere by the jets taking off from L.A. and surrounding airports is less than 2% of what comes from cars in the L.A. basin. The actual figures: 203 tons per day from jet airplanes, 12,000 tons per day from cars. The amount of pollution that all the jets create vs. the total put out by all the cars is what counts—in this particular case.

CAR THEFTS: The other day a gentleman stopped by our office to show us an anti-theft device he had developed and was asking us for advice on how best to market it. Timeliness is certainly on his side. (They'll be mandatory in 1970.) The unit involved a combination lock, was operated by vacuum, could be installed within half an hour on any car and very effectively stopped the car dead in its tracks after being able to start it—by whatever means. It appeared tamper-proof and if he goes into production, you'll hear more about it in these pages.

This got us to thinking about the prevalence of car thefts, which we found had risen dramatically in 10 years. The odds of having your car stolen in 1957 were one in 211 and today are one in 125, according to the National Auto Theft Bureau. The astounding fact, however, is that if a car is stolen, chances are it was the owner's fault. In the majority of thefts, stolen cars had been left unlocked, with the key in the switch! That's why you'll find some form of theft warning

and or theft deterrent device on most '69 model cars. Though that "buzzer" that sounds in every '68 GM car when you leave the key in the switch and open the door is annoying, we have to admit that it's a very effective reminder.

A NEW LOOK AT SAFETY: Not long ago, an Advisory Committee on Traffic Safety headed up by Daniel P. Moynihan made a report to the Dept. of Health, Education and Welfare that has come as close to identifying traffic safety priorities, particularly as they pertain to human factors, as any such report to date. Some quotes from the report (without comment):

"We have sought to go beyond the specifics of traditional traffic safety concerns and to engage the issue where it is to be encountered—not merely on the streets and highways, but in the hospitals, the schoolrooms, and the courts of the nation, as well as in the recesses of the human mind where impulses to violence and self-destruction arise..."

"A broad and systematic inquiry is needed into the general question of how driving behavior is acquired, and how drivers can be taught not only to operate automobiles, but also to understand the major problems of highway safety, including its crash and post-crash aspects."

"... Alcohol is involved in a large percentage of automobile crashes (with) a very substantial proportion being alcoholics. The problem requires a massive Federal program concentrating on the disease of alcoholism..."

"... Uncontrollable violent behavior... almost certainly contributes to a significant number of automobile crashes. The National Institute of Mental Health should establish a center for the study of violent behavior..."

"The unprecedented volume of highway crash litigation has brought the American judicial system to the point of crisis. A Presidential commission should be established to review the process of accident investigation, enforcement of traffic laws, and the litigation of claims arising from highway crashes..."

"If the great new initiative of the Federal government in the field of traffic safety is to fulfill its promise, what are needed in both departments of Health, Education and Welfare (Public Health Service, Bureau of Disease Prevention and Environmental Control) are men with fire in their bellies who want to make things work..."

— Walter A. Woron

CHAPTER TWO: THE RENAULT 16 SEDAN-WAGON

Things have been going very well indeed for Chapter One—the Renault 10. Last year sales jumped 59.2%. So it seemed a good time to introduce another member of the family: The Renault 16 Sedan-Wagon.

The Sedan-Wagon. Besides being a new chapter for us, the Sedan-Wagon represents a new chapter in the industry.

Until now, even if you only needed a station wagon occasionally, you had to drive one around all the time. With the Renault 16, you drive around a sedan. And when you need a station wagon, it turns into a station wagon.



The front-wheel drive. Quite logical. The engine up front to get maximum hauling area in the rear. The drive wheels also up front to get maximum traction from the engine's weight.

The engine. Pressure cast aluminum block. 5 main bearings. And a sealed liquid cooling system that virtually eliminates the bother of having to

add anti-freeze. It can milk 28 miles out of a gallon of gas, and still manages a top speed of 93 mph. It is so well put together that you could roll up 30,000 continuous miles at 85, as we did, back and forth and back and forth between Rome and Milan.

The seats. They're every bit as comfortable as those in the

Renault 10. And the seats in the Renault 10 have been stacked up against the seats in the Rolls-Royce.

The road manners. The suspension is soft, without being mushy. Each wheel moves up and down independently, controlled by long torsion bars.

The price. The Sedan-Wagon sells for \$2,395.* The price of most sedan-sedans.

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JAMES A. ALLINGTON

Lucas indirect fuel injection with Grand Prix-type sliding throttle plates. Ferrari always demands Super Shell Gasoline for his cars.

Four-liter V-12 light alloy engine puts out 450 hp at 8000 rpm. Three valves per cylinder—two intake and one exhaust. Two overhead cams per cylinder bank.

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Ferrari-designed-and-built 5-speed synchromesh gearbox. Ask for details and everyone quietly smiles. (The lubricant, though, is one of Shell's extreme-pressure gear oils.)

Sliding spline half-shaft, fitted to U-joints at both ends. Lubed with a Shell extreme-pressure grease.

Outboard-mounted Girling disc brakes. Vented rotors, quick-change interchangeable discs.

Water surge tank.

Oil sump tank. System capacity is 16 quarts.

Cast aluminum-magnesium wheels. Bearings are packed with a Shell grease.

INSIDE DETROIT

What's New For 1970?

Look for a significant breakthrough in electronic components on 1969 cars—on Ford products, at least. Up to now, the only development has been an electronic voltage regulator, offered first by Pontiac with the start of the 1968 models and, more recently, by Ford on the Continental Mark III. In 1969, quite a few additional items will go electronic, including a speed-control system at Ford. Present speed control systems—where you can pre-select the speed you want to travel—are mechanically operated.

Chrysler Corp. will have concealed windshield wipers on its full-size—or "C" body—1969 models. The intermediate-size Mopars will not have them because this would require a major tear-up of the hood and cowl area on the Belvedere-Coronet models. Nevertheless, since they will show up on the big Dodge-Plymouth-Chrysler-Imperial models, this will leave Ford the only member of the Big 3 without them. Pontiac started the trend a couple of years ago. Most other GM cars adopted them this year. When they first appeared, some wheels at Ford styling and in the executive suite were not sold on them, fought the idea of copying Pontiac. Consequently, Ford didn't get rolling until this year, so they won't have them until the 1970 models.

Reflective Plates May Help

Reflective license plates reduce rear-end collisions at night by more than 13%. This is the conclusion of researchers at the University of North Carolina Highway Research Center. Their state converted to reflective plates last year and the researchers said their use prevented as many as 1000 rear-end collisions. The safety plates are visible at more than one-third of a mile in the headlights of an approaching vehicle. A total of 32 states now have such plates.

Tire Recall Touted

Some of the Firestone Wide Oval tires have been defective—subject to severe cracking and splitting on the sidewall, according to Senator Gaylord Nelson. The Wisconsin senator asked the National Highway Safety Bureau to begin proceedings to recall a number of defective tires placed in

service over the past year. Nelson said he didn't know how many were involved. He called it an "unsafe tire" because "severe sidewall cracking is a significant hazard which will cause tire failure or tread separation." The safety law doesn't require rubber manufacturers to recall defective tires—the way Detroit has to recall its cars. But there is a little known section of the law which enables Washington to institute recall proceedings if there is a clear safety defect in some automotive product. Nelson is trying to get the law changed to spell out tire recalls.

BRIEFS:

Ford is working with some vendors on rubber bumpers. But they won't show up on any models until 1970 or 1971.

Auto engineers say the electronic speedometer is "two to three years" from production even though an electronic speed-control system will be offered by Ford next year.

Bootlegging: Detroit Style

The Motor City, where rum-running across the Detroit River from Windsor, Ont., was a major enterprise during Prohibition, is experiencing a 1968 version of sorts—automobile bootlegging. Some Detroit area residents have been buying foreign cars in Windsor at a considerable savings because the cars aren't equipped with all the safety and anti-smog features required on the same cars sold in this country. They have little trouble bringing them in because officials say they don't have the manpower to check every car for compliance with the new federal regulations.

Belted Bias-Ply Tires

Customers are buying the new belted bias-ply tires in record numbers. Goodyear says that since its Polyglas tire came out late last year it "has had faster acceptance than any other tire ever introduced in the rubber industry. Production has reached hundreds of thousands. They are being gobbled up in the renewal market as fast as we

can make them." The tire originally was introduced in a wide-tread version for high-performance cars. Goodyear has just come out with a standard version that will fit all regular American cars. Look for it to be standard equipment on some 1969 models, although initially it's being offered only in the aftermarket. The tire costs 25% more than conventional tires. For example, a blackwall Power Cushion Polyglas tire of a size equivalent to a standard 7.75 x 14 tire will cost \$41.75. The tire features a conventional bias-ply body of polyester cord surrounded by two belts made of fiberglass cord. It's said to combine the long-wearing features of a radial-ply tire with the softer ride of conventional bias-ply tires. Goodyear believes it may be standard on most American automobiles in a few years. And, judging by the initial reaction, they may be right.

GM's Perennial Show Car

A show car is a show car, GM apparently feels. But industry observers were still surprised when the Buick Century Cruiser was displayed at New York's international automobile show. It looked just like the Firebird IV idea car GM exhibited at the New York World's Fair in 1964. Wonder what it will be called next year?

Anti-Theft Is Safety

If any auto companies are behind in safety research, they may have to scramble to catch up. This is the implication from Washington in the wake of a decision by the National Highway Safety Bureau to require anti-theft devices on 1970 cars despite the protests of Chrysler Corp. that it won't have enough time to develop its own system and would have to buy one from General Motors.

Chrysler wanted the bureau to wait until 1971, saying it could have its own, better system by then. GM will have the anti-theft lock on its 1969 cars. When the car key is removed from the starter, the device locks the steering column, the automatic transmission and the ignition system. Ford will have its own system for 1970.

While Chrysler objected to buying a device from GM, such arrangements are common in the industry. GM sold the collapsible steering column it developed to American Motors and Chrysler for the 1967 model run. Ford has sold its 3-speed automatic transmission to Pontiac in recent years. And GM's Delco Division sells electrical items to other car firms. But Chrysler's position is that it used GM's column because it was an extremely important safety feature, while the need for an anti-theft device is not as pressing and thus it should be allowed to develop its own system for 1971.

The whole affair is something of a test case. If the government wins its point, there probably will be other cases in the future where one American firm will be forced to adopt a safety feature developed by another company. Such examples could be the anti-skid braking system and the electrically-heated rear window—two things that will be on a small number of 1969 model cars. Why is the safety bureau interested in anti-theft devices? Because they should reduce traffic accidents. More than 600,000 cars were stolen last year and close to 20% of them were involved in accidents, some 200 times the normal accident rate.

More Safety Rules

In addition to the anti-theft standard requiring a steering column lock, Washington has finalized some other new rules for 1969 and 1970 cars. One requires a fail-safe design for hidden headlights in 1969 and stipulates that starting in 1970, the covers take no more than 3 seconds to open. Washington had wanted the 3-second limit

for 1969, but the companies said it would take them another year to develop the mechanism. The fail-safe requirement was proposed after a recall campaign involving the concealed headlights on the Mercury Cougar. Some of the early models had headlights which tended to disappear at night, a problem that has since been corrected. Another 1969 standard calls for a double latching mechanism on car hoods—something U.S. automobiles already have anyway.

Safety Grading System

Federal officials are well along in their program to develop a system for giving each car a safety rating. Something like this was suggested in the safety legislation which passed Congress two years ago. Officials were directed to publish lists of accidents and defect statistics involving different makes of cars. But this is easier said than done. Reporting methods have varied from state to state and not all states have compulsory motor vehicle inspection plans. The National Highway

Safety Bureau has acquired some preliminary data from insurance companies which is not as thorough as had been expected. It's also received compilations of accident reports from some states. One from Massachusetts indicates that high-performance cars—including some well-known foreign sports cars and big-engined U.S. models—have far higher accident rates than the family sedans. The safety bureau expects to get more information on a regular basis in the future and expects to be able to begin publishing a book in a few years which will rate the safety and durability of all makes and models of cars sold in this country. The book would be printed periodically, probably every year. The Massachusetts study shows that the accident rates of various cars can differ by as much as 800%.

Ford's Anti-Skid Progress

That anti-skid braking system which Ford will pioneer in 1969 has been one of the most thoroughly tested safety devices. One or another such device has been under almost continual testing by the auto industry for more than 10 years. It was tested in winter and summer, on wet pavement and on dry road surfaces. One of the latest tests was made at Detroit Metropolitan Airport. Firemen coated a taxiway with a layer of foam, the sort that's used when a plane is in trouble. A Thunderbird was sent speeding over the foam surface and the brakes applied hard. The T-bird came smoothly to a stop, in a straight line with no skidding.

The Haddon Juggernaut Goes Marching On

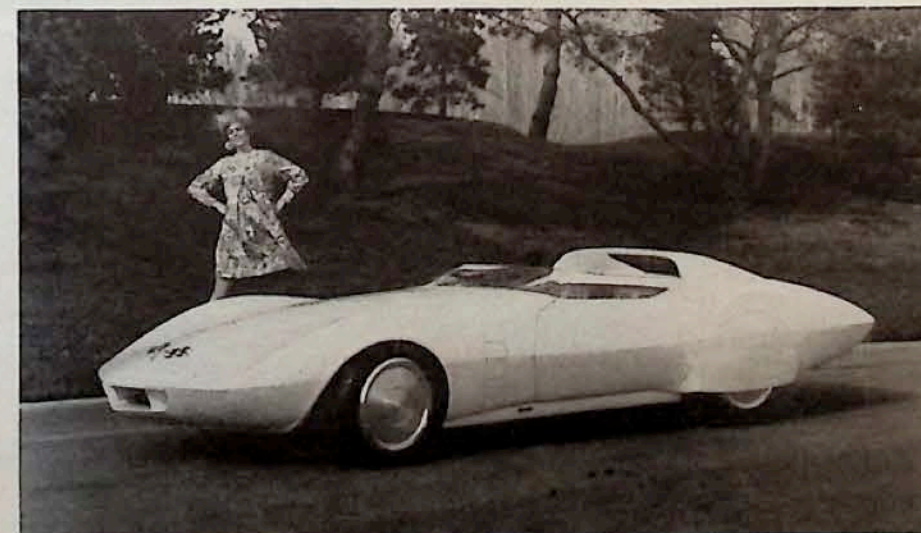
Hood ornaments are a thing of the past on American cars because of the safety campaign by Washington. But federal officials still aren't satisfied. They now object to the front end designs of some cars. Federal Safety Director William Haddon says that "if some of these designs were carried to their logical conclusion they would eliminate pedestrians and force everyone into automobiles." Haddon notes that 9300 pedestrians are killed yearly in traffic accidents and another 333,000 injured. He says some stylists are "irresponsible" and wonders whether "they would design that way if they knew members of their own family were going to be hit by these cars."

Bunkie Is Still Stirring

Bunkie Knudsen is a frequent visitor at Ford styling these days. One industry stylist says the new Ford president has his own clay studio for advance designs at the center, with a "Restricted" sign on the door. Stories have been circulating for months about how he's changed this or that car. Latest run-



An automobile deliberately leaves GM test road to demonstrate how safe a highway can be if the roadside is cleared of obstacles and properly graded to provide a safe recovery area. It has been proven that a roadside can be made very safe with only 100 feet cleared and graded on each side, and only 25 to 30 feet would help considerably.



Although it's only a show item at this stage, Chevrolet's new Astro-Vette amazingly differs very little from the current Corvette . . . But fender skirts? Aw, come now!

INSIDE DETROIT *continued*

down: Bunkie made some changes on the 1969 models, ordered major changes on the 1970-71 models and wants all new designs for 1972, which are still in the preliminary stage. All this has led one industry designer to comment sarcastically, "It's amazing the way people automatically become experts in everything as they climb the executive ladder. They especially become experts in styling. They really shine in this field even if they started out punching a press." Sound like sour grapes? You will be able to judge for yourself in a couple of years.

Ford's New Gimmick: Talk to Your Mechanic

Ever had a complaint about the way your car was fixed? Who hasn't! Sometimes, according to service technicians, the mechanic can't fix the problem because he hasn't been told what is wrong. Ford's working on a way to correct all that. Experiments at Ford's Service Research Center would let the customer talk directly to the mechanic—even if it was a big dealership. This is the way it works: customer drives in and meets the service manager or a service liaison man, who doesn't fill out an order but simply turns on a tape recorder. The customer explains what



You might soon be able to make your Torino a Machete, above, or your XL a Fiera, below, simply with trim.



he wants done to the car, perhaps telling where there's a hidden rattle, and so on. The liaison man asks the customer any necessary questions to round out the report. Then a mechanic is assigned to the car, listens to the tape and does the work. Afterwards, he talks into the recorder and explains exactly what he's done. J. A. Kordick, Ford service research and operations manager, says that "We foresee this verbatim customer problem description as a potential asset in our continuing struggle to diagnose and repair cars properly." If the service center experiments seem promising, the approach will then be tried in a dealership.

GM Turbine in Offing

General Motors' Detroit Diesel Division remains quite confident it will have turbine engines in production by the very early 1970s. Some fleet tests are expected to begin late this year. GM's got two types under development—a large unit in the 5000 to 7000 hp range for off-road equipment and a small one for trucks and buses. There's been no mention of a car turbine.

Bunkie Makes Out

Ford paid a bundle to get Bunkie Knudsen from General Motors. He was given a stock bonus of \$750,000 and guaranteed a salary of \$1 million over the next five years to resign as executive vice president of GM and become president of Ford. He also got an option to purchase 75,000 shares of Ford stock. The whole deal appeared to more than offset the \$1 million in accrued bonus awards he gave up when he left GM.

Dodge's Showbiz Sense

Dodge has a better idea for promoting safety. Why not work into television and movie scripts casual scenes showing actors and actresses buckling their seat belts or locking the car door before driving off? These would be

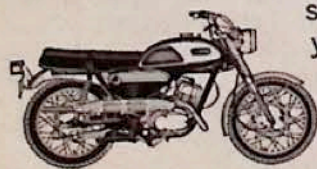
The secrets of the EXCITERS!

Here's how Yamaha's exclusive 5-Port Power benefits you.

With Yamaha's two extra transfer ports, on the back side of the cylinder, each induction charge completely scavenges the stale gases from the combustion chamber and spreads the fresh induction mixture throughout the entire cylinder area.

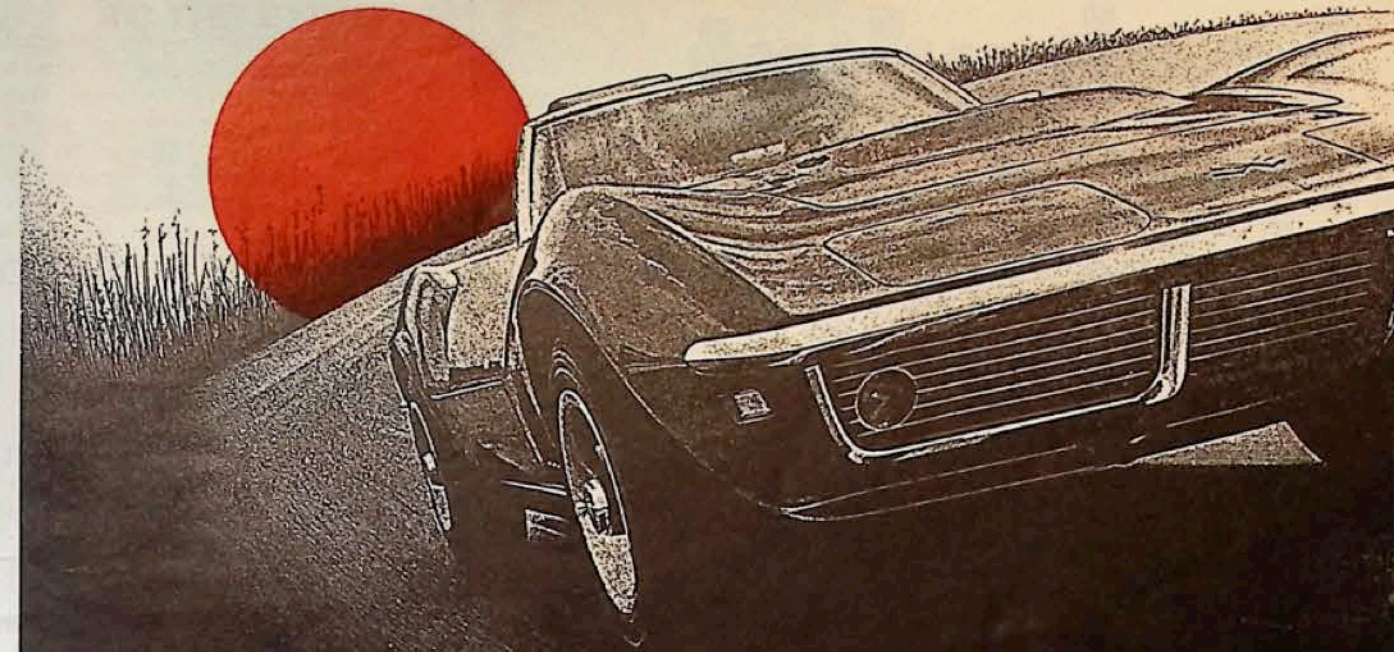
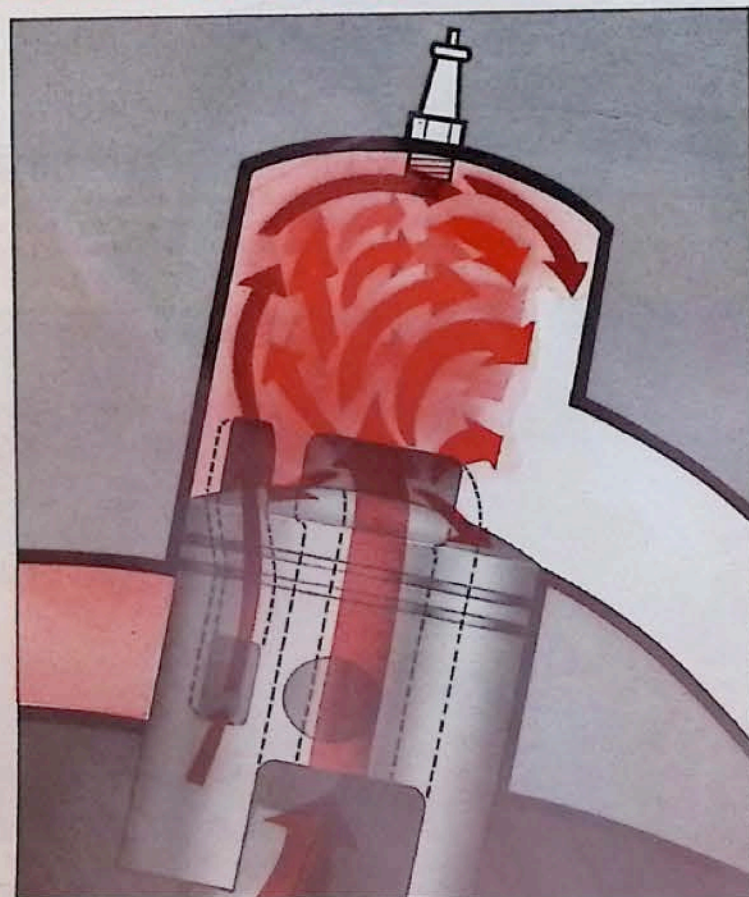
Result: quicker throttle response, greater torque... higher top end, better fuel economy and a broader power range—all because there's a clean and complete charge for each power stroke. Cylinders, heads and plugs stay cooler. And fuel waste is virtually eliminated.

Why not discover the secrets of the Exciters for yourself? This year, there are 20 great models to choose from. All thoroughbreds. All at your Yamaha dealer's.



While you're there ask for your free copy of Yamaha's brochure of Exciters for '68. Or write: P.O. Box 54540, Los Angeles, Calif. 90054, Dept. MT-7-8. Canadian Distributor: Yamaha Division of Fred Deeley Ltd., British Columbia.

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Corvette gets a kick from AC.

Every Corvette that leaves the factory moves out with AC Fire-Ring Spark Plugs. Because Corvette performance demands a clean husky spark.

ACs deliver that spark. They have a hot tip that burns off carbon.

So they stay cleaner for Full Time Firepower.

Corvette engineers know all that already.

Now that you know it, give your car the kick Corvette gets. Get AC Fire-Ring Spark Plugs. AC Spark Plug Division.



For Safety's Sake, Check Your Lights—Replace With AC Guide Lamps.



Look what 'The Cat' dragged in-4 big wins.



Driver Wayne Gapp designed and built this "Super Cat" Cougar himself. And this "gasoline funny car," as he calls it, won four major meets last year, including the NASCAR Summer Nationals.

When you build a racer yourself, you're even more particular which motor oil you use. Wayne used Quaker State—in all four victories. The oil that can take it under tremendous heat and pressure. Quaker State's refining perfection makes a difference, too—plus the use of only 100% Pure Pennsylvania Grade Crude Oil . . . the world's choicest.

There's a more dramatic way to see Quaker State's superiority. Just watch its performance in cars like "The Cat."

Quaker State your car to keep it running young.



INSIDE DETROIT *continued*

similar to the scenes where an actor casually lights a cigarette or sips a drink. Dodge General Manager Bob McCurry believes such scenes might subconsciously prompt viewers to use their seat belts and keep the car doors locked while driving. McCurry thinks the subtle approach might be more effective than the sledge hammer technique of showing photos of what can happen in an accident.

Michigan's Safe Highway

There is a network of roads in Michigan that stretches more than half the length of the New Jersey Turnpike, that is far ahead of the government's program for highway improvement. It is the General Motors test track at Milford, where accident/injury frequency is only 1/25th as high as on rural highways, which are statistically the safest traffic arteries in the country.

Conceived originally to test GM vehicles, the grounds have also proved that motor vehicle traffic can be made safe through advances in road design, traffic control and other essential elements of an updated highway program.

For example: a 1956 study showed that three-of-four proving ground mishaps occurred because a car ran off the road and struck an obstacle. A program was instituted in which many proving ground roadsides were cleared 100 feet from the pavement as an optimum safety measure. Further research disclosed, however, that 80% of this type of accident could be eliminated if the roadsides were cleared only 25 to 30 feet, a span well within the rights-of-way of many existing highways.

Ditches paralleling many of the proving ground's original roads presented another problem. Cars, unable to cross the ditches, crashed into them. As part of a subsequent program, proving ground engineers developed ditches and drainage installations which automobiles could safely cross but would still drain the roadways effectively.

Beyond the ditch the roadside may rise or fall, creating a slope upon which an errant vehicle may overturn. The solution to this problem came from a series of attempted roll-over tests which determined it was practically impossible to overturn a car on a slope that rose or fell no more than one foot for each 6 feet of lateral distance.

Extensive guardrail studies have also resulted in safer designs. In addition, line of sight, night lighting, lane width and other elements were based on advanced concepts.

These roads now handle more than 20 million miles of driving each year, yet there has not been a fatality since 1942. This, in itself, should prove something.

/MT

FRAM FILTERS TALKS TO THE EXPERTS

Bruce McLaren talks about Group Seven performance and design



Fram spent a few minutes with Bruce McLaren and Denis Hulme, Can-Am and Group 7 champions in the middle of the Canadian-American Challenge Cup Series. Much of the success of the McLaren team effort is due to Bruce's talent as both a designer and driver—and his extremely cool performance under pressure.

FRAM: Bruce, your performance during this series has been fantastic. What are the reasons for this?

McLAREN: Well, I'd say it's "preparation"—which means a combination of good planning, hard work and having the best crew in the business. We got hold of Denis—his job has been to drive as fast as he possibly can—and he has been, all season. Finally, we've a crew that's taken a long time to put together. Each one's an expert in his field. Consequently, we were as ready at the start of the first race as the other cars are right now.

FRAM: What about the competition at this point?

McLAREN: One thing is certain: Hall is definitely going to push us if he can hold

together. But as far as our strategy is concerned, we've already made what is pretty much a policy decision to stick right through the series with what we have.

FRAM: Then it boils down to driving, right?

McLAREN: That's about it. And on this we work pretty much on the basis that whoever is in the lead goes out and endeavors to stay there, and whoever is second has to push hard. After all, we hired Denis because we thought he was the best driver we could get. To ask him to do anything less than his best would be very difficult.

FRAM: That makes sense. Getting away from driving for a moment, Bruce, what about the chassis design on these cars? How did you come to a final decision on that?

McLAREN: It was really a matter of evolution rather than pure design. This March, when we started on sports cars, we took all the principles that we had developed in the single seaters and applied them to the sports car. We used the same techniques and exactly the same methods of construction. So, all the weak points were ironed out even before we started building these Group 7 cars.

FRAM: Bruce, we noticed you were having some wheel problems this year. They were cracking.

McLAREN: Yes, they certainly were. Here's why: We've been using basically the same wheel castings since we first started in sports car racing four years ago. At that time we were using a rear tire with about 6½ to 8 inches of tread. Now we have 12 inches of tread on the rubber, great big tires, rather like a drag set. I'm afraid it just caught up with us. About half-way through the series we simply went past the fatigue life of the wheels and discovered that they were starting to crack. So, we started the people back in England working on the problem. In about seven days we had our wheel patterns modified, magnesium castings poured—the castings X-rayed, checked

out, machined, sealed and sent off to America in time for the next race.

FRAM: That sure speaks well of the people you've got supporting you.

McLAREN: It certainly does. As I said before, everyone on this team is an expert. They know what has to be done and they do it—magnificently. My pit crew, for example, they're sticklers for cleanliness. This extreme cleanliness is essential, it helps us to get to and solve problems at very short notice.

FRAM: Cleanliness involves more than clean components, doesn't it?

McLAREN: Yes, most definitely. There are two very important areas where cleanliness is a must. The first is the fuel injection system. You've got to have clean fuel—that's all there is to it. So we use considerable filtration here. The oil system's even more critical. The entire system, inside and out demands strict cleanliness. Bearing life on an engine like this is one of the most important things we have to watch. If any dirty oil is allowed to remain you've more or less had it. This is the reason we use Fram filters. We know that Fram effectively filters out all contaminants and at the same time allows for the free flow of the lubricants. Fram works—I'm not surprised that so many of the winning cars in this game swear by Fram.



Fram Performance-Proven Filters
They work on the track.
They work on the road.

FRAM Corporation, Providence, Rhode Island 02916

Driving Impressions: Volvo 145S

The newest edition to Volvo's 140 series was just beginning to come to the States when MT received one of the first off the boat. The immediate impression of those who laid eyes on it in suburban New Jersey was, "Why it's not small at all" or words to that effect.

The wagon differs basically from others of the 140 series only in body configuration—which is, after all, its reason for existing. It seems to convey the impression that it is appreciably larger at 182 inches than the 142 2-door sedan and the 144 4-door. In fact, the 145S is 6 inches longer and 4 inches wider than the 122S wagon it replaces. It is also more expensive (\$3395, \$3495 Poe on the respective coasts).

When one puts out that kind of money for a wagon, he expects something special. The 145S is special, mostly for the same reason any 140 series Volvo is special—disc brakes, headrests, anti-theft steering lock, front seats with adjustable support.

It's also special because it is a size of wagon that seems to fit suburban life perfectly: that is, it will haul bushes, grocery bags, even an occasional piece of furniture, but if you want to take your pet cow to market, forget it. Maximum cargo space with the back seat folded is 74 inches; interior height is 33 inches (the tailgate hinges up) and width varies from 42-52 inches; there are four cubic feet of storage hidden under trap doors in the floor. The tailgate can come equipped with an optional wiper and washer to add to the defroster.

The wagon remains a highly maneuverable, good-riding vehicle which, at 182-inch overall length is in a size category which American makers abandoned. It is comfortable for over-the-road driving—we pounded it 250 miles over Eastern toll roads in a single day—and it eats up those winding back roads.

However, this wagon will not appeal to all-out economy buffs: it uses premium fuel (like its Volvo brethren) and when it is loaded near capacity, the mileage seems to be around the



19 mark. The rugged, proven, dual-carb 4-cylinder 109-cu.-in. engine gets the job done, but don't step out of a performance car into this one. While there's a 3-speed automatic available, it takes just enough power from the engine to turn this into a very tame Swede indeed.

The 145S is an honest car which will not be obsoleted by successive waves of safety legislation and which, with reasonable care, should retain its utility for years. Just remember: if you expect to go up against Gas Ronda and the Chrondeks, buy this one to get to the track and get yourself some big American inches for the run.

Incidentally, many of the extra touches on the 140 series Volvos are put there because of Swedish insurance laws. Cars equipped with anti-theft steering column locks, non-pickable side window vents, shoulder harnesses and collapsible steering columns get a lower insurance rate. Perhaps the Swedes have a sensible approach here which could be adapted to the U.S. insurance practice somehow.

Volvo has always made sense with its automobiles, and the 145S 4-door station wagon is no exception. It is utilitarian to an extent that puts larger wagons to shame for practicality. Durability is still its strong suit, and with its good space utilization and interior cargo dimensions of 74 x 33 x 42 inches, it is ideal for wifely duties.



Special City Car

A small British firm, Universal Power Drives Ltd., of Perivale, near London, makers of the BLMC-engined Unipower GT sports car, are preparing to go into production with an unusual city car this year—something that could easily be picked up here. Only 6 feet long and 5 feet, 6 inches wide, it is virtually cubic in shape and a 6-seater, designed for city and inter-city use. Its power unit is the BLMC Mini 4-cylinder of around 1-liter capacity, mounted low under the rear seat. It drives the rear wheels and is teamed with Automotive Products' 4-speed automatic transmission. Top speed is about 55 mph, and the car is expected to sell for around \$2200 (including U.K. purchase tax).

4-Wheel-Drive Mustang

Harry Ferguson Research Ltd., of Coventry, whose 4-wheel-drive system is now in series production in the Jensen FF sedan, are now preparing to offer their 4wd layout and anti-skid braking system as a package alternative to standard transmissions for a wide range of cars. They estimate that with a reasonable production volume of around 50,000 vehicles a year, the extra costs of the conversion for a large car should not exceed 200 in Coventry.

The car chosen for Ferguson's latest project is the Ford Mustang, which is using the same layout as that on the New York safety car.

At the joint invitation of the Swedish Road Safety Board and Swedish Automobile Association, demonstrations were recently arranged in Sweden, in which the FF Mustang took

continued on page 22

People write to



Have a question about motor oil? Lubricants? Engines? Ask the Pennzoil experts...

70,000 Miles Young. I bought my 1963 Buick Wildcat new. Now I have 70,000 miles on it. I don't burn any oil and the engine runs like the day I bought the car. I'm going to make a 3,000 mile trip soon. What should I do?

Sgt. T. A. H.
Schofield Barracks, Hawaii

Count your blessings and have a compression check on the cylinders before you leave. Such a check would indicate the condition of the valves. If any of them appear to be burned, they can be repaired or replaced now, saving you a lot of money and inconvenience on your trip.

Holder Upper. I'm building a Pontiac engine up for competition. What oil would you recommend that will hold up under drag strip conditions?

G. G. L., Audubon, N.J.

We recommend Pennzoil Racing Oil in the correct SAE grade for your car. It's specifically designed for hot, high-performance cars and is now available in SAE grades 20 through 60.



Over-Fill. In some cars a white foam is found on the dip stick and in the oil filler pipe and cap. Why?

G. C., Alden, Iowa

Usually foam is caused by oil aeration that results when the crankcase is filled above the add oil mark. We recommend that you add oil only when your dipstick is at the "add" level.

Go!! I have a Go Kart that hits 75 mph easily. But there's one problem. I have to mix oil with the gasoline. Is there a single oil I can use for this job?

S. C., Avon Lake, Ohio

Sure. Pennzoil two-cycle oil, or our Outboard Motor Oil, will do just fine in that two-cycle Go-Kart engine. And be sure the oil and fuel are thoroughly pre-mixed for maximum performance.



Wrong Book. In a book I read it said that after an engine sets, the oil drains out of the bearings and moving parts, and—for an instant—there's no oil protection. What do you say?

D. B., Assumption, Ill.

We can't speak for other motor oils. But we do know that Pennzoil with Z-7 puts an adhering lubricating film on all engine parts. The film sticks. So when you start, there is oil protection.

Gear Oil. The owner's manual for my 1966 Renault says that the gearbox should be filled with grade EP 80 gear oil. What does EP stand for?

A.L.S., Sumter, S.C.

EP signifies the presence of an extreme pressure additive, necessary to prevent gear tooth wear.

Trucks, Too? I know Pennzoil with Z-7 is good for cars. But what about using it with light duty trucks where sludge build-up is a problem due to short runs?

F. B., Black Eagle, Mont.

Pennzoil with Z-7 is great for light duty trucks, too, and gives maximum protection against sludge and varnish. It exceeds all car manufacturers' engine test requirements.

Top Up Down Under. I have a 1959 Wolesly 1500 that's gone over 74,000 miles. The engine is in good condition, but I sometimes have to top up with a pint of oil between oil changes (every 1,000 miles). Can I extend oil changes to 2,000 miles with Pennzoil?

D. T. B., Hurtsville, Australia

Yes. Depending on driving conditions, we recommend you use Pennzoil Z-7 SAE 30 in your Wolesly and drain the crankcase every 60 days or 2,000 miles, whichever comes first. This should help keep your engine clean as well as prolong its life.

Air Cost. I own a 1968 Pontiac with a factory-installed air conditioner. I'm getting about 12 miles per gallon. And I have the air conditioner on constantly. Would I get better gas mileage if I didn't use the air conditioner so much?

M. O., Gardena, Calif.

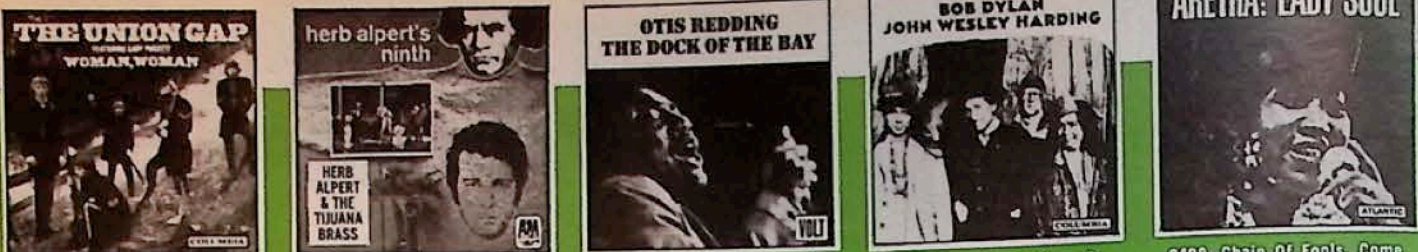
Yes. Gasoline consumption with the use of air conditioners varies with different engines, of course, but it is quite high. From our experience, with the air conditioner on, you can figure about three miles per gallon loss.

WE'RE OPEN TO QUESTIONS about motor oils, lubricants, engines. But, you can tell us a few things, too. Maybe you have discovered something interesting about motor oils or lubricants. Or you have a special reason for being a Pennzoil fan. We would like to hear from you. Write to: Pennzoil Company, Research Department, P. O. Box 808, Oil City, Pennsylvania 16301. Note: sorry no pictures or material can be returned. Letters chosen for publication are subject to revision necessary for publication requirements.

The Pure Pennsylvania Motor Oil with Z-7



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for
it!



6120. Also: By The Time I Get To Phoenix, To Love Somebody, many more
6066. The Happening, The Trolley Song, Flea Bag, Carmen, The Love Nest, etc.
6405. Also: I'm Coming Home, Tramp, The Hucklebuck, Ole Man Trouble, etc.
6103. Also: The Drifters Escape, Down Along The Cove, Dear Landlord, 12 in all
6408. Chain Of Fools, Come Back Baby, Groovin', People Get Ready, 10 in all



6366. Mrs. Robinson from 'The Graduate,' Fakin' It, At The Zoo, Old Friends, etc.
6312. Summertime Blues, Rock Me Baby, Second Time Around, etc.
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Vikki Carr It Must Be Him 10 MORE	The Dave Clark Five Five's Greatest Hits 10 MORE	THE 4 SEASONS NEW GOLD HITS 10 MORE	With Love, CHER 10 MORE	SPANKY AND OUR GANG SUNDAY WILL NEVER BE THE SAME 10 MORE	The DOORS Light My Fire 10 MORE
PAUL REVERE & THE RAIDERS Revolution! 10 MORE	THE ROLLING STONES Flowers 10 MORE	THE BEE GEES Horizontal Plus: Massachusetts 10 MORE	THE BEE GEES Horizontal Plus: Massachusetts 10 MORE	THE BEE GEES Horizontal Plus: Massachusetts 10 MORE	THE BEE GEES Horizontal Plus: Massachusetts 10 MORE

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if you join the Club now and agree to purchase a record a month during the coming ten months (you will have up to 300 records a month to choose from)

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PAUL REVERE & THE RAIDERS Revolution! 10 MORE	THE ROLLING STONES Flowers 10 MORE	THE BEE GEES Horizontal Plus: Massachusetts 10 MORE	THE BEE GEES Horizontal Plus: Massachusetts 10 MORE	THE BEE GEES Horizontal Plus: Massachusetts 10 MORE	THE BEE GEES Horizontal Plus: Massachusetts 10 MORE

HERE'S OUR BEST OFFER EVER... an opportunity to get ANY 12 of the hit records shown here—all 12 for less than the price of one! That's right—if you join the Columbia Record Club now, you may have any 12 of these records for only \$3.98. And all you have to do is agree to buy a record a month during the coming ten months.

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You'll find hit albums from over 70 different record labels! You may accept the monthly selection for the field of music in which you are mainly interested...or take any of the other records offered—the choice is entirely up to you!

RECORDS SENT ON CREDIT. Upon enrollment, the Club will open a charge account in your name...you pay for your records only after you have received them—played them—and are enjoying them. They will be mailed and billed to you at the regular Club price of \$4.98 (Classical, occasional Original Cast recordings and special albums somewhat higher), plus a small mailing and handling charge.

GENEROUS BONUS PLAN. As soon as you complete your enrollment agreement, you will be automatically eligible for the Club's bonus plan—which entitles you to **ONE RECORD FREE FOR EVERY RECORD YOU BUY!** There are no "savings certificates" to accumulate, no delays, no limitations—every time you buy a record, you choose one free!

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OVERSEAS REPORT *continued*

part in acceleration, climbing, braking and cornering tests in comparison with an otherwise identical Mustang with standard transmission.

The conversion, complete with all modifications and the Dunlop Maxaret braking unit, adds about 196 pounds to the weight of the Mustang. The only modifications to the Ferguson car are a cast aluminum sump and slightly modified oil suction pipe, with the engine raised by 0.75-inch and a new Y-pipe fitted from engine to muffler. Transmission is Ford Cruise-O-Matic, with 3.0:1 rear axle and normal differential unit. To this is added the 4wd unit with a 2.93:1 front axle ratio (overall axle ratio 3.031), all this entailing a front prop shaft and output shaft, front drive shafts with c.v. joints and spindles, a subframe, new front hubs and removal of the tailshaft casting on the standard assembly. The front suspension is standard, apart from modified A-brackets. Standard Mustang steering is retained, with new steering arms and drop arms, lowered slave arm and reset track rod.

The Mustang brakes are retained (with Midland-Ross C48 servo), plus the Maxaret-Ferguson anti-skid system. Wider rim front wheels are used, the Mustang prop-shaft is shortened by 7.56 inches, and the front drive shaft



The front-wheel-drive, 1.3-liter Austin America 2-door sedan by BMC is aimed specifically at capturing U.S. sales from VW and Japanese cars. It is priced at \$1825, has been designed for long-distance, high-speed cruising and has automatic transmission.

is of 1-inch diameter with two U-joints. Front track is also increased from 4 feet, 8 inches to 4 feet, 8 1/2 inches.

The results of the comparative tests between the Ferguson Mustang and a standard car on a wet skid pan are impressive. Under straight-line braking from 50 mph, the 4wd car refused to lock its wheels even with 140-pound pedal pressure, and stopping distance varied between 150 and 185 feet. The standard Mustang locked all wheels

with as little as 80 pounds pressure, and stopping distances varied between 225 and 260 feet.

In the wet, the 4wd car took 4.6 seconds to cover a standing 150 feet, as opposed to 6.5 seconds. Other tests involved acceleration on a flooded pebble surface left-hand curve. At half throttle the 2wd car instantly broke away, while the Ferguson version displayed no trouble apart from a slight controllable breakaway at the end of

the curve on some runs. Braking on a right-hand curve under similar conditions produced no change of direction with the 4wd car until high pedal pressures were applied, when there was slight understeer, though the car remained stable. But on the standard car, a mere 40-pound brake pressure sent it straight on, and with 30 pounds the rear wheels locked and the car changed direction. Only with pressures as low as 20 pounds did the car hold its course.

Twenty Ford Zephyr 6 sedans equipped with the Ferguson 4wd system are being put into use by the British police later this year.

Strong Showing By Saab

A Swedish newspaper conducted a test of 18 automobiles, each driven 40,000 kilometers by average drivers, and concluded that Saab V-4 was the "most economical car to own and drive." Criteria were fuel consumption, service and repair costs and depreciation. The mileage and figures are, of course, by Swedish standards in a Swedish environment.

However, the V-4 remains in short supply Stateside because of its unprecedented (for Saab) popularity. Dealer organization as you read this may have reached 400 as the firm slowly expands.

BRIEFS:

NSU of Germany and French-based Citroen have been reportedly discussing merger terms. The firms have shared research work in the past.

Latest estimated arrival time of Chrysler's answer to the Opel and Model C—the Simca front-drive—is July. Although Sunbeam fastback (mini-Barracuda) and Arrow and Alpine all are here, the front-drive retains hope for any kind of second car volume. Pricing and production have delayed matters.

Sneak preview of 1969 (?) Rootes cars reveals curved contour body designs, we are told. Assuming that they do come out for the '69 model year, Chrysler-Rootes will have junior Buick Rivieras running around.

Japanese styling has come a long way since 10 years ago when they were copies of English cars. Major firms all have stylists trained in U.S., Italy and at Japanese academies. Styling hopefully is thus a blend of best in world.

Austin America

Launching a special version of their front-wheel-drive 1.3-liter sedan on March 21, BMC announced the "Austin America" 2-door sedan, aimed

specifically at capturing U.S. sales from VW and the Japanese cars. It is priced at \$1825, complies with all current federal and state safety requirements and is being boosted by an initial \$250,000 advertising campaign throughout the U.S. BMC hopes to sell 50,000 of these Austins in the first year and subsequently 100,000 a year, which seems a bit over-optimistic at this stage.

But the corporation has carried out extensive market research and is confident that they will succeed with the Austin America as a second or third family car, and maintain that they have a second-to-none service network to back it. Engine and gear ratios have been designed and tested for long-distance, high-speed cruising, and transmission is the Automotive Products Group 4-speed automatic with torque converter.

Sample cars seen here were extremely well-finished, comfortably kitted out and stylish, incorporating deeply padded seats, deep carpeting, wood-rim sports-type steering wheel and floor-mounted T-bar gear selector. Charles Griffin, BMC engineering director, said that to meet exhaust emission requirements the cars are equipped with air injection pumps, but this method, though effective, was not the final answer. /MT

Have you read your front tires lately?

They tip you off when there's trouble in the steering system

Uneven tread wear, flat spots and scuff marks are signs the front wheels are running out of line. Misalignment is most often caused by worn or excessively loose parts in the steering and suspension system—a condition that wears out tires fast and makes driving dangerous.

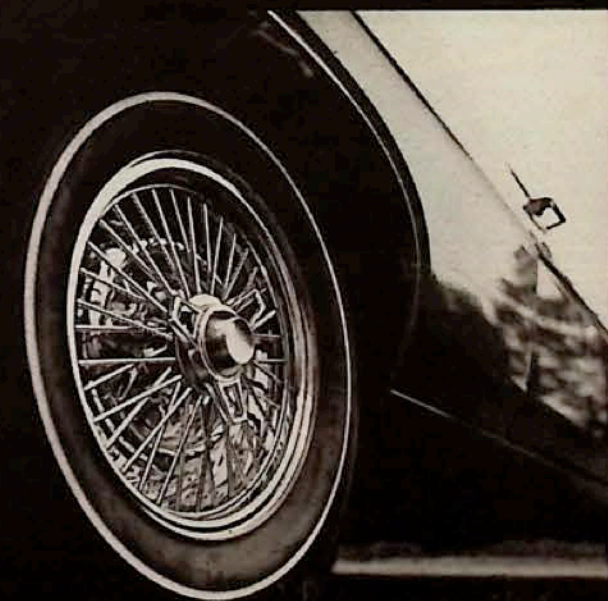
To be safe and sure, and to protect your tires, your car should have a complete "Wheel-to-Wheel Security" Check every 5,000 miles—available from most alignment specialists. For maximum security, ask to have worn or excessively loose steering and suspension parts replaced with *Moog Problem Solving Chassis Parts*. They extend tire life, hold alignment longer, give extra driving comfort and safety—wheel to wheel!



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HOT ROD ACTION!

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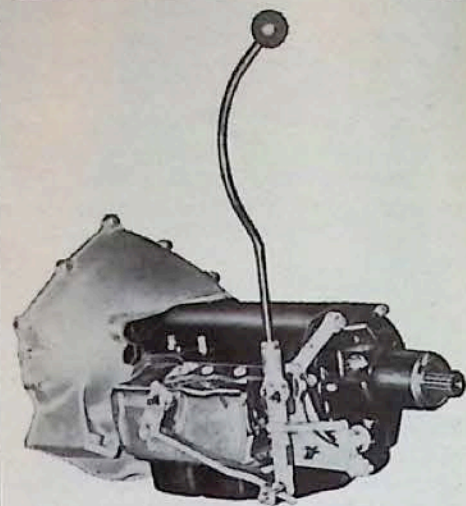
SEE AND THRILL TO —

- Spectacular competition and record breaking speeds at Indy
- Exciting stockers on the high banks of Daytona
- Wild, wheel-standing, tire-burning dragsters
- Breath-taking land speed record attempts at Bonneville
- Water-skimming drag boats in action



An American General Release
A Robert E. Petersen Production

PRODUCT TRENDS



in getting away from it all

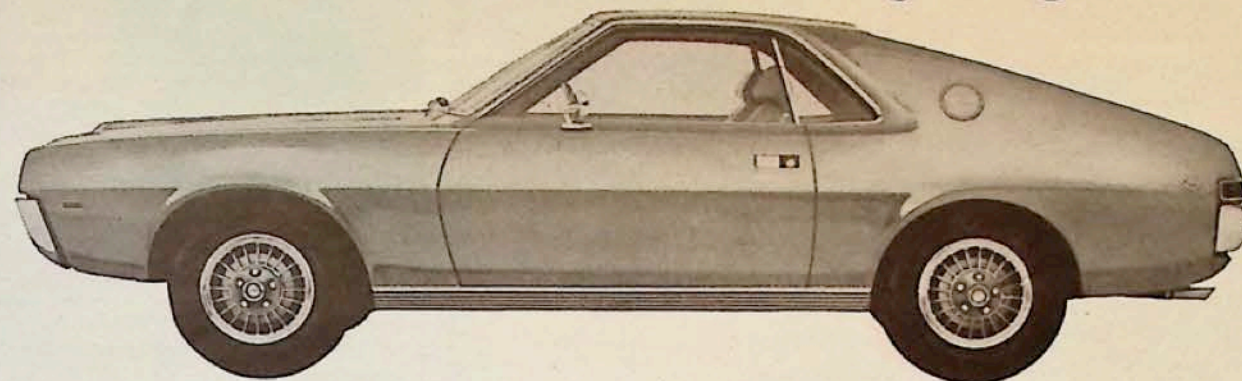
Like it is right now, campers are the hot setup. Here we were on the road to Panamint City, California, the world's most inaccessible ghost town, 200 parched miles from anywhere, and the place is lousy with campers. Death Valley, same deal. Ditto, Yellowstone. It's that leisure time, man. Give a guy a long weekend and a couple of bucks and he gets out of smog city as fast as his vehicle will carry him.

And that's partly a hang-up too. Slap a camper on the back of a standard pickup and you're banished forever to the slow lane on the freeway or the status of a portable obstacle on 2-lane, twisting mountain roads. The truck world has always been the world of reduction — gear reduction — where torque and mechanical advantage are the watchwords rather than free revving horsepower. All of which means a 4- or 5-speed standard shift transmission — almost anathema to us shiftless metropolitan cats. So, more and more camper pickups come with automatics — 3-speed passenger car automatics. Automatics that were designed for 400- or 427-inch engines carrying a 2-ton automobile, not 300-inch engines carrying a 3-ton pickup/camper deal — up seemingly endless grades. Automatics programmed to shift to the next higher gear at the approximate engine rpm come what may. Automatics that do not offer enough downhill braking.

But, aha, from out of the West deliverance is at hand. It's B&M Automotive. Who? B&M. I thought they built racing automatics. They do, everything except the jobs for Chaparrals. And because of it the people who owned the race cars wanted beefed up units for their towing rigs and before you knew it there was old B&M sliding super-stout never-say-die Hydra-Matics into Joe Doke's camper so his transmission didn't fade away on the south slope of Mt. Whitney. This has gotten to be a regular program. So regular in fact that a unique, re-engineered Hydra-Matic was developed — it's called the Traveler. Among other things it has four speeds (not three with a torque converter) both full manual control and automatic, adapts to virtually all American made passenger cars or trucks and is fully warranted with provisions for a second owner to boot.

The AMX.

It takes more than money to get one.



If you can find an AMX, we'll sell you one. But as this message goes to press, less than 2,000 AMX's have been produced.

And we, American Motors, will only make about 8,000 more this year.

You see the difficulty.

Even if you have the \$3,245¹ necessary to buy an AMX, you may get a lot of exercise before you ever get close enough to pay for one.

Ah, but the thrill of being the first man in your state to own one will surely be surpassed by the thrill of being the first man in your state to drive one.

A two-seater, the AMX gives you the ease of maintenance associated with a family sedan, combined with the sheer fun and maneuverability of a foreign sports car.

In fact, its incredibly *uncomplex* design means that, once the optional 390 engine is broken in, you could roll right onto a race track and be ready to do about 130 mph.

In pure stock form — without special engine modifications.

Specially equipped AMX's with modified engines broke 106 USAC speed records.

And while there are cars on the road that are faster than the AMX, we hasten to add that beating other drivers isn't the AMX's main appeal.

It's the way the car reacts to you *as you drive*, not the usual dull split second later. You get out of lane, pass the car in front and get back in lane in one sure motion.

Because the AMX offers one of the fastest steering wheel ratios of any U.S.-built car, it turns, corners, follows your direction *simultaneously*.

Being a sports car, the AMX is sports-car sized.

So, while the inside isn't much of a place to hold meetings, it will hold a lot of other

things.

The trunk is a lot bigger than you'd expect a sports car trunk to be. Because we didn't fill it with a big spare tire.

We gave you The Airless Spare.

When you need it, it "wwhhhoosshh!" inflates.

The Airless Spare is nice because it doesn't fill up your trunk with air that you don't need.

It's something every car should have.

But then, every car should have a lot of things.

Things like a short throw, all-synchromesh 4-on-the-floor, fiberglass belted wide-profile tires, shoulder harness seat belts, tachometer, aircraft-type instrument panel, energy-absorbing steering column, heavy-duty springs and shocks.

To mention only a few of the AMX's standard features.

Another un-standard standard feature is the production number that will be set in the AMX dash when you (if you find one) buy it.

AMX 00001 through AMX 10,000.

While this number may mean a lot to collectors in the years ahead, we do want to point out one thing.

All AMX's are made with the same attention and quality.

And while possessing a lower number may have a sentimental or prestige value, it does not in any way make one AMX better than another.

Just as possessing an AMX does not make one man better than another.

Just luckier.

American Motors

Ambassador • Rebel • Rambler American • Javelin • And the new AMX

¹Based upon manufacturer's suggested retail price, federal taxes included. State and local taxes, destination charges, options, excluded.

If your car looks sick,
here's the medicine.



ALL CLASSIC PRODUCTS ARE GUARANTEED: YOUR MONEY BACK IF NOT SATISFIED

Classic Products, Ltd., Dept. M-7
2616 N. Tamarind Ave., West Palm Beach, Fla. 33407

Enclosed is \$_____ in check or money order. Please rush:

___Tins, Classic Car Wax. Goes on easy, dusts off easy, brightest, toughest protection you can get. Loaded with carnauba, the hardest wax known. Wax in the sun or rain without streaking. 1-pound, 2-ounce tin gives 6 or more wax jobs. \$5.00 each.

___Pints, Classic Vita-Lustre. Liquid wax and polish. Best for metallic finishes. Vitalizes paint, restores original depth and provides lasting brilliance. Leaves gem-hard lustrous finish. \$3.00.

___Pints, Classic Car Finish Restorer. Car Cleaner & Chrome Cleaner. Restores dull and faded oxidized paint. \$2.00.

___Jars, Classic Leather Care. Cleans, softens, preserves, and protects leather or plastic upholstery, tops, tonneau covers, etc. Prevents stitches from rotting. 10-oz. \$2.50.

___Jars, Classic Car Wash. Add water to a table-spoonful and wash a whole car, wheels and all. No drying necessary if water is free of chemical deposits. 13-oz. \$2.00.

___Pints, Classic Plexiglas Cleaner. For clear, clean, scratch-free plexiglas or lucite. Eliminates surface crazing, prevents yellowing and clouding. \$2.00.

NOW AVAILABLE IN CANADA

Name _____
Address _____
City _____ State _____ Zip _____

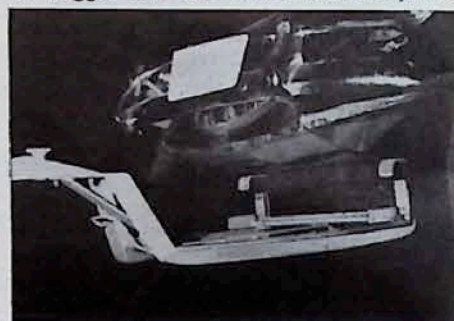
(Sales representatives wanted nationwide.)

PRODUCT TRENDS *continued*

Sure, Detroit is coming around to meet the needs of the camper craze but if you can't wait for the establishment to get in gear, get hold of B&M Automotive, 7700 Woodman Ave., Van Nuys, Calif., and bring money.

Ok, now that B&M has gotten you without hassle to whatever verdant hideaway known only to yourself and seven or eight thousand other outdoor nuts there is the question of local transportation. If you've got a trailer, no problem, unhook and flee the scene. A cumbersome camper is another story. There are three choices: drive around in your camper which is probably taking on the dimensions of the Queen Mary getting about amongst all the other campers; bring some bikes; tow an extra small car something like the dorry all great yachts seem to have always dangling above the aft deck. VW's are the natural choice since besides being small and light, they float.

WHICH BRINGS TO MIND the old line about where all the old Volkswagens go—the Old Volkz Home. The particular Old Volkz Home on 5216 Elston, Chicago, Ill., besides having its allotment of old bugs also has something to tow them with—the 'Lil Bugger Tow Bar. How nice. Really! No



squat, stoop or bend, no fuss, no muss, from a standing position you can slide the 'Lil Bugger (boy, we love that) past the front axle of the bug to be towed, push down of the draw-bar and "snap" you're hooked over the front axle. A tug on the locking rod and two flat bars came into position to trap the axle from below. Drop the draw-bar on the bumper ball and drive away, secure in the knowledge your VW is following like Mary's lamb. The price for such fabled peace of mind is 99 bucks. That's just under a C-note M. Goose.

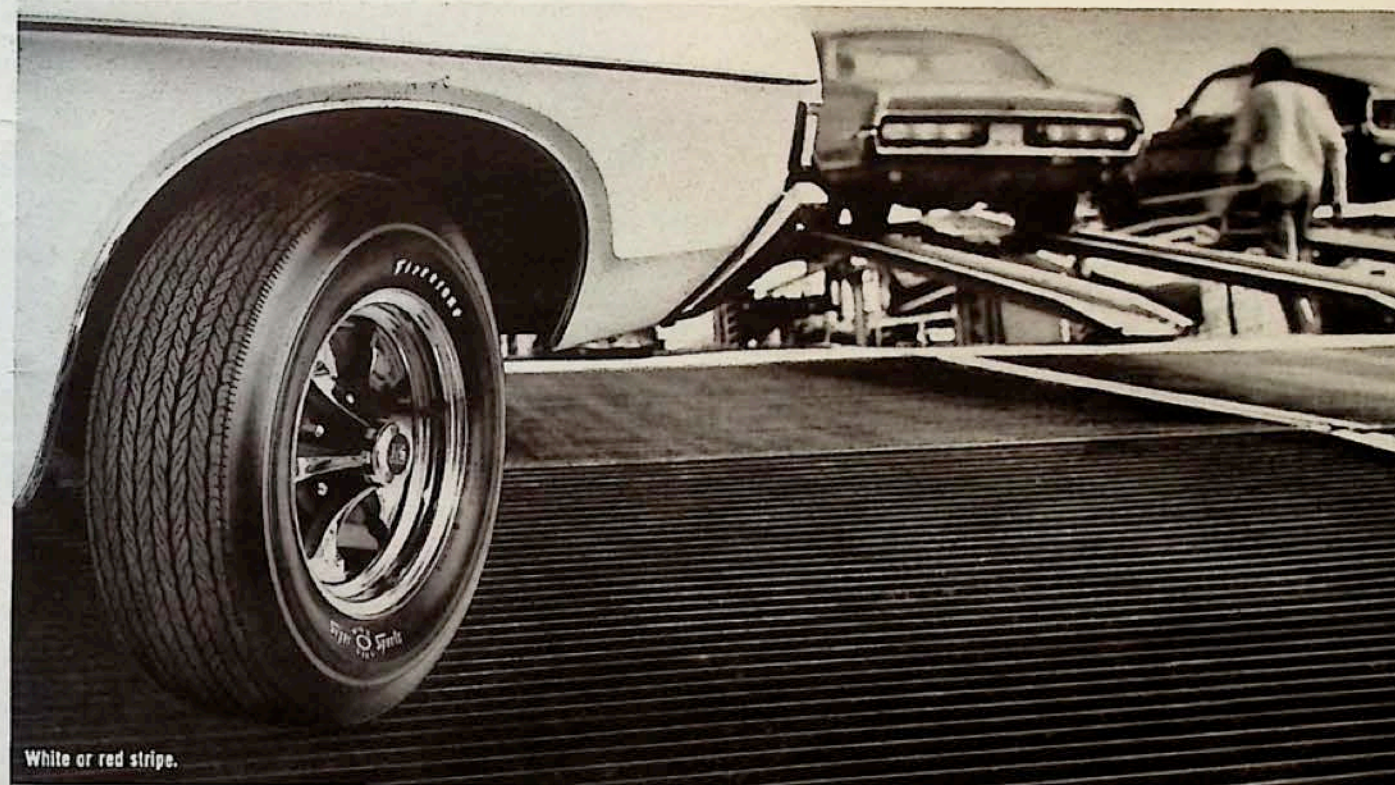
THEN THERE ARE THE BIKES. Anything mini is in today, right? So how about a mini-bike? The Bonanza BC 1300 for gosh sakes.



And it's not one of those little devils the kids are always being chased back up on the driveway by the cops with. No sir, its



Detroit agrees: it's a Wide Oval World.



White or red stripe.

Times have changed since Columbus said the world was round.

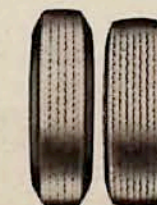
It's 1968, and America is fast discovering that the world is oval. Wide Oval. The Wide Oval World of Firestone.

Perhaps you've noticed it, too. On the cars coming out of Detroit. How tires are getting wider, lower.

We started it all when we introduced the original Super Sports Wide Oval

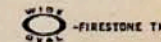
tire. A totally new kind of tire. Nearly two inches wider than conventional tires. It grips better. Corners easier. Runs cooler. Stops 25% quicker. And it gives your car an all-out look of driving excitement.

It's built with Nylon cord, too. And that gives it maximum strength and safety at sustained high-speed driving. Sure, others may look like it, but



Nearly two inches wider than your present tire.

none perform like it. There's really only one original Wide Oval tire. And Firestone builds it. The Super Sports Wide Oval tire. Anything less is less.



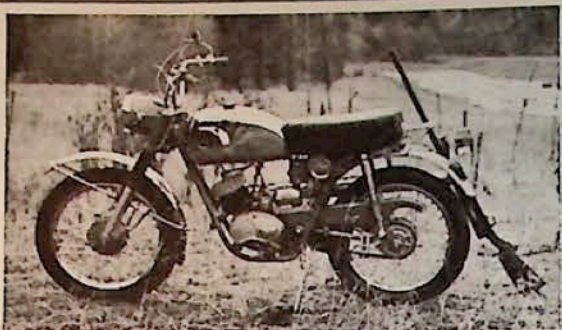
Firestone The safe tire

FREE

Brochure Information

For information, send coupon to:

PABATCO
Dept. M
Box 327
Athena, Oregon 97813



Name _____ Address _____
City _____ State _____ Zip _____

Thinking motorcycles? Think about the HODAKA '100' five-speed (national 1966-67 trailbike champion and 1968 Daytona winner). It's worth looking into.

The HODAKA success story is unique in the industry. Designed with the idea of building one motorcycle perfectly, the HODAKA now holds a level of performance and reliability that sets industry standards. Although today's HODAKA looks much like the first one built over four years ago, 107 improvements have been designed into it. And most of the improved components will fit the first HODAKA built. By building only one model (100cc) in one color (red), costs stay down. No planned obsolescence. This means higher resale value and lower initial price (around \$435 fully equipped). More accessories are designed for HODAKA than any single motorcycle ever built. Standard equipment includes five-speed transmission, mounted side mirror, owner's handbook and service publications, tire pump, tool kit, extra carb main jets, fifty tooth overlay sprocket and attach. hardware, and extra chain and master links.

No Slip. No Flip. Great Grip!



Dayco's New DS+7 Racing Belt The Choice of NASCAR Champions

Get with a winner. Get Dayco's DS+7 Racing Belt. Cool belt for

hot cars. Designed exclusively for high speed engines. Proved in over a million miles of tough NASCAR competition. The Choice of Champions. No flip. No slip. Great grip. Ask for the Checkered Belt. It stays in the groove. See your local Automotive Accessories Supplier or use the attached coupon. Dayco Corporation, Automotive Replacement Sales, Dayton, Ohio. Free Official Dayco Racing Team Decals with each belt purchase.



DAYCO
CORPORATION
RUBBER PRODUCTS DIVISION
AUTOMOTIVE REPLACEMENT SALES - DAYTON, OHIO

Dayco Corporation
Automotive Replacement Sales
333 West First Street
Dayton, Ohio 45401

Please rush me _____ Dayco Racing Belts @ \$5.00 each, plus FREE Decals. The outside circumference of my old belt is _____ inches. (Enclose check or money order.)

Name _____
Address _____
City _____ State _____ Zip _____

PRODUCT TRENDS

continued

high and low beam headlight, tail light and alternator satisfies lighting regulations of all 50 states. What's more from 1967 the frame castor angle has been increased for better street stability and the front and rear suspension given longer travel. Sling a 4-cycle, 4-horsepower motor in it and dizzying speeds of 40 mph are at your command. Your command, not ours. Ok, so it's not a BMW shaft-drive but you can't put a BMW in the back door of your camper either. Why don't you write Mike Farrand, Bonanza Industries, Inc., 1775 South First Street, San Jose, Calif. 95112, and he can tell you what \$200 buys these days.

in the wonderful world of wheels
God, isn't it the truth, here old Ted Halibrand started putting out the original "mag" wheel way back in the dim reaches of hot rod time and now everybody's gotten into the act. Of course, Halibrand Engineering, 1506 West 228th Street, Torrance, California, is still forging ahead, their latest being this new, superlight magnesium competition wheel for dragsters and funny cars that the kids will figure out some way of adapting to their street machines.



EVEN A BIG CHEMICAL OUTFIT like Dow has gotten into the wheel biz (that should be pretty safe from protestors) not with a wheel but with the accumulated technology to build maybe the best one in the world. Their thing is pressure die-casting, a process which increases fantastically the accuracy, fatigue-strength and finish characteristics of a mag rim. Cromodora-Fergat, an associated company of Fiat Motor Company in Italy, has become a Dow licensee and as such is the first automobile manufacturer in the world to offer magnesium wheels as standard equipment. While they were at it they also worked up designs for Alfa Romeo, BMC 850 Mini, Minor and Cooper, and Simca 1200.

Until 1966 when Dow came out with the pressure die-casting arrangement, true magnesium wheels were prohibitively priced because of the use of relatively slow sand-casting, forging or gravity die-casting methods. Besides that, mags were generally a bother to keep clean since they didn't resist the onslaught of the elements. Dow has an answer for this too, their #17 anodic coating which will accept baked enamel if desired.

Aerodynamic duo



Front: Camaro SS Sport Coupe. Rear: Corvette Sting Ray Coupe.



They're two of a kind. The fantastic, low-slung Corvette Sting Ray. And Camaro, The Hugger, the only car that comes even close. In styling, in handling, in performance. Both are aerodynamic from nose to deck, with Astro Ventilation, full door-glass styling, bucket seats, refined suspension and 327-cu.-in. standard V8s. You can order Vettes all the way up to 435 hp in a 427-cu.-in. Turbo-Jet V8. Camaros score almost as high: Cubes — 396, Horses — 325. Corvette's a tough act to follow. Buckle up a Camaro and see what we've done for an encore.

'68
Camaro  **Corvette**

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A Cacophonous, Kaleidoscopic, Panoramic, Girl-studded, Look at cars

The poster on the back of the bus challenges: "Shift Into High Gear! See the World's Greatest Cars at the Greatest Auto Show Ever!"

Taking up the challenge, I went to the New York Coliseum to see for myself.

The opening jarring assault upon the nervous system when entering the International Automobile Show, is noise.

The visitor is greeted by a cacophony of sound.

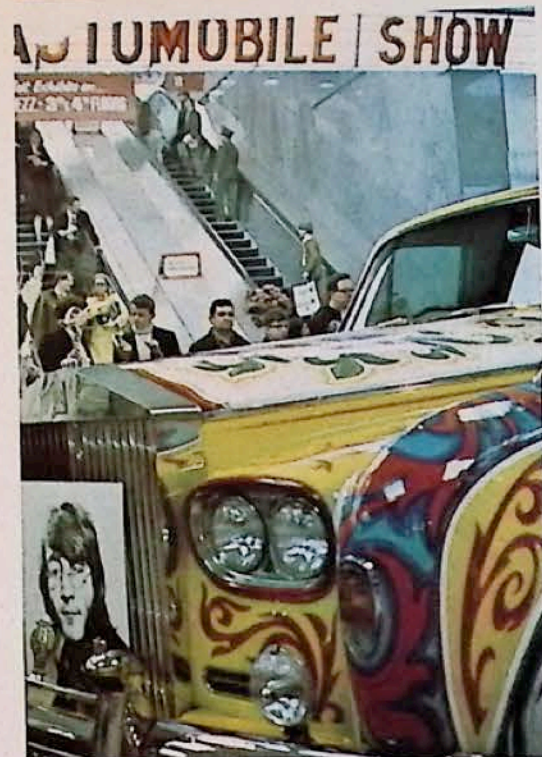
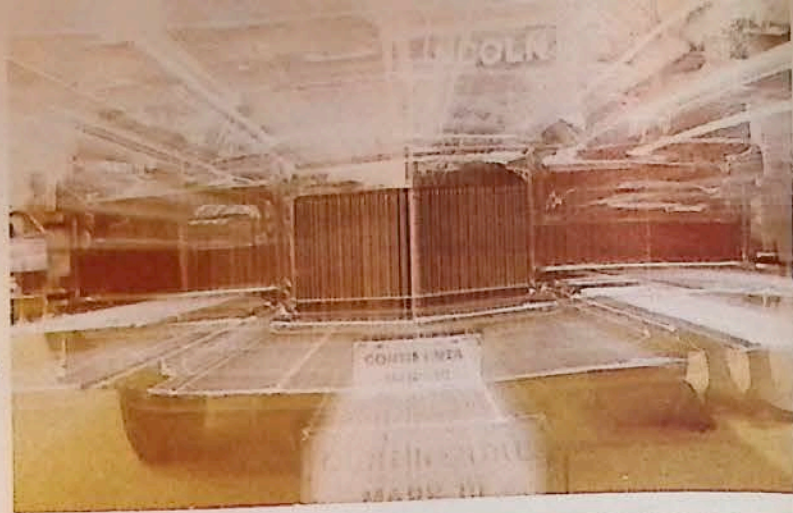
Blaring sound.

Piercing sound.

Sound, sound.

Redundant sound.

Once you have become inured to this frenetic noise level your other senses slowly arrive on the scene and begin to grapple with the unreal reality. The eyes see, for the very first time, the kaleidoscope of color that is thrust upon you from every



John Lennon's Rolls takes a trip



Lamborghini Miura & Company



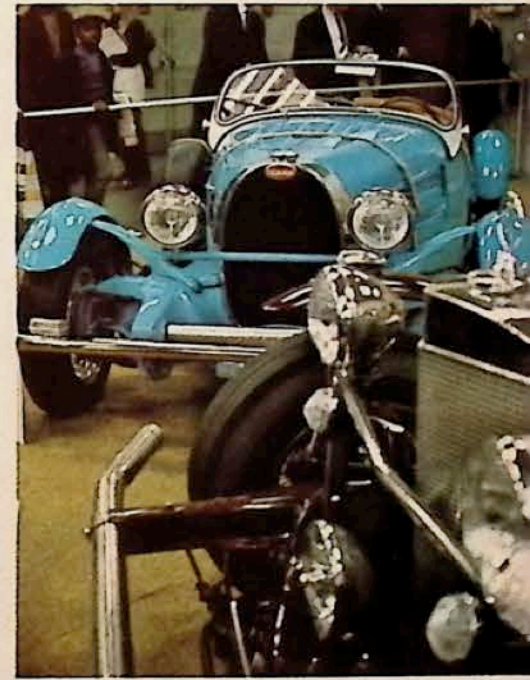
Rowan electric car: It's as you might expect



Plymouth swings



Mach II



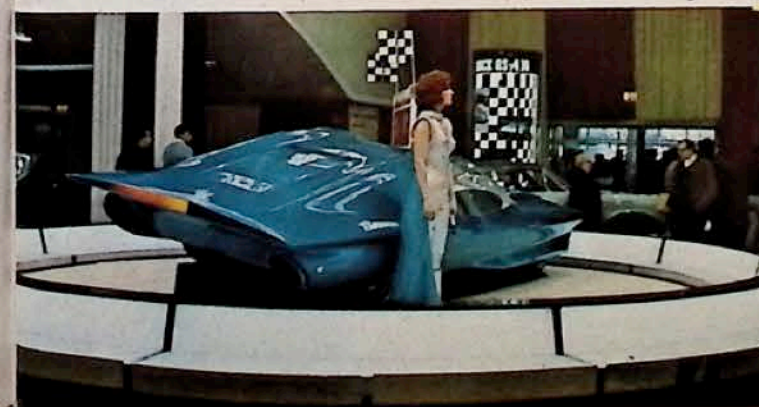
Excelsior 57

Creative photography by Pat Brollier



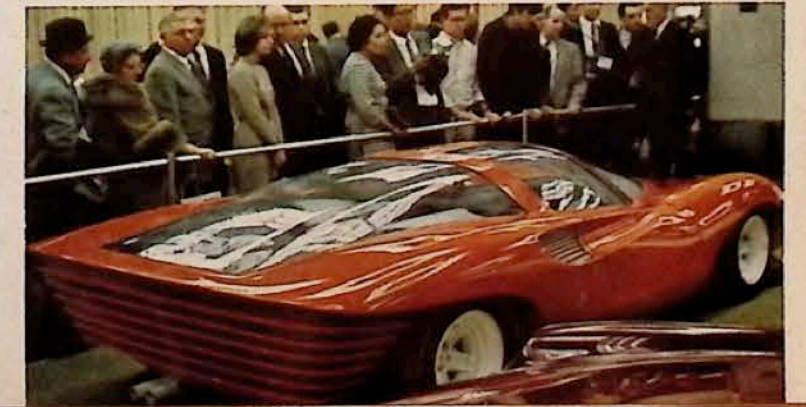
Ford's Mach II is a mystery

Bertone's Jaguar Pirana claims high-speed comfort



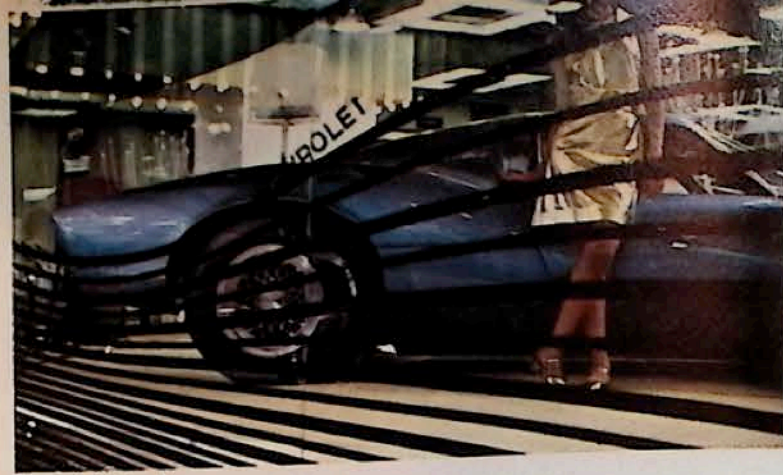
Buick Century Cruiser

Ferrari's realistic racer





A Torino hit Chevrolet Astro II



kaleidoscopic

Continued
direction. As if coming out of a dream you are suddenly aware of the seething, pushing, shoving mass of humanity which has engulfed you, with the seemingly ubiquitous yellow-and-black Renault shopping bags stuffed to overflowing with brochures, booklets and pamphlets.

Then there are the endless legions of kids, kids, kids.

In a carnival-like atmosphere with hucksters hawking their wares, you can pick your way between the Go-Go Girls who are as much on display — and in some cases even more so — than the automobiles they are describing. You can make like Bart Starr and throw a football through a hanging tire, pretend you are A. J. Foyt and have your picture taken with a tiger in your



Ghia Thor

Firebird for the future



Astro-Vette

Try Richard Petty's **CHAMPION** racing jacket on for size!



Richard Petty and his Plymouths are the biggest winning combination in NASCAR Grand National history. Like most racing Champions, Richard runs on Champion spark plugs



and for looks!
This jacket NASCAR Grand National Champion Richard Petty wears is trimly tailored in all red nylon for bold good looks. It carries a white racing stripe plus a special Champion racing emblem.

and for action!
Cadet-style tab collar plus adjustable cuffs and waistband seal out wind and track dust. Lightweight and water repellent with zipper fly front, large patch pocket, and sleeve pocket for sunglasses or pad and pencil. Machine washable.

and for keeps!
Monsanto Chemical guarantees this jacket for one year against failure due to normal wear.

Girls go for these racing jackets too — and the jackets look great in pairs! Available in extra small, small, medium, large and extra large. A \$10.95 value, they're just \$5.95 each. Fill in the coupon below and send it with your check or money order (no C.O.D.'s) to Jacket, P. O. Box 7025, Toledo, Ohio 43615.



JACKET
P. O. BOX 7025, TOLEDO, OHIO 43615

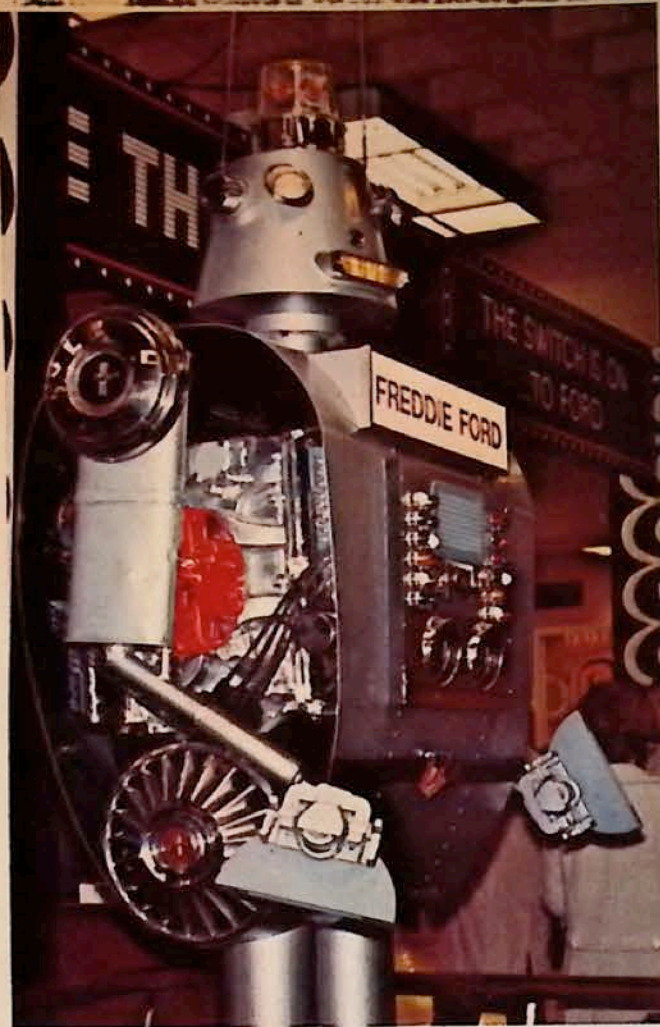
Please send the Champion racing jackets I have indicated below. Enclosed is \$5.95 for each jacket (check or money order only—no cash or C.O.D.'s please).

Indicate Quantity					
Size	Extra Small 32-34	Small 36-38	Medium 40-42	Large 44-46	Extra Large 48-50

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Freddie Ford gets turned on

cacophonous

Continued

tank, emulate Daniel Sexton Gurney and drive Brands Hatch, or be tattooed (with water colors).

Cars?

To be sure there are cars at this, the 16th Annual International Automobile Show. Cars everywhere, as far as the eye can see and for four floors. Some 500 cars, give or take a baker's dozen, ranging from dream cars, electric cars, pop art cars, racing cars, "one-of-a-kind" cars, luxury cars, economy cars, specialty cars to every day, ordinary, mundane cars that you have seen on the street since last September.

For the 500,000 people who wearily wend their way through the four floors of automobiles, this is the consummation of America's great love affair with the automobile. Consider, if you will, that one out of every seven people in America derives his income either directly or indirectly from the automobile industry and it is easy to understand the almost totally universal appeal of an automobile: Show

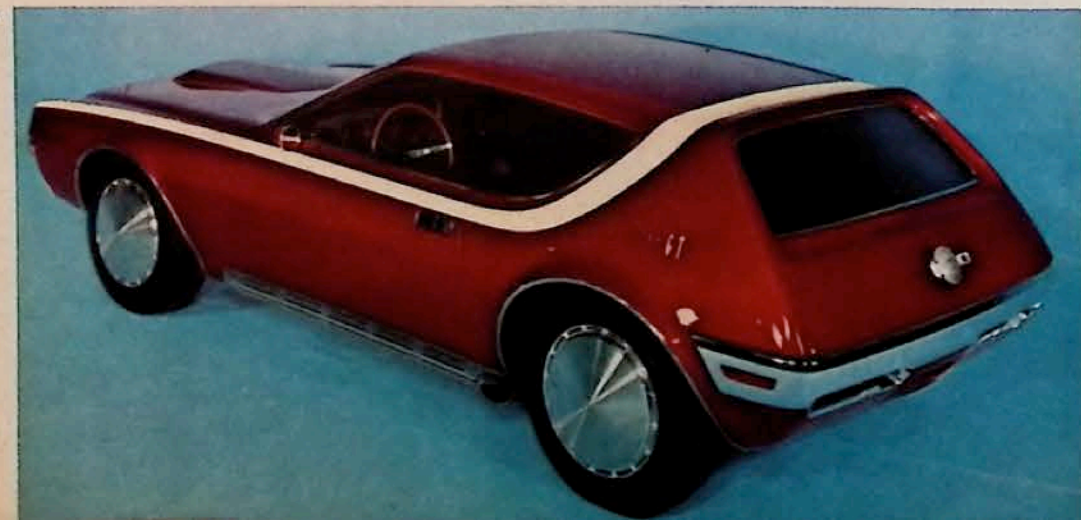
This then is a slice of Americana, as American as apple pie, a Sunday picnic, a Fourth of July outing and the "big game," all wrapped up into one hand-rubbed, lacquered candy apple red package waiting your pleasure.

The poster on the back of the bus certainly didn't exaggerate . . . even a little bit.

/MT



AMX-GT could and should be a reality



Confessions of a flamboyant balloonist, or

How the Insistent Metal from Alcoa has a lofty attitude about automobile weight

One day, we asked a balloonist to air his thoughts on Alcoa® Aluminum automotive parts.

"Aluminum cuts excess weight," he answered. "Makes for all-around better driving! Of course, ballooning is much more adventurous . . ."

It's easy to get puffed up about Alcoa Aluminum. Because no other metal is so light and strong at the same time!

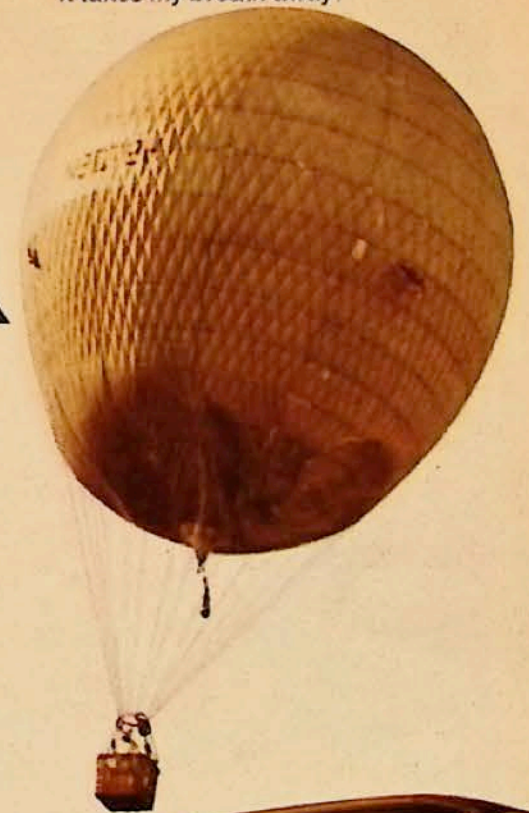
Lightweight aluminum automotive parts mean smoother, more responsive handling. Quicker acceleration. Faster stops. More go per gallon, too! Alcoa's cooperation with automakers makes aluminum insist on being used anywhere an extra pound cuts performance. And production economies are a must.



In the words of a windy balloonist, "It takes my breath away!"

Change for the better with Alcoa Aluminum

ALCOA



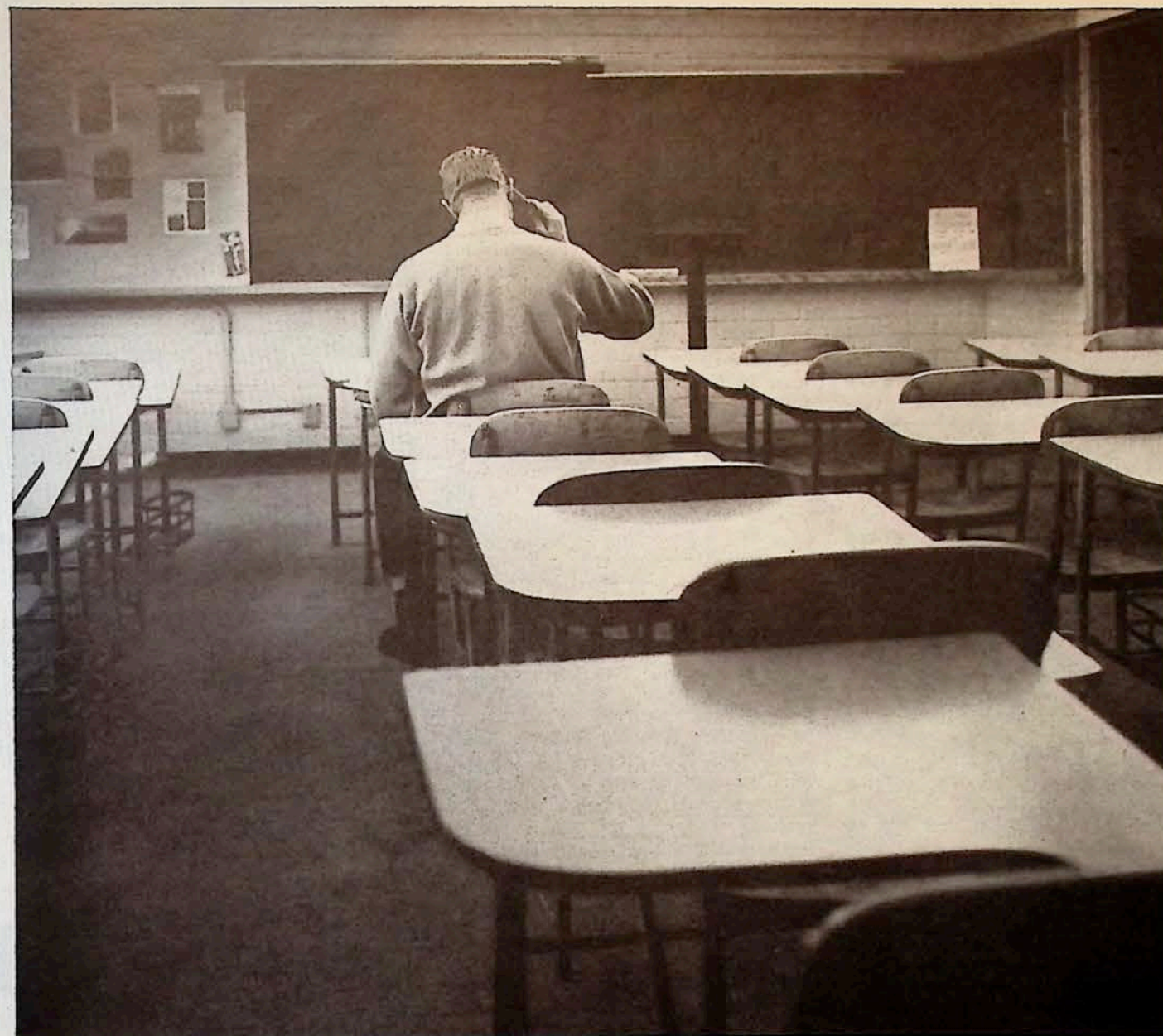
BEST IDEA YET IN PICKUP LUXURY! ALL-NEW RANCHERO BY FORD



Imagine! A pickup that generates all the vibrant excitement of the raciest sports cars. All the performance. All the luxury. That's Ford's all-new Ranchero—longer, lower, livelier for '68! Inside you can have luxury without limit: color-coordinated styling, all-vinyl seat trim, bucket seats, full carpeting, AM/FM stereo radio, SelectAire conditioning. And for spirited going, Ranchero offers Six or V-8 power up to 325 horses. 3- or 4-speed manual transmission or SelectShift Cruise-O-Matic for both manual or automatic operation. Three new models, including a pulse-pounding GT. Ranchero—Ford's bright new idea in pickups. Watch it turn you on!



It's never too late to go back.



If you made the mistake of dropping out of school, think about this. There are plenty of places where you can *go back to school*: adult education classes, trade schools, colleges, correspondence schools — or you can go back to high school.

If you've been thinking about dropping out, *don't*. It's tough to go back. No matter how you do it... *finish*. A diploma is the stuff better jobs are made of. And it's never too *early* to think about a career.

"Your Career in the Retail Automobile Industry" is a booklet we've produced to start you thinking. To get a copy, send us your name, address and "career booklet" on a postcard. See if you'd like to aim for our business. But remember, there are many businesses, many opportunities.

The important thing is to get the right start. And to do that, you need the right finish.



National Automobile Dealers Association

2000 "K" Street, N. W., Washington, D. C. 20006
Official organization of America's franchised new car dealers

Let's assume that your family car, be it a Chevy, VW or Ford, has an engine developing just over 1000 horsepower. Let's assume further that it has 4-wheel drive, and you're crouched behind the wheel, driving it along a rain-slick highway. And assume also, that you want to keep the wheels from spinning so you can maintain control during acceleration. Wouldn't it be just a little bit difficult? It would indeed — yet this is just what many engineers are now trying to achieve, not with your car's engine, but with its brakes.

The job of achieving skid-free braking with modern braking systems is just like that of creating a driveable 1000-hp car. That's about the rate at which a set of today's better brakes can absorb and dissipate energy. And some of our ablest designers and researchers are now trying to find ways to help the driver control this tremendous decelerative power so that the wheels will not break traction with the road surface under severe or emergency conditions. The systems they're working on, known as "anti-skid" or "anti-lock" braking equipment, are so far along in development that they may be available on the next car you buy.

Though anti-lock systems have been in use in various forms for 30 years, they've only been intensively developed for cars in the mid-'60s. Why the sudden enthusiasm? Is it a question of stopping a car in a shorter distance than is possible with the classic locked-wheel panic stop? Partially, but only partially, yes. Researchers in the U.S., Britain and Germany have confirmed that a rubber tire grips the road most tenaciously when it's working hard, being pushed beyond the phase of simple static traction, but not so far that it breaks its "gearing" with the road to begin to slide.

Just how much should the wheel be allowed to slip? Technicians say that the tire will grip best, providing a maximum friction coefficient, when it's in the range of 14 to 22% slip. What this means is that at a car speed where the wheels would normally be turning at 1000 rpm you apply the brakes enough to slow them to between 860 and 780 rpm without slowing them all the way to zero rpm, which is a fully-locked wheel. And then you have to maintain that speed differential all the way down the car speed scale as the vehicle is brought to a stop, using tools, in the form of brake linings and control systems, which are often anything but predictable in their response. It's exceedingly difficult but if it can be achieved it would mean shorter stops, by a small although significant margin.

Of even more concern to car designers is improving stability under heavy braking conditions — exemplified by an "expressway or freeway

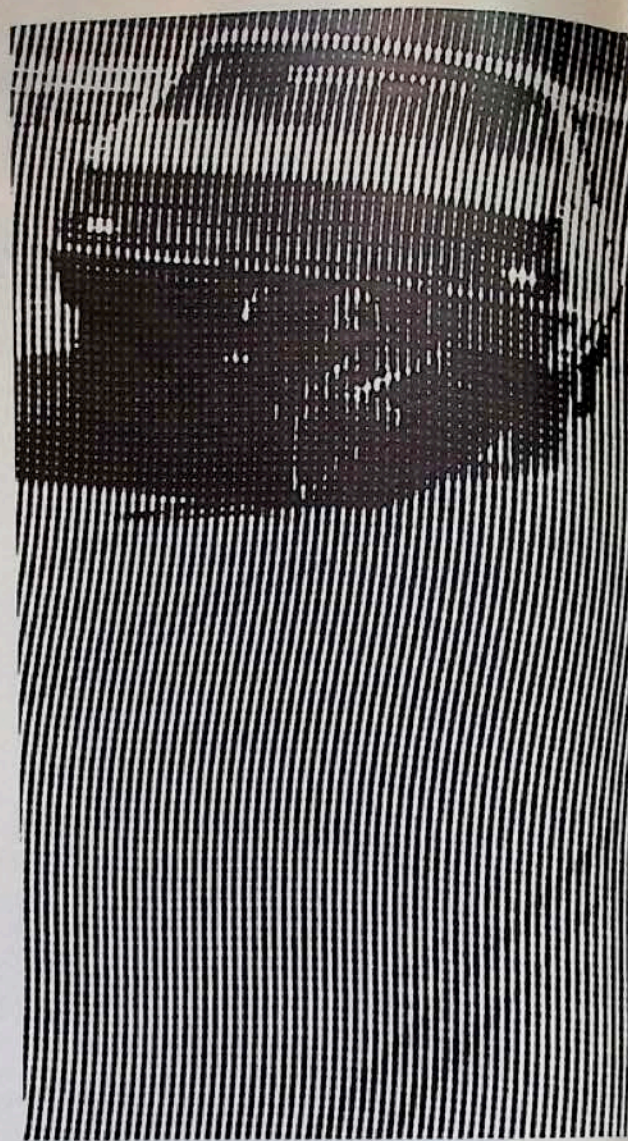
stop," sudden deceleration from 60 or 70 mph in the midst of close-packed traffic. On a freeway a straight stop is often more important than a short one, and a locked wheel is a sure enemy of a straight stop.

Each combination of locked wheels produces a different effect. When the rears lock up while the fronts are still braking, the tail of the car invariably slews around, and after a yaw angle of more than 20 degrees is reached it's almost impossible to regain control. This is the worst condition in close traffic. When the front wheels lock, the car keeps going in the direction it was heading when the brakes were applied. This is a safe situation on a straight road — but not in or approaching a corner. What about a simultaneous four-wheel lockup? Wouldn't the car go straight then also? Theoretically it would, but in practice the wheels don't lock up all at the same time, and there's a small initial angular input that starts the car rotating as it slides.

For braking stability, then, it's best to keep the wheels rolling to avoid lockup. But they can't roll too freely, in the interests of anti-skid, or the braking distances will be increased. Engineers are working on lock-preventing systems because they can produce stops that are both short and controllable. And also because their management has pointed out to them that the U.S. General Services Administration, buyer of cars for the government, is actively interested in buying such systems as soon as they're on the market. Dr. Haddon's National Highway Safety Bureau will also propose an anti-skid vehicle brake standard as soon as several practical and reasonably-priced systems are ready for production. So the anti-skid motivation is economic as well as technical.

All anti-lock braking systems are just that: devices which keep the wheel/brake from locking up after it's shown an inclination to do so. But what about the other approach: that of designing the basic braking system so it's less likely to lock a wheel or wheels in the first place? It turns out that this is an ideal that can be approached but never attained, because road surfaces vary, braking stresses vary, and the amount and location of load carried in the car varies also.

Let's take a brief look at this side of the problem. At rest, a typical car might have 55% of its weight on the front wheels, with only the driver aboard. "All right," you'd say, "the braking system should be laid out so the front wheels do 55% of the work." But that's not right, because there's a transfer of weight forward when the brakes are applied, perhaps to the extent of 75% on the front wheels in a medium-severe stop. "Okay, we'll make



Skid-free Stopping A Reality in '69

Advanced technology, enhanced safety and increased U.S. Government interest account for the intense worldwide activity in systems that will help your car stop quickly without skidding.

by Karl Ludvigsen

it 75% on the front wheels, and only 25% of the braking at the back." That would be great, except when the car was on a slippery surface, or when it had a full load of luggage, the front wheels would lock up very easily, being overbraked in relation to the weight they were carrying. "I see. We compromise with 60% braking on the front, accepting the fact that the rear wheels will tend to lock up on severe dry-road stops." Right. And you'll find that the actual front/rear proportion, when the brakes are being used hard, is even more rearward than 60/40, more like 45/55, because the front brakes fade more rapidly than the rears, doing more of the work. So the tendency toward rear-wheel lockup is even more exaggerated.

Designers today are compromising more and more toward added front-wheel braking, recognizing that front-wheel lockup is a generally safer and more stable condition. And in every major car-making country new designs, especially those with the forward weight bias of front-wheel drive, have valves in the braking system to limit or control the rear braking in proportion to the severity of the stop, the pressure in the brake lines, and/or the height of the rear end of the car, a measure of the amount of weight being carried.

American cars have historically trailed, rather than led, in the adoption of new braking points of view. Even today some American engineers are still defending the point of view that rear-wheel lockup is the safest kind because, they think, you still have some steering control of the front wheels. They fit their products with drum brakes which have a very high self-energizing, self-wrapping effect, a type that will lock up with less provocation than any other known brake. And on top of these duo-servo brakes they fit vacuum boosters which give even the lady of the house enough effective muscle to lock up all four wheels with no more than an impulsive toe-tap. In this context the disc brake has one powerful advantage: it is a far more progressive brake than the duo-servo drum, with no self-energizing effect, and for this reason as well as for its fabled fade-resistance the broader adoption of the disc brake on U.S. cars is praiseworthy.

Worthy of mention, however, is one excellent braking system which makes a silk purse out of the duo-servo sow's ear. It is perhaps the only simple hydraulic drum braking system which can adjust itself effectively to minimize lock and maximize braking under all road conditions. It's an invention of Ferodo of France, known as Self-Stabilizing Brakes in the U.S., where Eaton Yale & Towne is licensed to develop and produce it. Though its front brakes are

nominal duo-servo type, there's a piston at the abutment of each secondary shoe, connected to the hydraulic circuit which applies the rear-wheel brakes — an anti-energizing reverse-duo-servo type. This front/rear interconnection proportions the rear braking to the torque reaction of the front brakes, which in turn is proportional to the friction available at the road surface. In this way an anti-lock capability is provided. And fail-safe qualities are given by two separate circuits to the two front wheels, between which there is also pressure compensation that almost eliminates "pull" to left or right caused by road surface irregularities. The Eaton/Ferodo system is excellent — but in view of the swing to discs, perhaps five years too late on the scene.

The purpose of the foregoing review has been to illustrate the simple fact that there's much that can and should be done to improve the basic braking systems of automobiles before the additional refinement of anti-lock is considered. In other words there's little point in having an anti-lock system busily working to keep the rear wheels rolling if the front wheels aren't performing a powerful braking job at the same time. So let's assume we've solved the basic problems of linings, heat dissipation and force distribution. We now want anti-locking system — and there are many available.

Earlier we noted that the ideal automotive anti-locking system had a very sophisticated task to perform, keeping each individual tire in the 14-22% slip range. When anti-lock devices were first used the objective was simpler: prevent flat-spotting on steel railway wheels. Westinghouse Air Brake developed the mechanical Decelostat for this purpose in the '30s, and later adapted the same system to aircraft.

The motivation for aircraft anti-skid also differed from that for automobiles. Stability per se was less important than coping with the better disc brakes and higher unit loadings that meant that a locked-up wheel on a big plane was followed almost immediately by a burst tire. Work on the problem in the '40s led to the introduction of systems in the early '50s. Electro-mechanical devices were developed by Goodyear in the U.S. ("A.B.C."), Hydro-Aire in the U.S. ("Hytrol") and by Messier in France ("Ministop"). In 1952 Britain's Dunlop unveiled the hydromechanical "Maxaret," which was to set the early standards for genuine anti-skid braking for automobiles. In 1958 the first Maxaret-braked cars were publicly shown; in 1964 the first Maxaret motorcycle arrived — and the anti-skid era was well and truly established.

Many systems are now contending for acceptance in this field. It's possible that the one you'll be able to buy

will employ a combination of the best methods of doing the job. For this reason it may be more useful to look at the two main fundamentals of anti-skid than at the various systems as such. The fundamentals are: first, how the system actually modulates, controls the wheel brake to avoid or release locking, and second, how the system senses locking of the wheel so it knows when to take appropriate action.

The brakes are really controlled, of course, by the driver's foot. In view of this the simplest anti-lock system would be one which would flash a light or sound a buzzer to warn the driver a wheel was about to lock, so he could back off slightly on the pedal! But human reactions in emergencies are not really reliable enough to make this a practical idea, through some kind of signal that the anti-lock system is working might be a useful adjunct to the devices being considered.

Another drawback of the driver-signal scheme is that it would reduce pressure on all four brakes at the same time, even though only one or two might be about to lock. The same disadvantage applies to the layout patented by Italian journalist-engineer Flaviano Moscarini, in which an hydraulic servo changes the mechanical advantage of the linkage connecting the brake pedal to the master cylinder. And the same drawback is also evident in the several systems which control a brake circuit by modifying the effects of its central vacuum-powered booster. (The sounder a car's basic braking system is, in terms of the pressure distribution compromises discussed earlier, the more effective it will be with a single central anti-lock pressure control. The Eaton Self-Stabilizing system, for example, would be ideal for such an application.)

Since 1965 the Marshall Division of Eaton Yale & Towne has been sponsoring research on a system which uses an electrically-controlled butterfly valve to modify the effects of a conventional vacuum booster. Subtraction of the booster's output from the total force being applied to the brake pedal is sufficient pressure relief to provide full anti-lock control on most dry-pavement stops. On wet pavements it has the welcome effect of reducing the locking sensitivity of the brake system, though locking can still be induced by very firm pedal pressure (over 130 pounds) on very wet pavement (friction coefficient of 0.2 or less). To the driver the feel of such a boost over-ride is that of having a very smart helper down there under the floorboards who knows more than he does about smooth, powerful brake control.

The only anti-lock-braked car now on the market, the Jensen FF, uses a further extension of the booster-control idea. A solenoid-controlled shuttle valve

Skid-Free Stopping *continued*

first reduces the vacuum boost to zero, then if needed applies the vacuum to the other side of the booster so that it pushes back against the driver's foot. The Jensen driver can feel this back pressure, pulsing under hard braking at the system's maximum cycling rate of seven brake-releases per second (better than twice as fast as you could "pump" the brakes yourself). If he ignores the pulsing and pushes still harder on the Maxaret-controlled FF system, the driver can nevertheless obtain wheel lock on very wet or icy roads.

The ultimate development of the vacuum control of anti-lock is represented by one of the alternatives developed by the Brake and Steering Division of Bendix. It uses special vacuum-operated brake pressure modulators, one for the front-wheel circuit and one for the rear wheels in a typical installation, controlled by solenoid-operated valves. When they're called into play they're automatically cut off from the foot-powered master cylinder so that they can't be overridden by the driver. At speeds below 5 mph the Bendix system is disengaged entirely to permit normal braking in slow-moving traffic.

In some braking systems the pressure boost comes not from an external

vacuum chamber but from high pressure in the actual fluid that applies the brakes. Perhaps the simplest form of this is the air-pressure brake system widely used for heavy trucks. In 1962 Hydro-Aire offered an anti-lock truck system, and Kelsey-Hayes's Gunite Division has recently announced one, stressing the advantages to truckers of improved tire life and reduced danger of jackknifing.

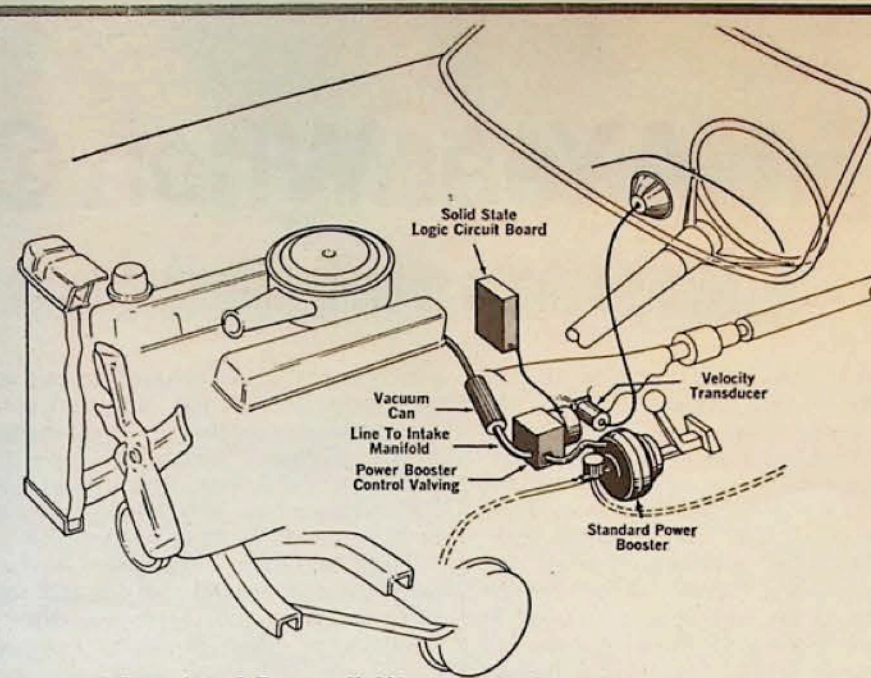
In 1967 the Jacobs Mfg. Co. (Conn.) made its first tests of a truck anti-skid system invented by Francis Stager. Now on the market, for about \$150 per wheel, the Jacobs mechanical unit controls each wheel individually with a pair of air valves. When the brake starts to lock up, one valve closes to shut off its supply of air while the other opens to vent its remaining air to the atmosphere. The brake releases and the valves return to their former positions, then repeat the cycle again if necessary. They can do this up to five times a second.

The same method, the cutoff and venting of fluid, can be used with hydraulics as well as pneumatics. In both cases it has the advantage that the cure is effected as close as possible to the disease, directly at the wheel where the locking problem is. Air is a little easier to vent, of course, since you don't have to worry about where it goes, while fluid has to be

retained and recirculated. This was the principle of the original Maxaret for cars, which had a braking system pressurized at 1700 psi with return lines to the central reservoir.

A pressure-hydraulic braking system with anti-lock was also a feature of General Motors' experimental Firebird III of 1958. It used solenoid valves to cut off and vent pressure at the two-trailing-shoe wheel brakes, which worked at a 1000 psi level. Bendix uses a higher pressure, 1600 psi from a piston-type pump, in its new Full Power Brake System being offered now for both trucks and cars. In its anti-lock application it also uses solenoid valves to change the pressures at the wheels, but it does so in a more graduated, controlled manner than earlier devices, allowing it to approach more closely the ideal of 14-22% slip.

Finally, some systems have been worked out which control, at the wheel, the 700-odd psi pressures your foot generates when you push the brake pedal. This was a feature of Briton Alexander Kerr's 1964 invention, and also of a system shown by British Lockheed in 1962 and tried on a Triumph in the Monte Carlo Rallye in 1963. The Lockheed layout used engine vacuum to operate valves which changed the volume of the hydraulic elements at the wheel, thus reducing pressure without a loss of fluid.



Schematic of Eaton, Yale & Towne anti-skid system showing various components required

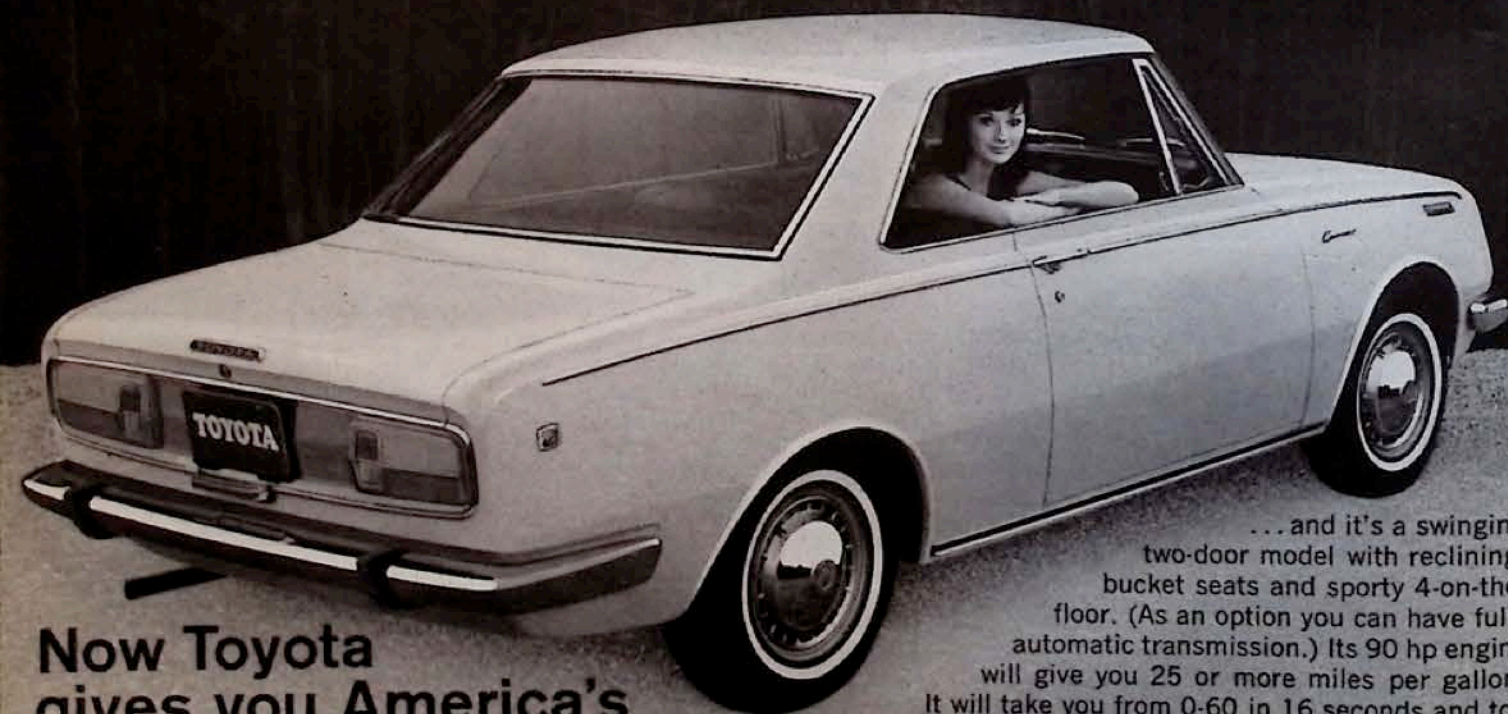
Lockheed's device was for the rear wheels only, as is the latest offering for cars by Kelsey-Hayes. K-H also uses vacuum operation of the wheel valving, triggered by solenoids, requiring a return system for the small amount of fluid drained from the line each time the valves relieve the brake pressure. An enclosed pressure-return

circuit, complete within the foot-powered hydraulic section, is a feature of the layout devised by Teldix GmbH of Heidelberg, Germany, a firm jointly owned by Bendix and Telefunken. Formed in the late '50s to do joint research on gyros and missile controls, Teldix has also turned its attention to the brake locking problem.

The Teldix system uses quick-response solenoid valves to control directly the inlet and exhaust pressures at each wheel brake cylinder. The fluid exhausted from each cylinder is returned to the upstream side of the brake by a central pump driven by an electric motor, which thus maintains system volume and brake pedal height. The valving system of the Teldix gives it one of the fastest response and cycling abilities of all the anti-lock systems. Engineers point out, however, that there's little point in cycling rates much faster than 8-9 cycles per second, since in the 11-12 cps range the oscillations start to have an unpleasant effect on the car's movement on its suspension.

Speed of control response is of no value to an anti-lock system if it's not also blessed with sensors which can detect wheel lockup as early as possible and issue the appropriate commands rapidly to the pressure controls. The sensing of lockup is a sophisticated proposition, especially when designers want to avoid complete lockup and keep the wheel in the 1/8-slip region. It involves the detection of a change in wheel speed, or a change in wheel deceleration, or a buildup of wheel reaction forces, that's more rapid than occurs with normal vehicle braking.

Sudden increases in suspension
continued on page 76



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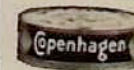
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1969: A Year When Changes Might Mean Improvement

Styling remains virtually untouched on most cars, but attention to details and engineering gives automotive evolution a big jump ahead.

By Robert W. Irvin

From one extreme to the other. That's where the American auto companies will be going in the next year as they restyle old car lines and develop new ones. These will be the models that will carry them into the early 1970s—a time when the auto market is expected to reach a new plateau of 10 million sales a year.

The first part of a 1-2 punch will be seen this fall when Detroit introduces completely restyled full-size cars. These 1969 models will provide the basic body shell for the '70 and '71 standard cars. Since the rise of the compact car 10 years ago, the full-size models have taken an ever smaller percentage of total sales. The increased popularity of the intermediates and the specialty or sporty cars further splintered the market. They also cannibalized the full-size car, with less than half of the

cars sold now being standard models. But they should pick up steam in 1969 with fresh styling.

At the other extreme in the marketplace are the small cars. Most imports fall into this category. Their sales are at record levels and will easily top 800,000 this year. Volkswagen itself will sell more than 500,000. Detroit, which countered the first import invasion in the late 1950s with the compacts, can no longer ignore the second foreign car assault. So next year, probably in late spring or early summer, you will see the first of the domestic small cars in dealer showrooms.

First off the line will probably be a Ford. The car may be introduced as a 1970 model, much like the Mustang, which came out in the spring of 1964 and was called a 1965 model. General Motors is also said to be working on a

subcompact, but is believed to be lagging behind Ford and may trail with the car by six months to a year. Shades of the Camaro, Chevelle, Chevy II, Riviera... interesting, isn't it, that GM has innovated in engineering but not in basic products in recent years?

To give credit, however, GM has been the styling leader of the industry in recent years and shows no signs of surrendering that position. For example, in 1969 some competitive car lines are going to have the concealed windshield wipers which GM pioneered a couple of years ago.

Generally, the styling of next year's cars will be what the industry likes to call evolutionary. Translated, this means that on cars where long hoods are popular, they will be longer next year, with the Mustang a case in point. Where pointed grilles are popular,

such as at Pontiac, they will be even more pointed in 1969. "Evolutionary" also means copying what the other fellow has. Thus, more cars will have wrap-around bumpers, something Pontiac popularized. More cars will also have rear end spoilers.

Also, the sides of the 1969 cars will be rounder, although in the case of GM it may be just in one's imagination. The curvature of the side window glass will be greater at Ford and Chrysler next year, but GM is staying with its present partially-rounded glass. GM will make up for it, though, by side sculpturing that will make the cars seem more torpedo shaped than they actually are. In most cases, GM is staying with the present rooflines, too, while Chrysler and Ford are changing some of theirs.

One styling theme that was popular

a few years ago will finally disappear from the last of the American cars next year. These are vertical headlights, another Pontiac gimmick that swept across the industry. Two years ago, Pontiac went back to horizontal headlights on the Grand Prix and this past year most other cars returned to this approach.

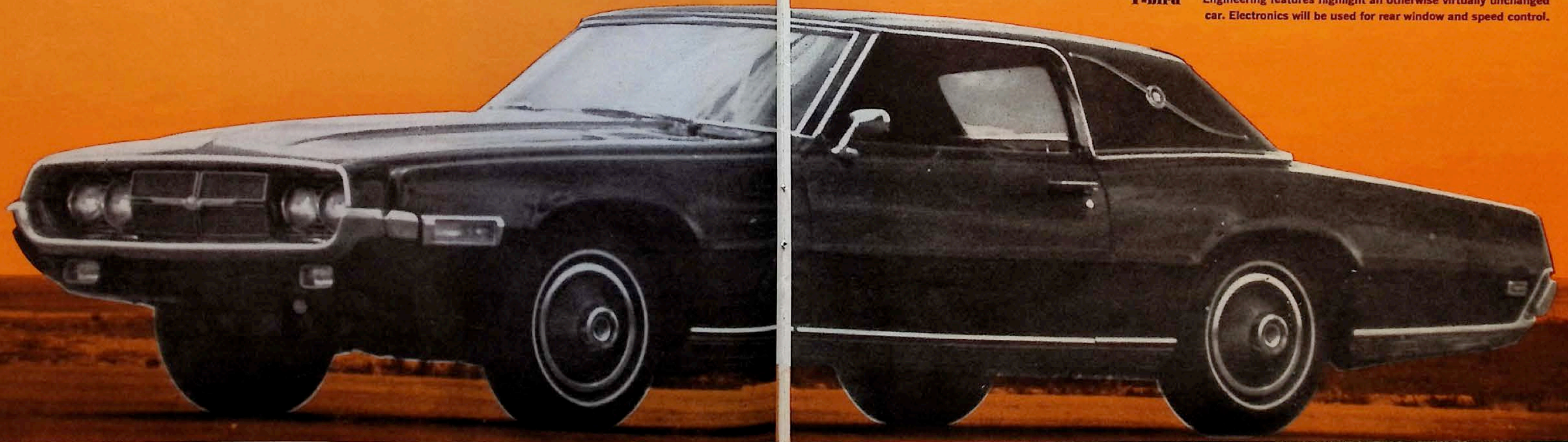
Another styling theme that is really a throw-back to pre-World War II cars is the ventless side window. Appearing first on specialty cars and then on 2-door hardtops in recent years, ventless side windows will probably be quite commonplace on all full-size cars made by the Big 3, while more middle-size cars will also have them.

The intermediate cars, which were brand new for 1968, will only get face-lifts next year. Also compacts, many being a year away from a major change.

The full-size cars aren't the only ones getting new body shells next year. Many of the specialty cars will also have major styling changes in 1969.

Most notable will be the Mustang and the Grand Prix, but the Cougar, Camaro and Firebird also will have new sheetmetal. However, their styling is more conventional than that of the Mustang and G.P.

There will be lots of competition among the companies next year for innovations. For example, you will see the first car with a concealed radio antenna. There will also be a station wagon tailgate that can be opened with the window up, like a door. Two cars will have electric wires in the rear window to serve as a defroster-defogging system. In addition, at least two cars will offer an anti-locking brake system, electronically-controlled. This is some-

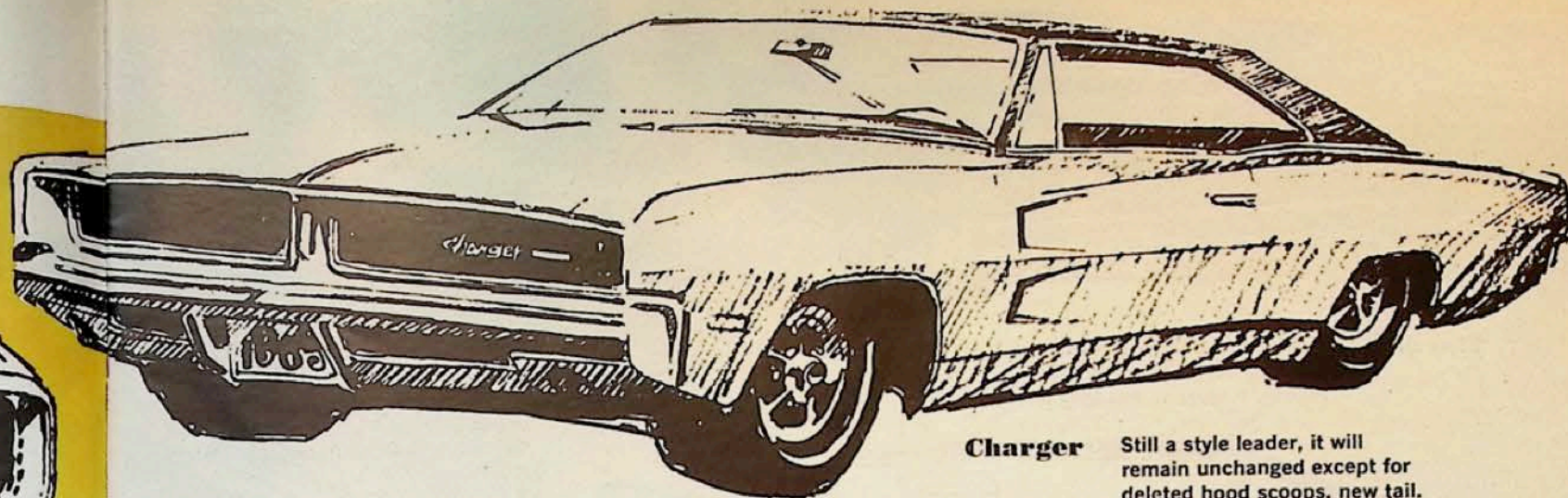


T-bird Engineering features highlight an otherwise virtually unchanged car. Electronics will be used for rear window and speed control.

1969:



Chevy One of the few with a major body change. Front and back will have much smoother lines.



Charger Still a style leader, it will remain unchanged except for deleted hood scoops, new tail.

Illustrations by Alexander Kerr

thing that's long been talked about and is bound to be regarded by Washington (and by us at Motor Trend) as an important safety feature. The pressure will be on to put the anti-skid system on all cars, although any requirement of this sort is a couple of years away.

Some things will be on next year's cars at Washington's say-so. All 1969 cars must have head restraints after Jan. 1. In most cases, these will be modified versions of the present add-on, optional equipment headrests. They probably won't be as attractive as the current ones because, as one auto official said, "we're going to take all the cost out of them we can." A few cars will have high-backed seats which will meet the head restraint requirement. It's an interesting point to recall that the Volkswagen, object of some attacks in recent years from safety critics, had built-in headrests as standard equipment this year. The reason is that Washington at one time was going to require them on all 1968 cars, then backed off when Detroit said it didn't have the production capacity. It gave Detroit a 1-year delay in the standard.

Both GM and Ford will have safety features not yet required by the government. GM's full-size cars will apparently have a built-in crash guard on the side—sort of a concealed bumper—designed to protect car occupants from intersection accidents. Ford is also supposed to have a collapsible front end on its full-size cars, similar to the energy-absorbing design developed for its intermediate cars in 1968. The "controlled crush" design helps

absorb the energy of an accident, thus making the impact easier for occupants wearing seat belts. It doesn't work if people *don't* use their belts. Neither the collapsible front end nor the hidden side bumpers is required by the government, although both have been discussed as possible future standards.

Manufacturers will continue to try different materials. Ford and Pontiac, for example, have started taping some decorative items on cars instead of using metal fasteners. There will be more plastic grilles and injection-molded plastic instrument panels. Alcoa still predicts a sizeable increase in the use of aluminum and insists the future is bright for aluminum radiators. Competitors are still trying to match the Pontiac GTO's ingenious rubber bumper pioneered in 1968, but it is questionable if they will have versions of their own for at least another year. One change you won't be able to see will be in the fuel tank. Some companies are working on plastic gas tanks, at least for station wagon models. By molding them to fit the underbody, it's thought this will provide more cargo or passenger space.

To guard against car theft, General Motors will install special locks on all its cars. The system will lock the steering column, transmission and ignition mechanism. This will be required by the government in 1970 but it appears that GM will have it a year early. Chrysler is said to be considering a pop-out key. When you turn off the engine, the key would pop out of the ignition. This would, presumably, elim-

inate a major cause of auto theft. Federal officials figure more than half of all cars stolen had the key left in the ignition by a careless driver.

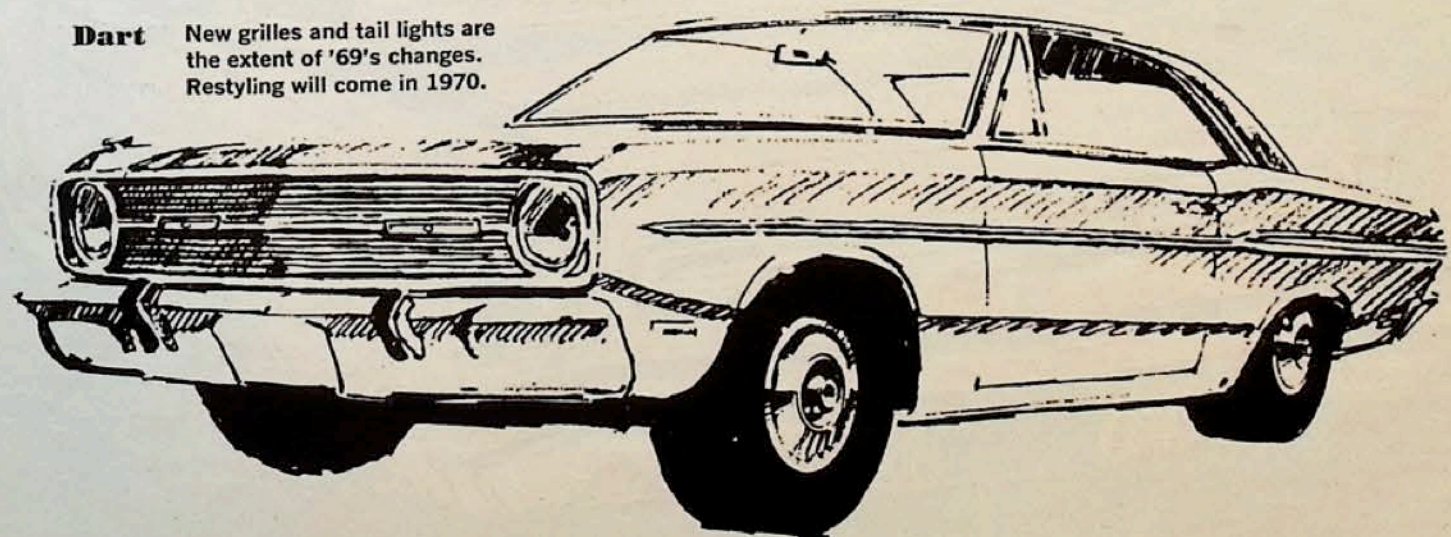
The tab for all these changes is a big one. It's been estimated at \$1 billion. This is in line with what's been spent in other years. But other costs aren't. Material and labor costs have gone up sharply in the past year. Thus, it's considered certain there will be a price increase of at least \$100 when the 1969 models are introduced. And, if manufacturers wait until Jan. 1 to install head restraints, there could well be a second price increase then. This is what happened in the 1968 model run. Base prices last fall went up an average of \$115. Then, another \$23 was added Jan. 1 when shoulder belts became standard equipment under a government order. Some auto executives actually wanted the second boost to be in the neighborhood of \$60 but were pressured out of it by Washington.

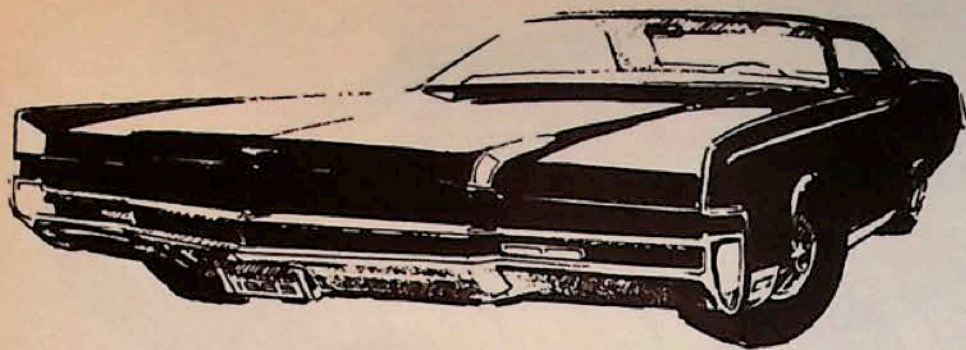
There could also be a hidden price increase in the fall. The manufacturers are thinking of further restricting their new car warranties. This would mean a buyer would be getting less in the way of a guarantee, or less for his money. On the other hand, some buyers probably won't figure they're losing much, since there was so much red tape in the warranty program that getting satisfaction was sometimes impossible. There have been so many complaints, as a matter of fact, that the Federal Trade Commission launched an investigation and two bills were introduced in Congress to put the new



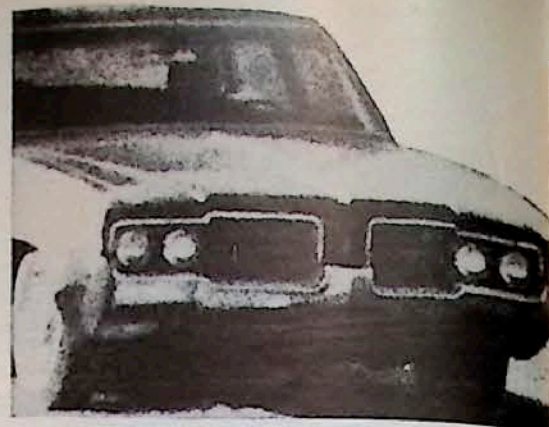
Cadillac It looks as though Cad's fin phase is returning. Also, headlights will be horizontal

Dart New grilles and tail lights are the extent of '69's changes. Restyling will come in 1970.

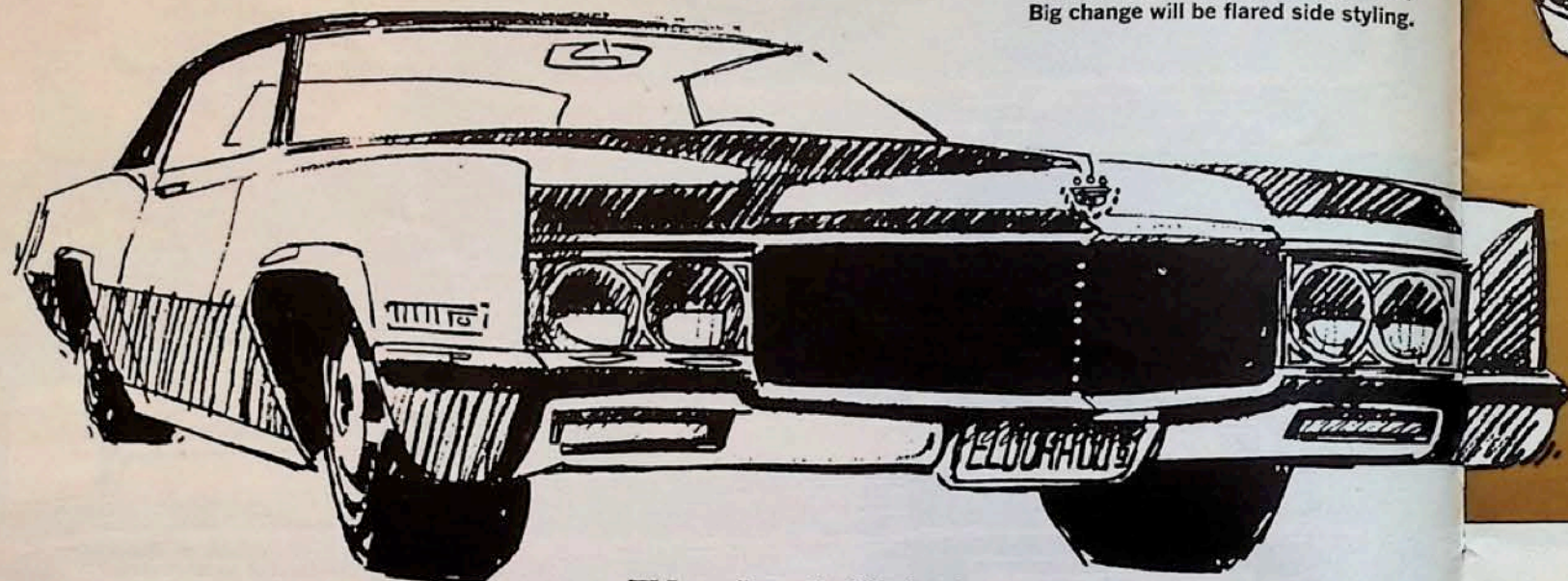




Marquis Everyone will call Mercury's new luxury-specialty car a "Baby Lincoln," with good reason. It looks it, has long wheelbase.

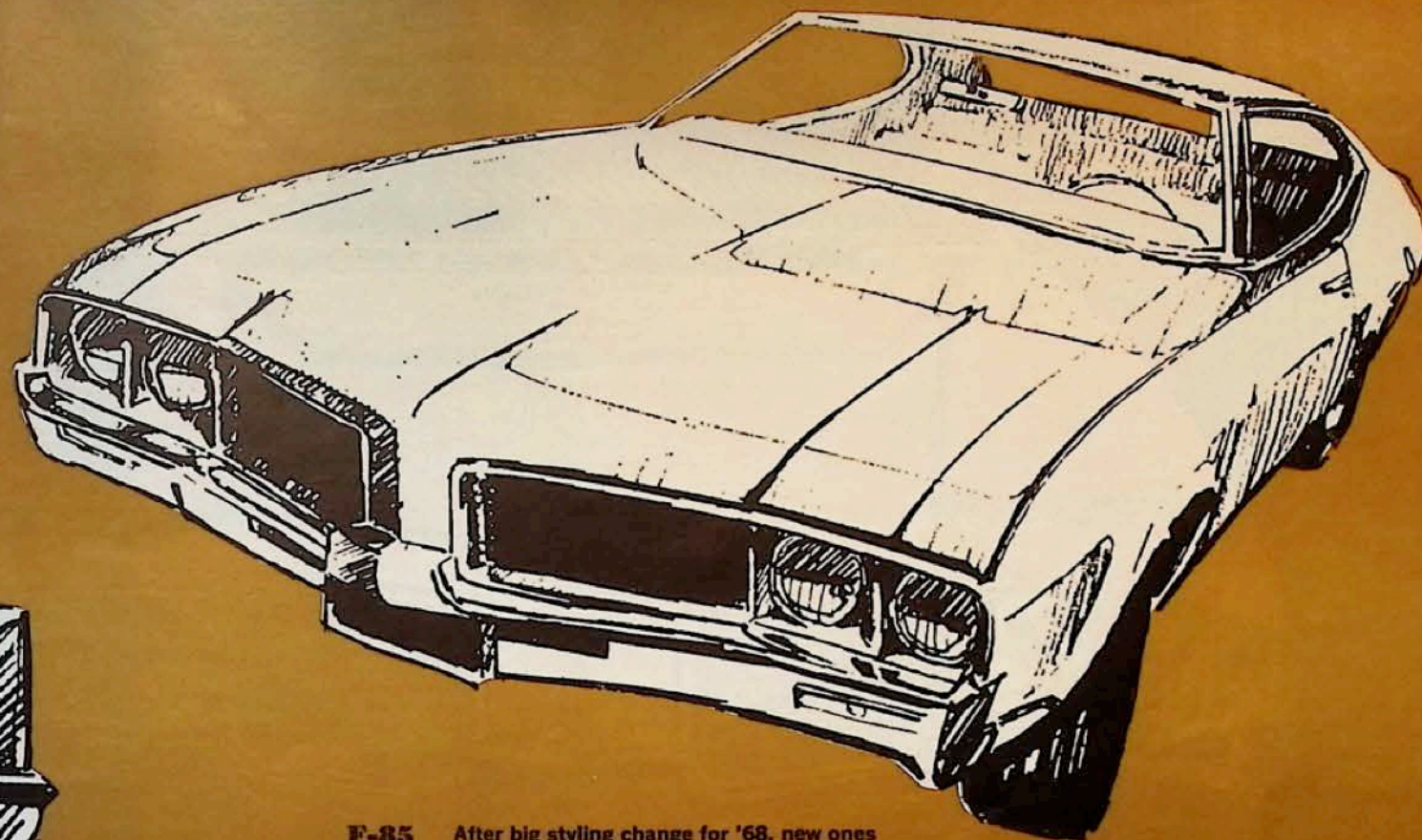
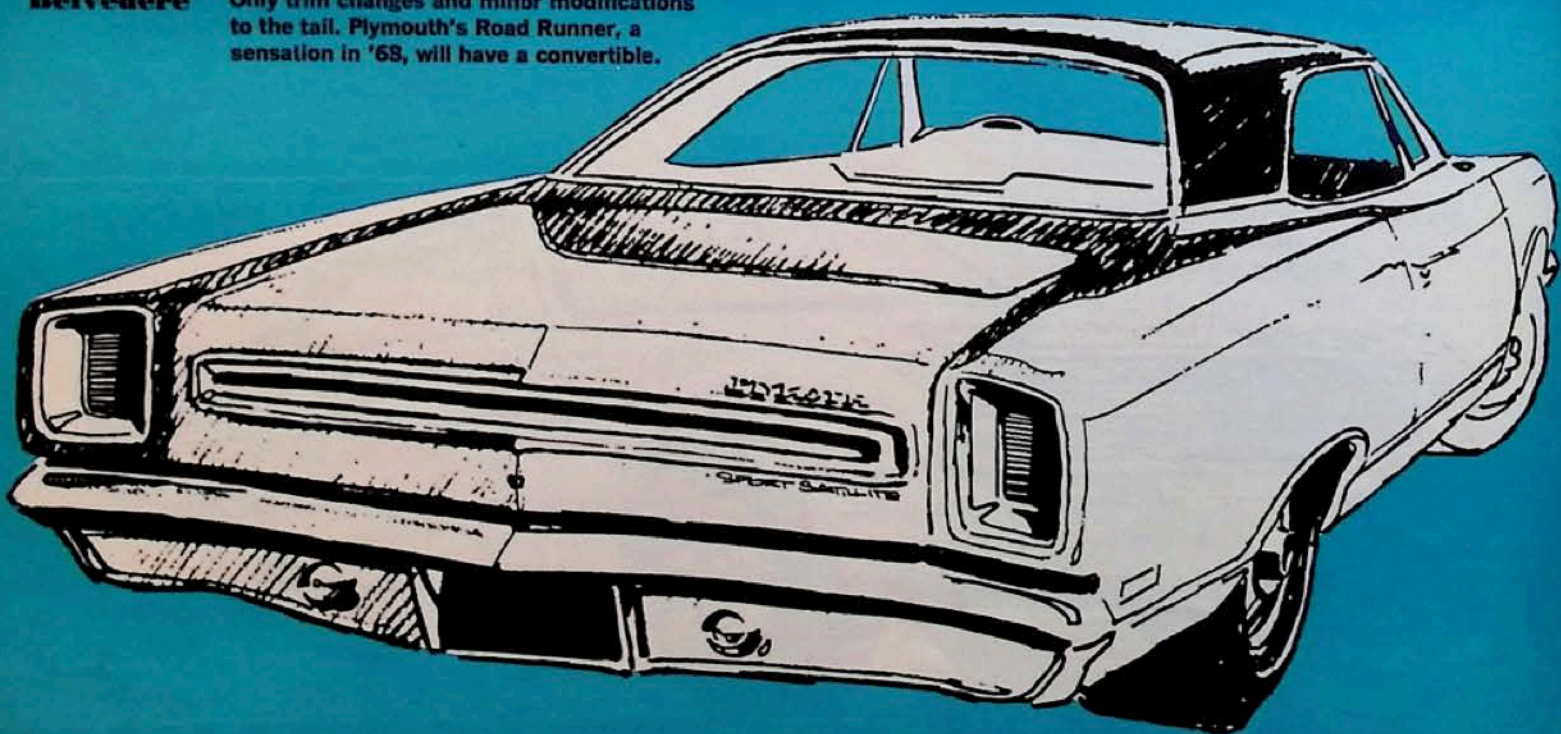


Delmont Though front has changed little, there will be all-new bodies for larger Olds. Big change will be flared side styling.



Eldorado It's difficult to improve on something so handsome, so changes are being restricted to minor ones both front and rear.

Belvedere Only trim changes and minor modifications to the tail. Plymouth's Road Runner, a sensation in '68, will have a convertible.



F-35 After big styling change for '68, new ones are confined to the grille. Best news is new 3-speed automatic, shared with siblings.

1969:

car warranty program under federal control.

Most of the cars will be introduced in late September or early October. In some cases, the 1969s may come out a week later than their 1968 counterparts. This is largely due to a tool and die makers' strike last winter which held up some of the 1969 tooling.

Here is what to expect in 1969 on a car-by-car basis, along with hints of what will be coming in 1970-71-72:

AMERICAN MOTORS

Javelin-AMX—Few changes in these American Motors sports models.

Ambassador—The top car in the American Motors line will have its wheelbase stretched about four inches, from 118 to 122. This will add some interior room. The car has received extensive front end sheetmetal changes, including grille, bumpers and hood. Vertical headlights are discontinued with new dual horizontal headlights hidden from the side by the front fender extension. They are connected by a horizontal bar which divides the upper and lower portions of the grille. Large parking lights are in the bumper.

The car also gets new tail lamps. Side vent windows have been dropped in favor of the cleaner looking (but less practical?) ventless type.

American—This AMC compact is also scheduled for restyling in 1970, hence little will be done next year. There will be only minimal changes in ornamentation.

Rebel—The middle-sized AMC car will go back to using horizontal headlights. The Rebel will not have much new sheetmetal, but a slightly changed grille gives it a fresh appearance.

CHRYSLER CORPORATION

Chrysler-Dodge-Plymouth—The full-size MoPars will have more round side window glass. The cars are also slated to have concealed windshield wipers. But, they keep the unitized underbody from the 1968 line. There had been speculation that the wheelbase on the Plymouth might be increased slightly, but latest word is that it will remain at 119 inches. The overall length of the Chrysler, however, is supposed to be up 5 inches.

Barracuda—There will be some sheetmetal changes but Plymouth fans will have to wait until 1970 for all-new styling of its favorite sporty car. Chrysler has done poorly in this segment of the market and one explanation is that

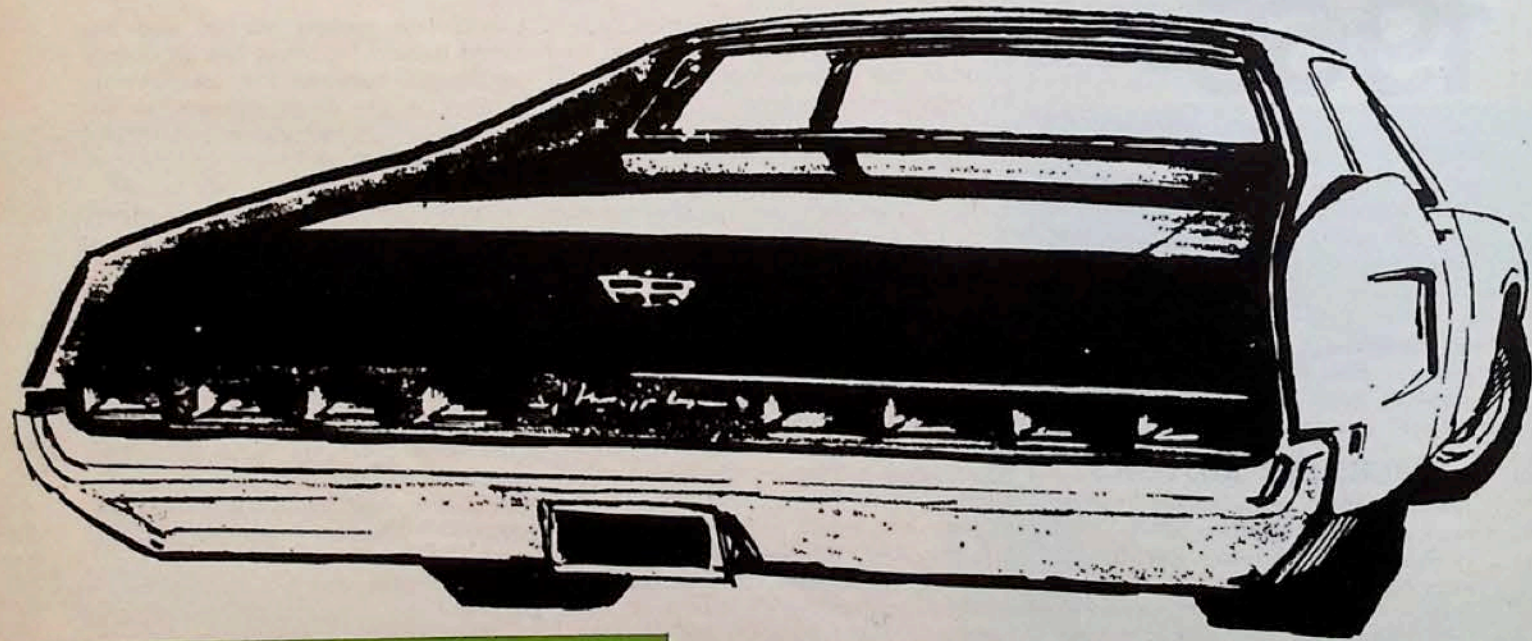
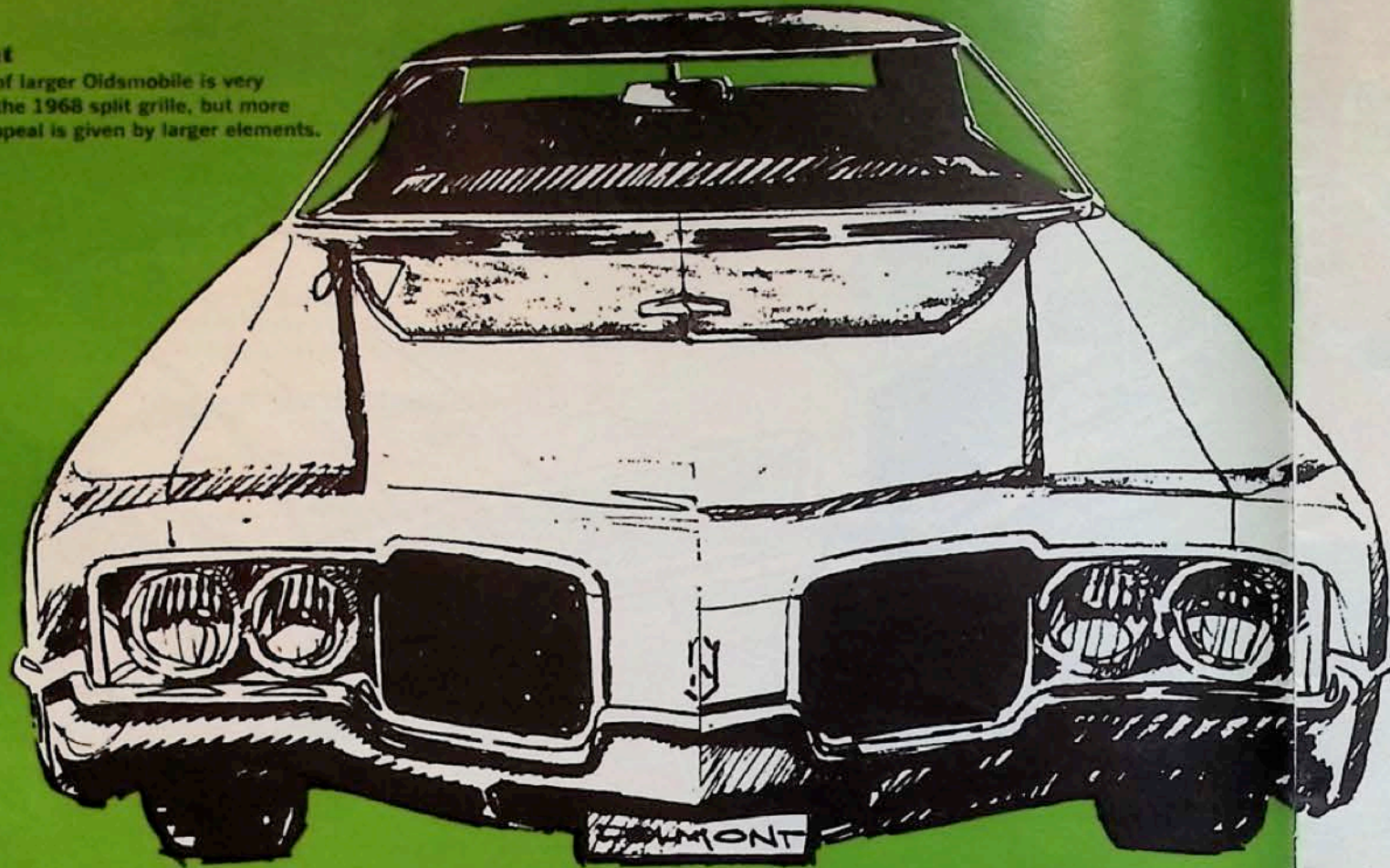
it was late getting started and has stayed behind by being late in changing designs to meet the competition. Another is the price differential between the Plymouth Road Runner and Barracuda Formula, being in favor of the former.

Coronet-Satellite—The Belvedere/Satellite keeps a narrow grille. A single horizontal bar separates the two pairs of headlights which are recessed in rectangular cases. The rectangular tail lights are also recessed in a rectangular frame. A wide but narrow trim bar decorates the trunk lid. The Coronet has a squared-off tail section. There are three rectangular tail lights, wide but narrow. Plymouth will add a convertible to the Road Runner series, which acquired a hardtop version earlier this year. The Dodge version of this car, the Super Bee, was introduced during the 1968 run as a coupe. It will add hardtop and convertible models for 1969.

Charger—This car, a real winner for Dodge as a newly restyled 1968 model, will get only minor changes for 1969. The grille looks almost identical to this year, with the exception of a thin vertical bar in the center. The scoops are taken out of the hood. The twin sets of bullet-shaped rear lights have been replaced by long, narrow, concave lights

Delmont

Front end of larger Oldsmobile is very much like the 1968 split grille, but more massive appeal is given by larger elements.



Marauder Mercury's new specialty item shows distinct influence from Charger's popularity. Roof will be swept back. Rear quarter has scoops.

Charger Charger started something in styling, but for the time being it will rest on its laurels with a design that's still fresh.



1969:

which almost meet in the center. There is a strong indication that Dodge will have its own small sporty car in 1970 built from the same new body shell as the Barracuda.

Imperial—Wheelbase on the Imperial is cut three inches, from 127 to 124. This puts it on the Chrysler wheelbase, a decision apparently made for cost reasons because the Imperial has not sold well in recent years. Like the other big Chrysler Corp. cars, the Imperial has a more rounded appearance. It also has a softer angle to the rear window. The convertible model may be discontinued.

Valiant-Dart—Both Chrysler compacts get new grilles and tail lights while awaiting a major change in 1970. Both cars have plain grilles with narrow horizontal fins and parking lights set inboard of the headlights. The tail lights on the Dart are rectangular, split by a thin horizontal bar.

FORD MOTOR CO.

Mustang—The 1969 Mustang is reportedly all-new, but retains the basic styling features that made it the auto industry's most successful new car four years ago and the one that started the sporty car revolution. All models are said to be four inches longer (mainly in the front), and in the case of the fastback, lower. Those who have seen it say the grille is familiar but two more headlights have been added to the rectangular portion of it, where special lights were added formerly on some custom versions of the Mustang. The rear lights are still in vertical clusters of three but are set out from the tail, which is concave shaped. The recessed side sculpturing is gone in 1969.

The car will come in three basic body styles—convertible, hardtop and fastback, but at least five models will be offered. Two new models are tentatively sporting names of Mach 1 (after the successful Mach 1 show car) and Grandé (after "grand"?). The Mach 1, as its name implies, will be the high-performance version and appears to have out-Shelbyized the Shelby Cobra, from simulated air scoops on the rear quarter panels, a rear spoiler, and a functional air scoop on the hood. The thing on the hood is being referred to as "The Shaker" by some Ford engineers. It's part of the engine air cleaner, sticks up through a hole in the hood and thus will vibrate when the powerplant is running. The engine for this hot package will probably be the new 428-cu.-in. Cobra Jet introduced this spring after a successful tryout in the NHRA Winternationals. Some models running around the country sport racing lock pins on the hood, a pop-up gas cap and bullet-shaped side view mirrors. Undoubtedly, such a car would have the handling package to go with the performance, and it's a good guess that the new limited-slip differential we've been hearing about is designed more for traction on the race track than in ice, mud or snow.

For the sport who wants a Lincolnized Mustang, there's the Grandé. This model appears to be a luxury version of the hardtop model with special upholstery, simulated wood-grain paneling, etc. There is more interior room in all models.

There's a unique rear quarter window on the fastback which can be pushed out for ventilation—as on some Chrysler intermediates this year—or rolled down as with an ordinary window.

Fairlane-Montego—These cars were new for 1968 and thus will undoubtedly get only minor front and rear end styl-

ing changes next year. There is a new roofline on the 2-door hardtops with a formal look to it. The Cyclone will have ornamentation changes. Ford's present 200-cu.-in 6-cylinder engine is being increased to 250 inches, standard on the Fairlane.

Ford—The wheelbase on the full-size Ford will be lengthened at least two inches, from 119 to 121. With a new body shell, the sides will be more rounded with greater side glass curvature. There's a pronounced V-shape in the center of the grille with a horizontal bar stretching across the grille and a center section made up of thin horizontal fins. On either side, the grille has a crosshatch design. Side vent windows have been discontinued. The instrument panel is similar to the cockpit approach of the Grand Prix with all instruments facing and clustered around the driver. The station wagon tailgate still has a dual-action design, but now it can be opened with the window up when being operated as a door. There'll be more room in the rear because of a plastic fuel tank molded to fit previously wasted space underneath the car.

Falcon—This Ford car will get only minor changes for 1969 and its future is clouded in mystery after that. Ford is working on a smaller car, one designed to be better able to compete with the imports. There's speculation the new car, being developed under the code name Delta, may serve as a replacement for the Falcon. If it is produced—don't forget the Cardinal project was killed as a U.S. car at almost the last minute—the Delta will appear in May or June of next year, probably as a 1969½ or an early 1970 model. Rumor has it the car will be built on a 104-inch wheelbase and will be 176 inches long. It would be only a few inches narrower and lower than the Falcon, lending credence to the belief

LTD

Body shell remains the same, but overall styling has been upgraded considerably by refined grille and smoother rear end.



1969:

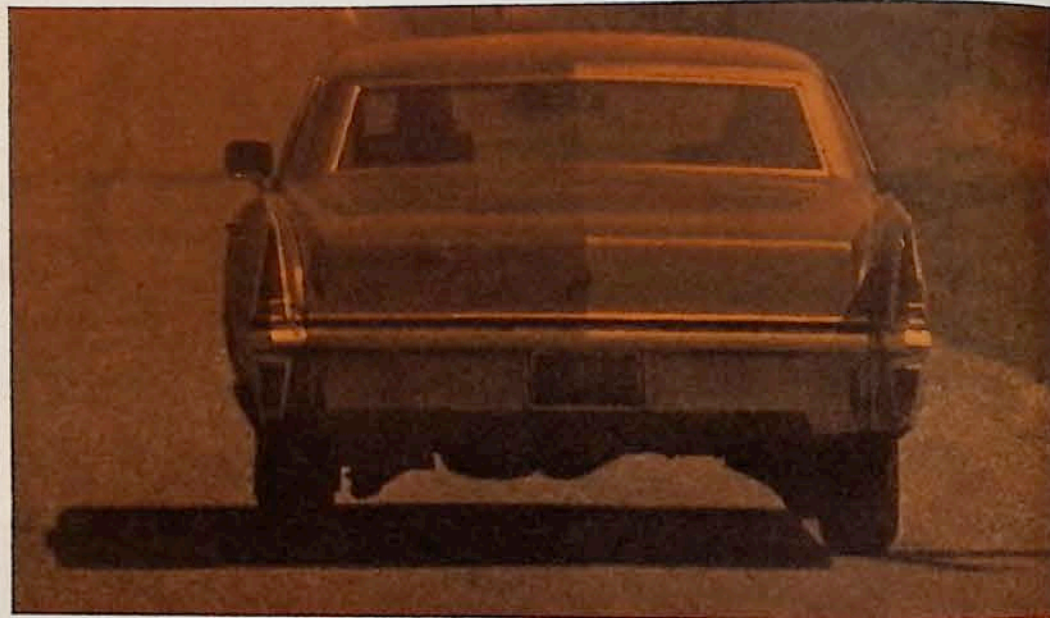
that it would use a lot of common parts. Word is that Ford is trying to come in about \$200 to \$300 below the Chevy II, which sells for a little over \$2200. This would give Ford a domestic car in the under-\$2000 category—but just under. GM is also supposed to be working on a small car—but aiming it at the Volkswagen price range of about \$1700.

Cougar—Only two years old, the Cougar, like the Mustang, will be longer, wider and virtually completely restyled. Due to popular demand, as the saying goes, there will be a convertible. Grille and rear end treatment are entirely new, looking more like a Falcon than the current Cougar and not having the similarity between front and rear. There is a slight side sculpturing, vaguely reminiscent of current Buicks, but without the heavy chrome that characterizes them. Lincoln-Mercury will apparently also be offering a performance version with racing hood locks, etc. Inside, the rear seats are rounded like the T-bird's.

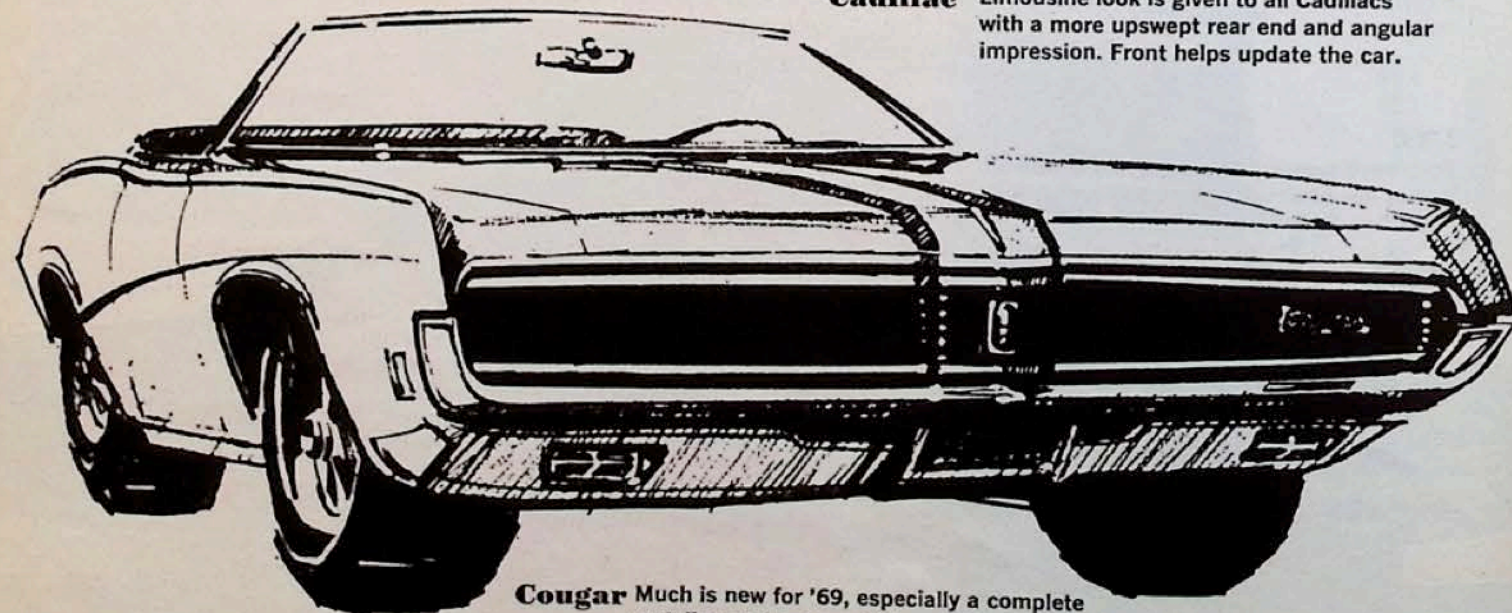
Mercury—The Mercury will be further upgraded in 1969 with the full-size Merc coming in two sizes. There will be a 121-inch wheelbase model, a new size—same as the '69 Ford and right on the 1968 Catalina. A new model, called Marauder, a 2-door hardtop in this size, has a swept-back roof, even more pronounced than the present Charger. The Marauder has scoops in

the rear quarter panel and two sets of three rectangular tail lights. A new 351-inch V-8 will be standard.

The present 123-inch wheelbase is dropped in favor of a 124-inch WB for a new line of cars—the Marquis. The Marquis is presently sold only as a 2-door hardtop. Four inches longer overall than the current Park Lane Mercury, the Marquis represents Mercury's attempt to crack the upper medium price market dominated by the Olds 98 and Buick Electra—and the Bonneville. The Marquis styling has a strong Lincoln Continental flavor, but is clearly a separate line of cars. It has a narrow, full-width grille with horizontal bars and concealed headlights. It will have full-width concave tail lights. It's richly styled inside, with a full-wood-grain interior. There will be a complete line of Marquis models, including a station wagon.



Cadillac Limousine look is given to all Cadillacs with a more upswept rear end and angular impression. Front helps update the car.



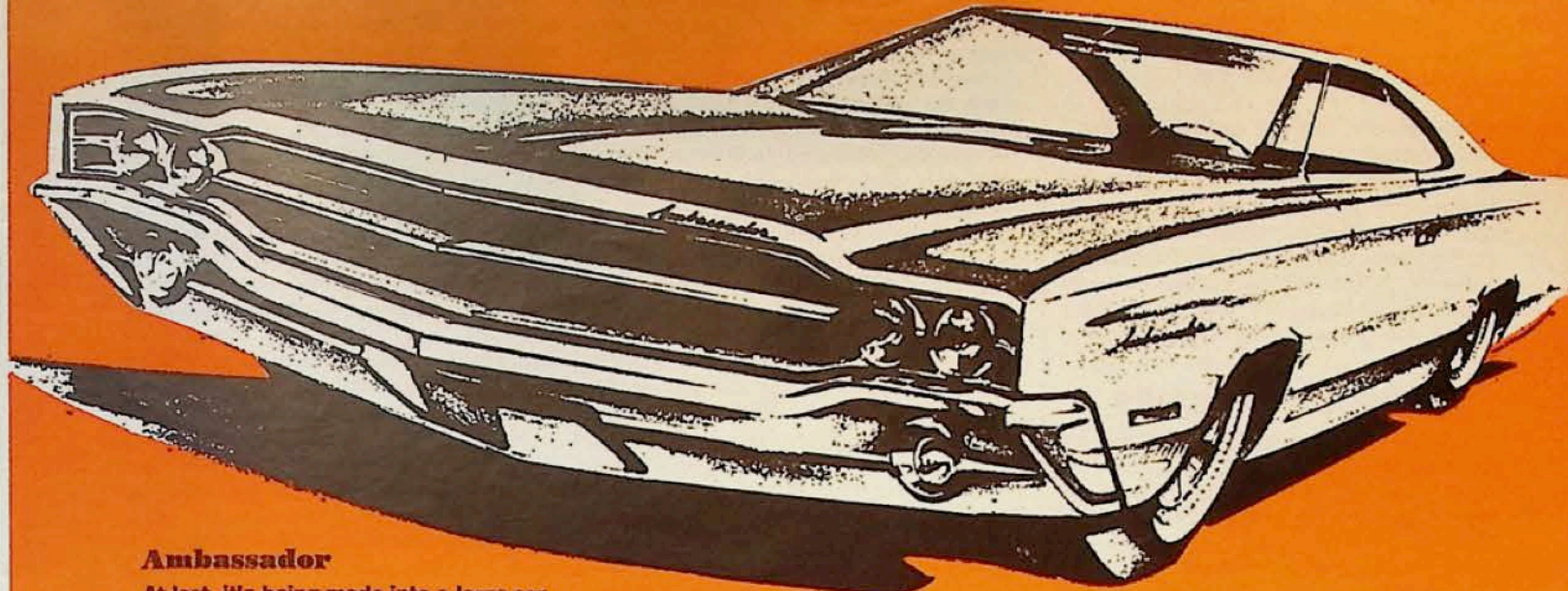
Cougar Much is new for '69, especially a complete restyling and a convertible model. Side treatment reflects sculpturing trend.

Thunderbird—There will be only minor styling changes in the grille and tail lights for 1969, with an all-new car in the works for 1970. Trade sources say that much of the original 1970 design was scrapped on Bunkie Knudsen's orders and a crash program started four or five months ago to redo the car.

Ford will, consequently, stress engineering features for 1969. One will be the electrified rear window. Another will be an electronic speedometer and speed control system. It is strongly rumored that the electronic anti-lock brakes, developed by Kelsey-Hayes, will be available on the Thunderbird for '69.

Mark III—The new Continental will be unchanged, as stated when the car was introduced in February (March, '67 MT).

Lincoln—The grille is square-shaped



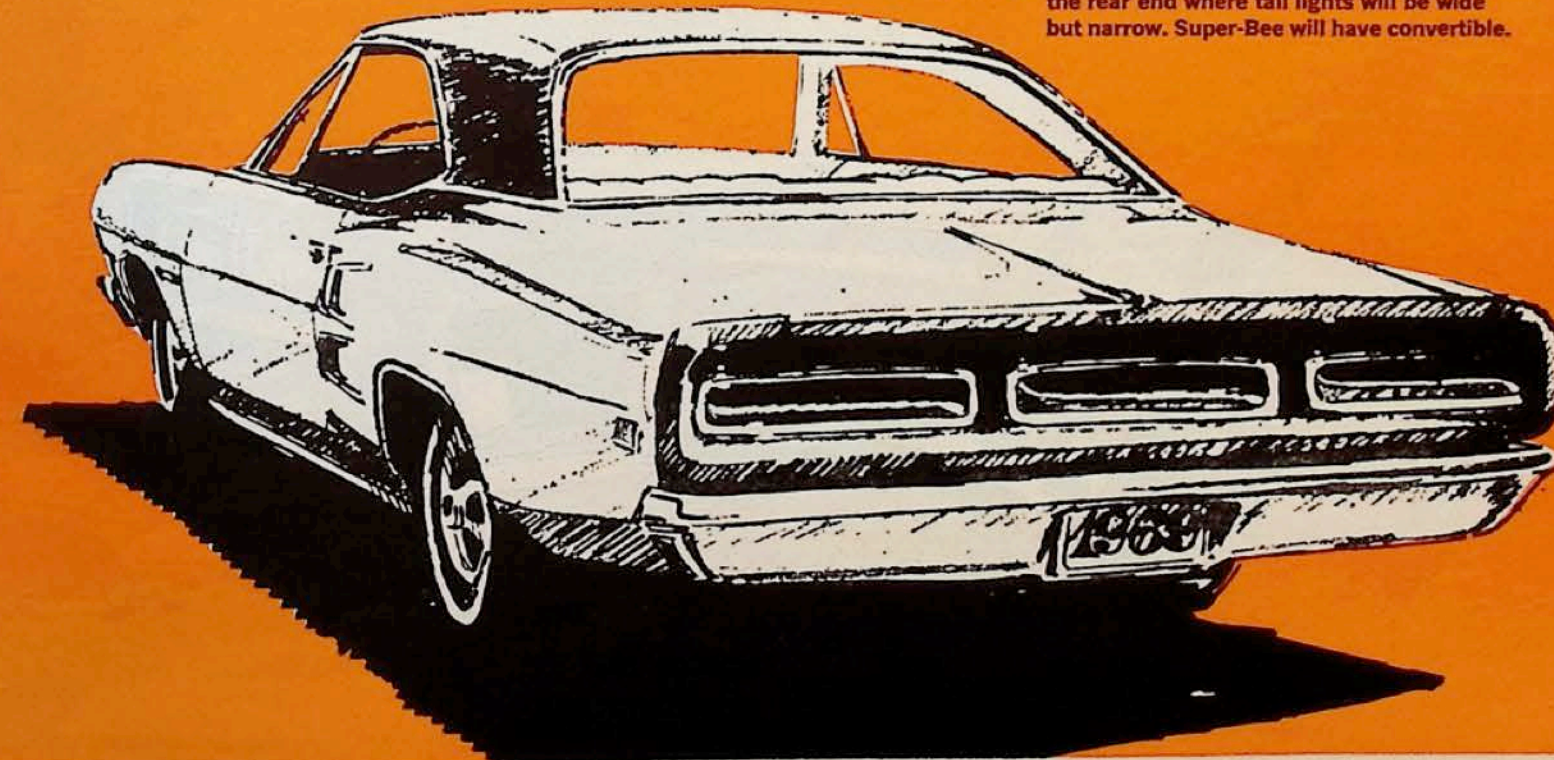
Ambassador

At last, it's being made into a large car. Wheelbase is 4 inches longer and interior is larger. Joins horizontal headlight trend.



Torino Virtually no change except hood scoop.

Coronet Biggest change is in styling, especially the rear end where tail lights will be wide but narrow. Super-Bee will have convertible.



1969:

in the center, like the new Continental Mark III and features a checkerboard design, with horizontal headlights. Tail lights are full width, located beneath the bumper. Backup lights are mounted in the back of the fenders, visible from the side. A full-burled interior denotes the tasteful luxury of the car. What's more, the trunk is even said to have carpeting.

GENERAL MOTORS

Camaro-Firebird—The Chevy and Pontiac sporty cars will have new exterior sheetmetal on a carryover body shell. They may be a few inches longer. The Firebird may be the first car to have rubber bumpers both front and rear. It is said that the Firebird will have a wrap-around, ellipse-shaped, front rubber bumper. Inside the bumper will be dual horizontal headlights, with the individual lights spaced well apart as on the G.P. Between the two sets of lights will be a square-shaped metal band with a vertical bar in the center. The grille work is recessed. It will have

a distinct family resemblance to the G.P. grille. While there obviously are some distinctive changes on the Firebird and Camaro for 1969, the two cars won't be all-new for at least another year.

Corvette—New in 1968, the 'Vette will have only minor changes in ornamentation

Chevrolet—With an all-new body shell, Chevy is apparently going to a wrap-around front bumper. Recessed in it is the traditional Chevy cross-hatch grille. Headlights are still concealed on the Caprice. On the side there is a theme line running from the top of the front bumper to the top of the rear bumper with slight bulges in the front and rear fenders. The tail lights are rectangular and are recessed in the rear bumper, as at present, in two clusters of three. The sedans have a new rear window angle. So does the 2-door Impala hardtop. The cars are about one inch longer than in 1968. A new somewhat revolutionary 3-speed automatic will be offered.

Chevy II-Corvaire—There will be modest changes in the Chevy II, but a 2-door hardtop—displayed at the Chicago automobile show—will be added to the line in 1969. The Corvaire remains

a question mark. Chevy will be lucky to sell 12,000 this year, but GM brass repeatedly deny they intend dropping the car. At the rate it's going, it will just die a natural death in another year or so anyway. Needless to say, there won't be any changes in the car if it's continued.

Chevle-Tempest-F-85 Special—There'll be a new 3-speed automatic for some of the GM intermediates. Stylewise, there won't be many changes, particularly since the body shells were new this year. The F-85 has a split grille next year and the dual headlights are no longer widely spaced. They are placed close together, outboard from a recessed grille featuring horizontal bars.

Buick-Olds-Pontiac—There will be all-new shells for these GM B and C body cars. There is still a split grille on the Olds and the Delmont series that resembles this year's 98 cars. The car also has flared side sculpturing on the rear quarter panels. There are slab sides on the 98. On the Buicks, a wrap-around bumper looks something like the current Riviera. The station wagon models may have a dual-action tailgate. Some test cars have been showing up with extra-wide inside rear view mir-

rors—about 12 inches long. These may be common on the full-size 1969 GM cars.

Grand Prix—Pontiac, an innovator in styling and performance through the era of Bunkie Knudsen, Pete Estes and current General Manager John DeLorean, will bank pretty heavily on a new Grand Prix to lead the pack in '69. Completely new from bumper to bumper, it no longer shares the "B-body" with other GM cars but is a stretched-out version of the intermediate car ("A-body"). Wheelbase has been lengthened by some six inches, while overall length will be close to that of the present G.P.

The front end treatment is sure to be controversial: V-shaped, giving the appearance of a vertical grille with dual horizontal headlights on either side. Parking lights and turn signals are behind large pieces of glass in the leading edge of the front fender. The bumper does not appear to wrap around. The car has a formal roofline with ventless side windows. The door handles are flush-mounted, a trend American Motors started this year. The tail lights are set in the rear bumper, with a number of lenses on either side of the license plate. The interior resembles an

airplane cockpit, much like the Corvette.

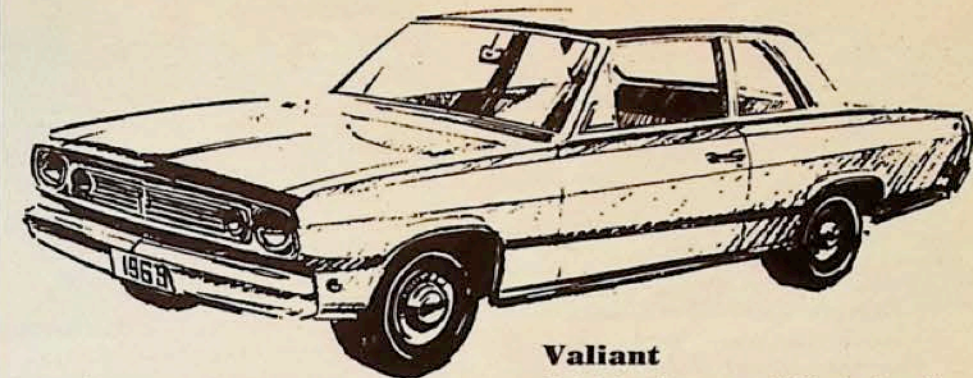
The car will have two interesting engineering features. One will be a concealed radio antenna said to be a thin piece of wire hidden in the windshield, adjacent to the A-pillar. The rear window has electric wires running through it that serve for defrosting and defogging. This presumably was going to be a Pontiac exclusive until Bunkie Knudsen left GM to become Ford president. He's since ordered it on the '69 T-bird.

Riviera-Toronado—These cars will have new grilles and tail lights. But as

with the T-bird, the next major change won't come until 1970.

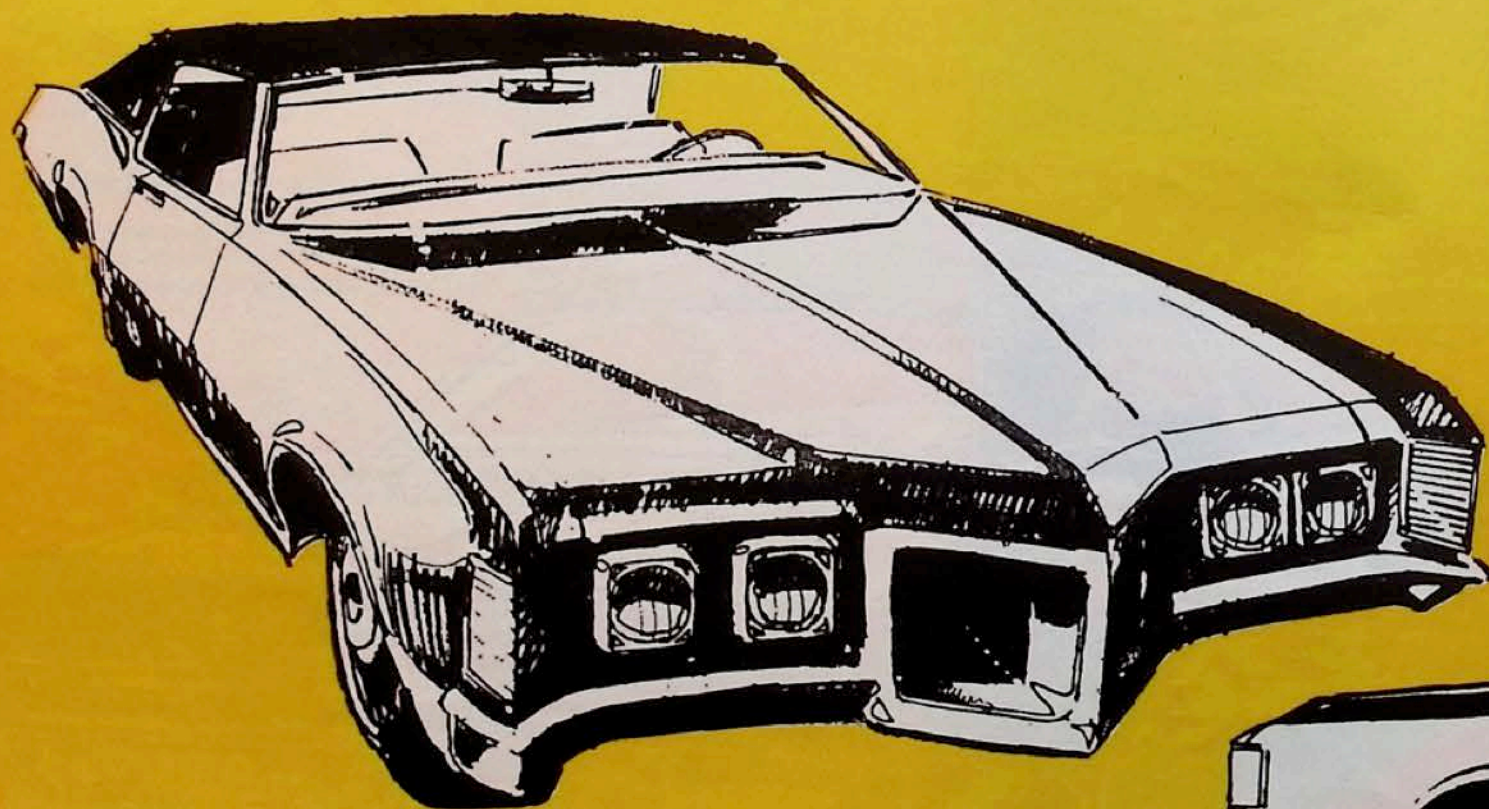
Eldorado—This personal luxury car will also have some minor changes front and rear.

Cadillac—The biggest change for Cadillac in '69 is apparently the reversion from vertical to horizontal headlights. Front fenders are squared off and extend beyond the hood slope—similar to the Lincoln's front end treatment. There is still the traditional Cadillac egg-crate grille. The car will also have new tail lights and more of a hop-up to the rear fenders. /MT

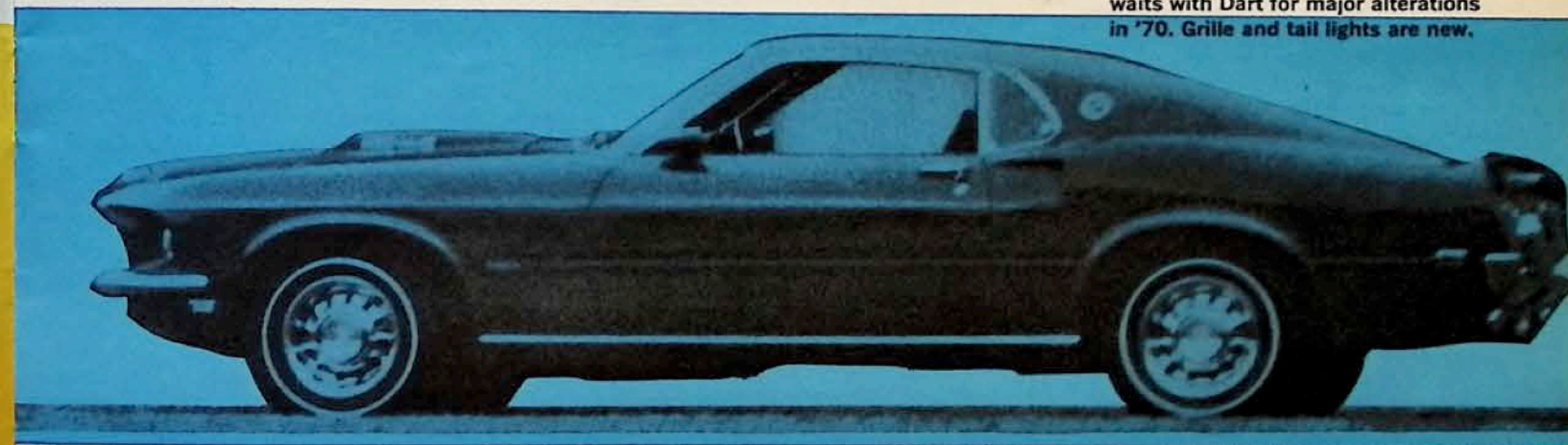


Valiant

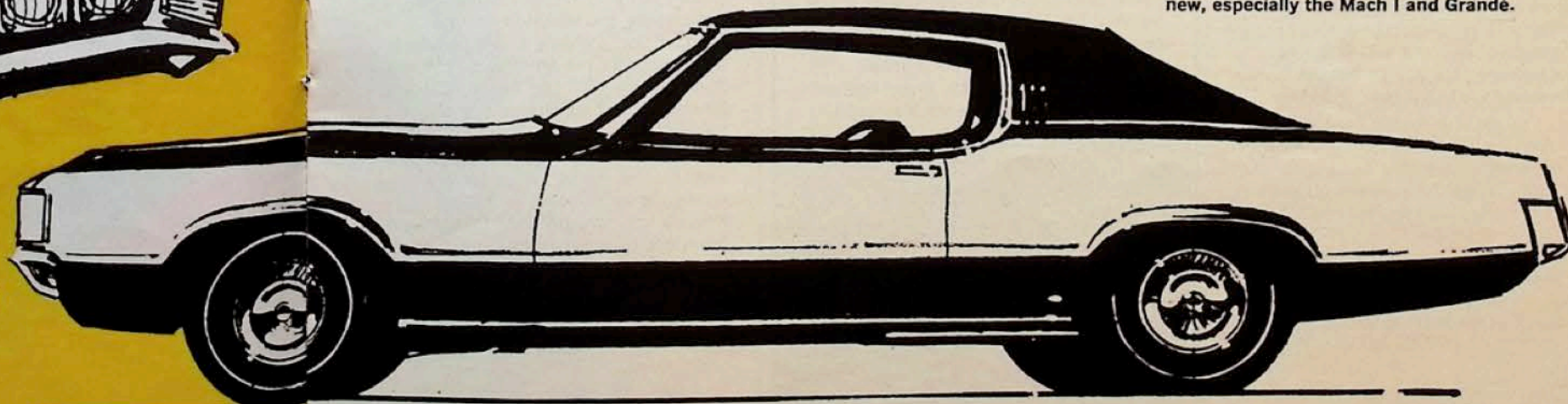
Only trim changes on Valiant, since it waits with Dart for major alterations in '70. Grille and tail lights are new.



Grand Prix Pontiac introduces biggest change in GP. Grille joins new trend of massive, vertical center component with horizontal dual headlights. Both ends are reworked.

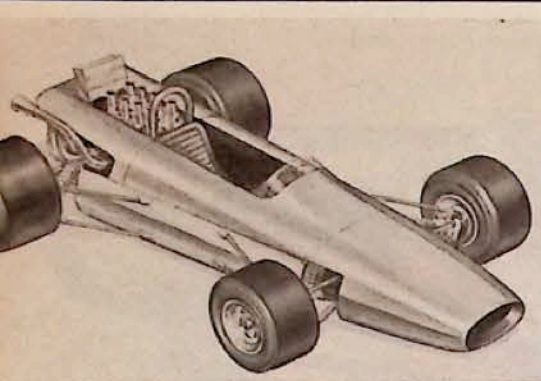


Mustang Though it retains basic styling of traditional models, there's much that's new, especially the Mach I and Grandé.



Formula for Success?

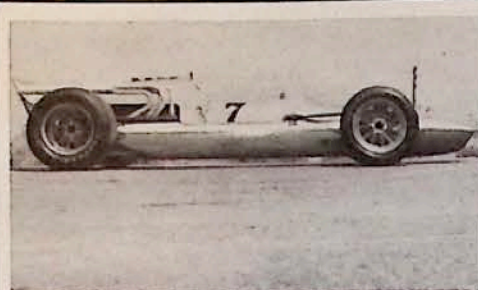
7:30 p.m. Van Nuys, Calif. This is the shop where Al Bartz plotted and planned and developed the 358.6 CID Chevrolet engine that will shatter the pre-eminence of Traco as the nation's top engine builder—winning the first five CanAm races straight in the new McLarens. Twenty-seven-year-old Al Bartz leans back against the tension spring of his swivel chair, stares at the ceiling for a moment. "You know," he says, "I think that



CALDWELL D-8

Autodynamics, Marblehead, Mass. Wheelbase: 97-inch. Construction: monocoque aluminum with 4130 steel heat-treated suspension members. Gearbox: ZF or Hewland LG 5-speed. Brakes: Kelsey-Hayes caliper on 11.8-inch disc. Engine: 304.6-cu.-in. Bartz Chevrolet. Price: \$10,000, less engine only.

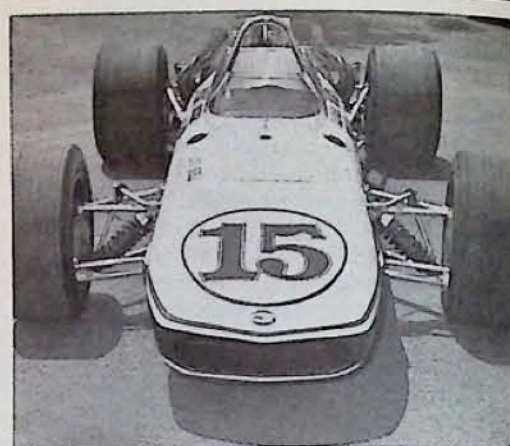
"Look," said designer Ray Caldwell, "the tire sections are getting so wide the common independent suspension layouts just aren't doing the job they were originally designed for. With around 12 inches of tread on the ground a 1-degree change in camber results in an 8-inch change in track. To demonstrate this tip one of these new wide tires up on edge 1-inch and you'll notice all the contact area is gone. In order to benefit from these big tires, you have to keep them on the ground. I think our semi-independent front suspension and modified deDion rear set-up is a better answer. Structural integrity is very important also because horsepower is in the 470-480 area, like last year's Group 7s but the Formula As are 200 pounds lighter."



EISERT

Eisert Racing Enterprises, Costa Mesa, Calif. Wheelbase: 96-inch. Construction: 90% monocoque 2024 T-3 aluminum, 10% 1¼-inch 4130 steel tube. Gearbox: Hewland LG 5-speed. Brakes: Girling caliper on 11.8-inch disc. Engine: 304.6-cu.-in. Bartz Chevrolet. Price: \$10,000, less engine only.

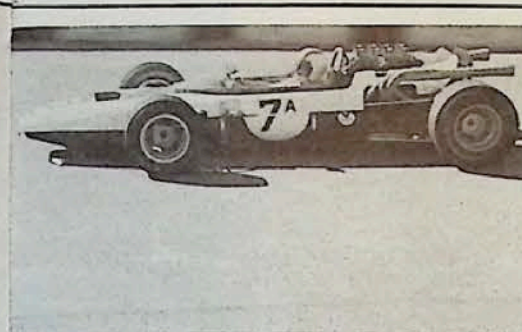
When you think of stock-block Chevies at Indy you think of Jerry Eisert. And Indy cars are very close in design to Formula As, right? So Eisert was just about all set for production when the new SCCA class came along and because his cars are very similar they are legal for both SCCA and USAC competition. Front suspension uses the rocker-arm-type layout with Koni adjustable shocks mounted inboard to clean up airflow qualities around the nose. "Inboard or outboard," allows Eisert, "it really makes no difference where you put the shocks." All of the suspension parts pivot on Fabroid spherical ball-joints with inserts of Teflon. A combination oil and water cooler provides a heat dissipation medium for 4 gallons of oil and 4½ gallons of water. Instruments are all Stewart-Warner except for a Jones Motorola "tell-tale" tach. Eisert bodies are all fiberglass with a ducktail spoiler.



EAGLE

All American Racers, Santa Ana, Calif. Wheelbase: 96-inch. Construction: welded mild steel tubing. Gearbox: Hewland LG 5-speed. Brakes: Girling. Engine: 304.6-cu.-in. Bartz Chevrolet. Price: \$10,700, less engine, gearbox and cooler.

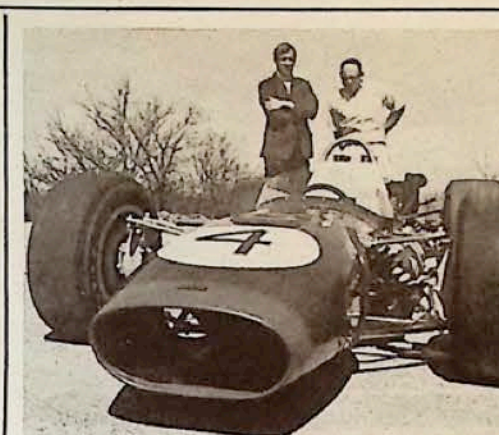
The Gurney Eagle is the hot item for the man who has everything. It is much like the Eagles of Indy fame except that the width is 2 inches less because a Formula A carries just half the fuel load — 70 compared to 30 gallons. Curiously enough, power is by Chevy instead of the Weslake-Ford you probably expected. To help with negative lift, the nose of all Eagles has been flattened to a flat, shovel-shape that eliminates the need for other spoilers. The shock-coil units have been moved outboard from '67 because Gurney felt they weren't doing any good inside and wouldn't detract from air flow anyway. This first Eagle A was built for the Smothers Brothers' Racing Team with Lou Sell and Dick Smothers to share the driving chores. Sponsoring companies are Goodyear and Wynn Oil, which is not bad for what started out to be low-budget racing. Being rich just isn't good enough anymore because technology advances by great leaps.



LeGRAND Mk. 7

LeGrand Race Cars, Sylmar, Calif. Wheelbase: 90-inch. Construction: Multi-tube steel space frame, brazed. Gearbox: Hewland LG 5-speed. Brakes: Airheart caliper on 10½-inch disc. Engine: 304.6 Bartz Chevrolet or 289 Ford as specified. Price: \$7680, less engine only; \$6095, less engine and gearbox; \$5295, disassembled less engine, gearbox, coolers, lines, etc.

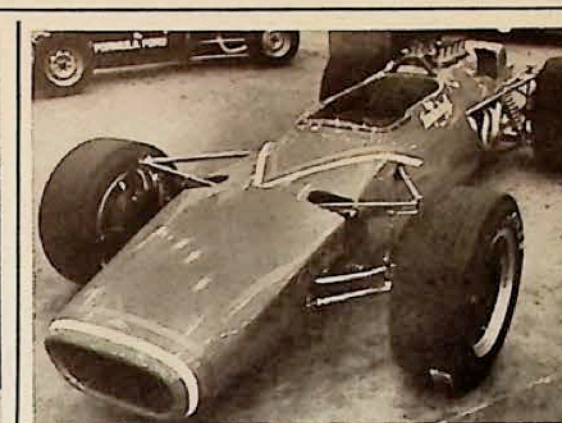
A few people think Red LeGrand is nuts, some haven't made up their minds yet and most consider him in the same league with Henry Ford — he's putting them on wheels they couldn't otherwise afford. LeGrand cars are brazed together instead of welded, a common practice in Europe but almost taboo in America. "We tested both kinds of construction but found brazing superior because any time you weld steel you not only distort it with the high temperature required but also destroy some of the metal's strength," LeGrand reflected. "Recent developments in brazing rod and flux have actually made it the soundest method. Besides that it's very easy to repair in the field. A minor crash doesn't necessarily end your race." On dual association cars: "Some people think they're building for both USAC and SCCA but USAC's licensing regulations will prohibit owners from running both except for FIA events (3)." Oh, yes, Bruce Eglington won the first "A" race at Vegas in a LeGrand.



McKEE

McKee Engineering, Palatine, Illinois. Wheelbase: 96-inch. Construction: Tubular space frame. Gearbox: Hewland LG 5-speed. Brakes: Kelsey-Hayes. Engine: 302-cu.-in. Motor Racing Specialties Chevrolet or 289 Ford. Price: \$9600, less engine only.

Bob McKee, right in the photo above, explains to owner Erwin "Ike" Uihlein, Jr., about a car which has been built with a new "sliding-pillar" type suspension and the invaluable aid of the Armco Steel Co., who supplied metal for the frame, exhaust, suspension and bulkheads. Additional strength is derived in the body by an aluminum belly-pan that rivets to the frame. Uihlein is head of the Grand Prix Corp. that will sponsor this McKee and another car on a racing budget of 50 grand which shows the interest Formula A has already created. Driver Mak Kronn of Chicago seems to have a good start.



LOLA T 140

Carl A. Haas Automobile Imports, Inc., Chicago, Illinois. Wheelbase: 96-inch. Construction: space-frame multi-tubular with boxed bulkheads. Gearbox: Hewland LG 5-speed. Brakes: Girling on 12-inch discs. Engine: 304.6-cu.-in. Bartz or Traco Chevrolet. Price: \$9400, less engine only.

All-time Formula and Group 7 sales champ Carl Haas imports the Eric Broadley designed T140 into the U.S. as a drop-in-the-engine-and-race package but does recommend substitution of better tires and fuel and oil lines. Broadley also concocted the Lola T70 sports car and the suspension is therefore very similar except that the 140's will have a lower roll center and the front wishbone's pivot axis lies parallel and horizontal so there is no anti-dive effect. Koni or Armstrong shock/coils are located inboard on the ends of the top link or "rocker" that has a leverage ratio of 1.6:1. Without driver, the front-to-rear weight bias is 38:62 with adjustable anti-roll bars at each end. Rear suspension is the common double wishbone with BRD roller splines half shafts. Engine and gearbox oil coolers plus the oil filter are located above the gearbox. Girling brake discs are now of the solid type but vented ones can be swapped. David Pabst, of the brewing family with the same name, will campaign one of these for G.P. Corp.

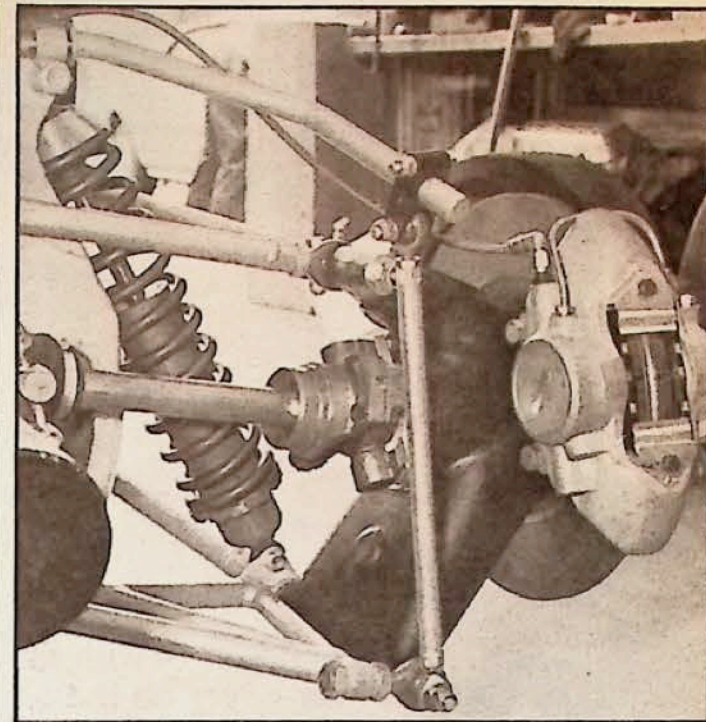
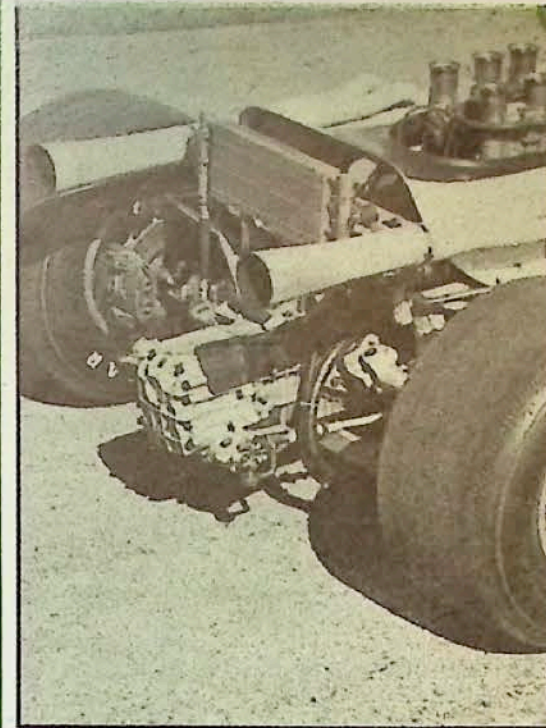
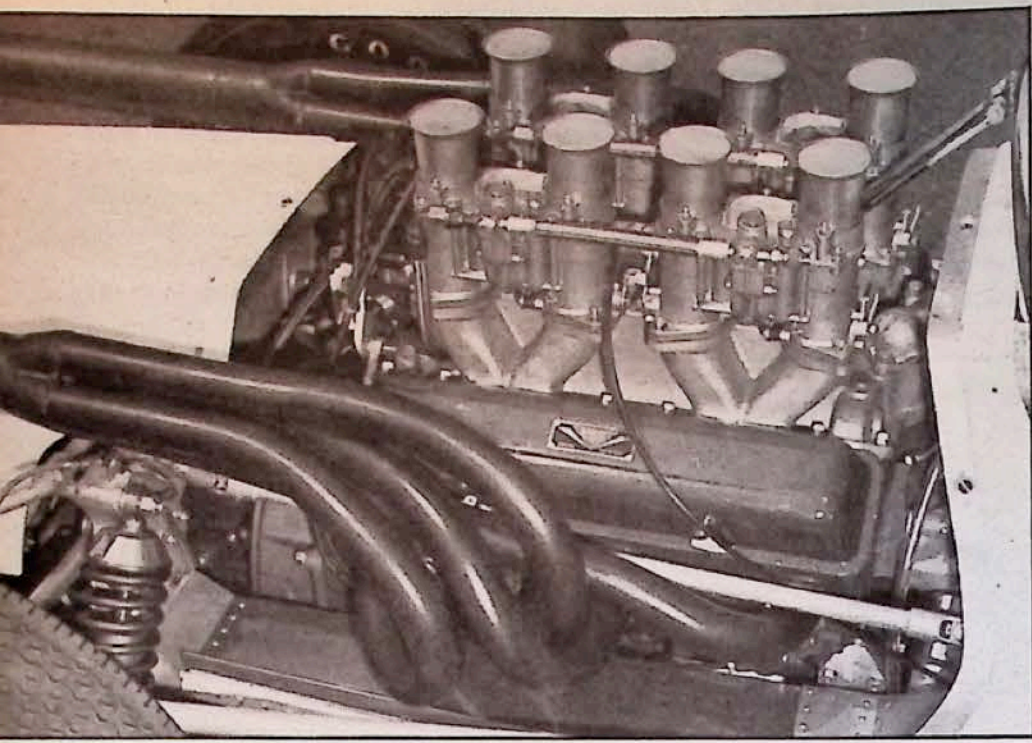
with the way the engines are coming along, the new SCCA Formula A will have the fastest open wheeled cars in the world. It will be the next big thing after CanAm."

Barely 10 months later six chassis builders have commitments on 14 cars, eight \$10,000 purse races are on the schedule, there has been a story in the New York Times and Bartz engines are in every car but one. It has all happened because Formula A is a step back from the chasm of prohibitive racing expense, a new direction toward the general use of production engines (over 5000 units) for competition powerplants and a microcosm of America's great, headlong racing binge. You see this truly is a golden age of automobile competition and if there have been other golden ages, this one will be remembered for its sheer scope and duration. To get on with it you need a single seat open wheel chassis, a 305 CID or less displacement stock-block, push-rod engine and 30 gallons of gas maximum. So what are you waiting for, it's a golden age, isn't it?

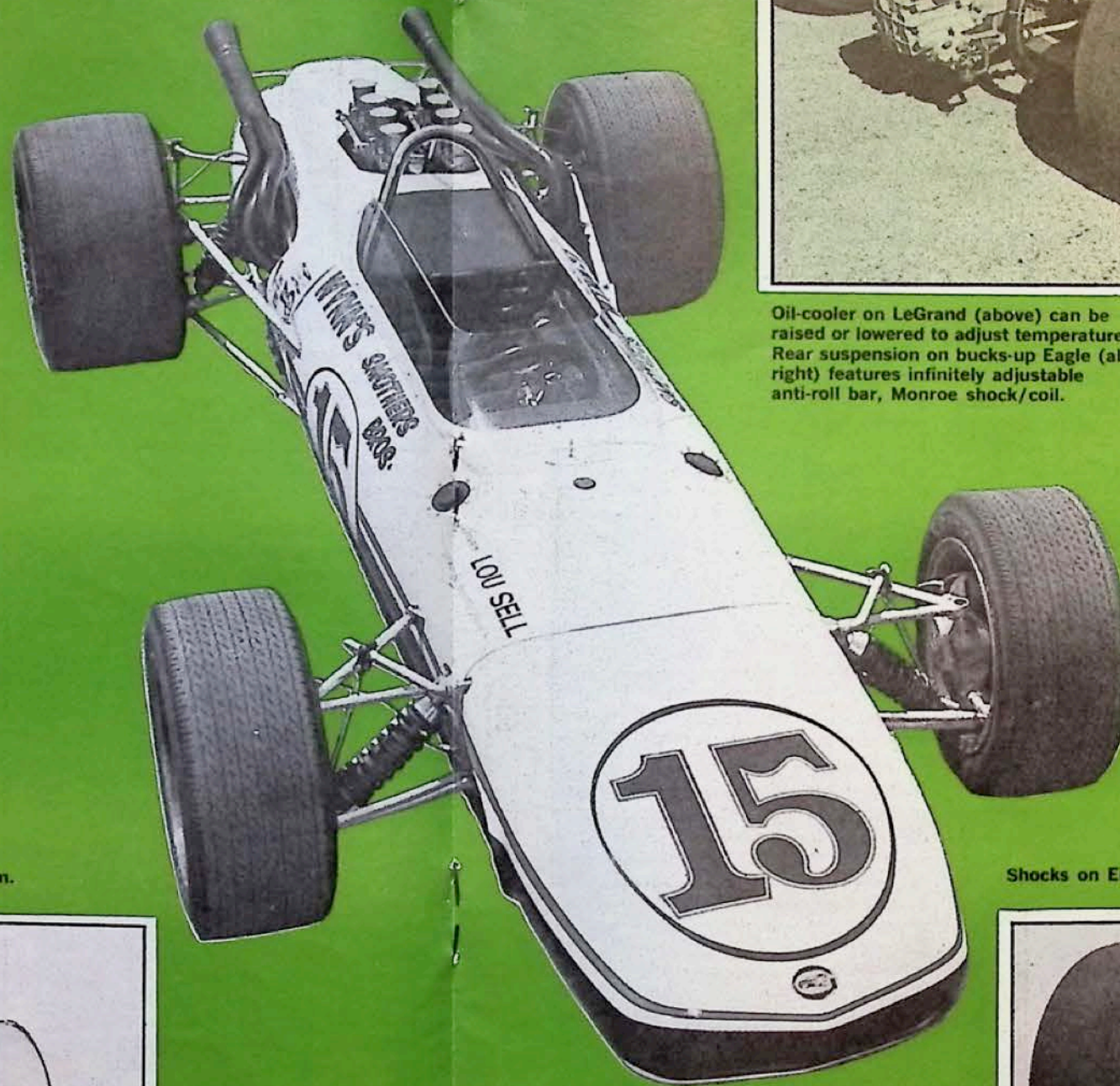
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Formula for Success?

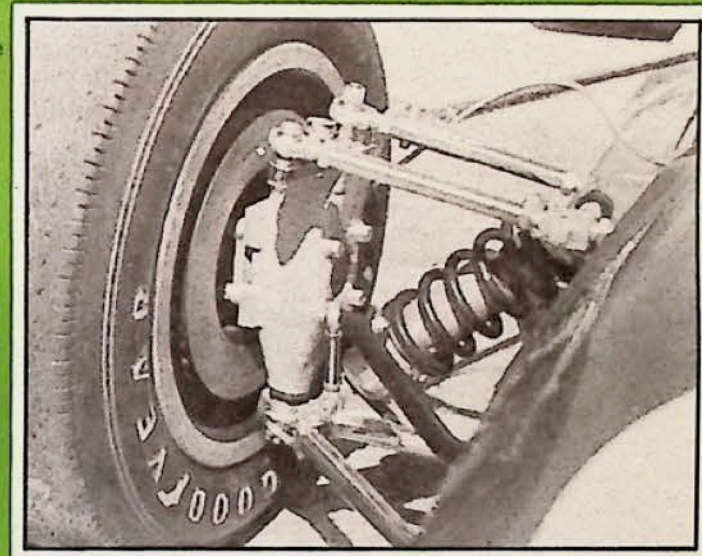
Bartz engines are 302s bored .020-inch to 304.6. Horsepower: 460 with 48mm Webers. Cost: \$4600. Econo 302 is available at \$3800. Horsepower: 445.



Photos: Pat Briller, John Hu-lan, Charles Nornel, Eric Dahlquist

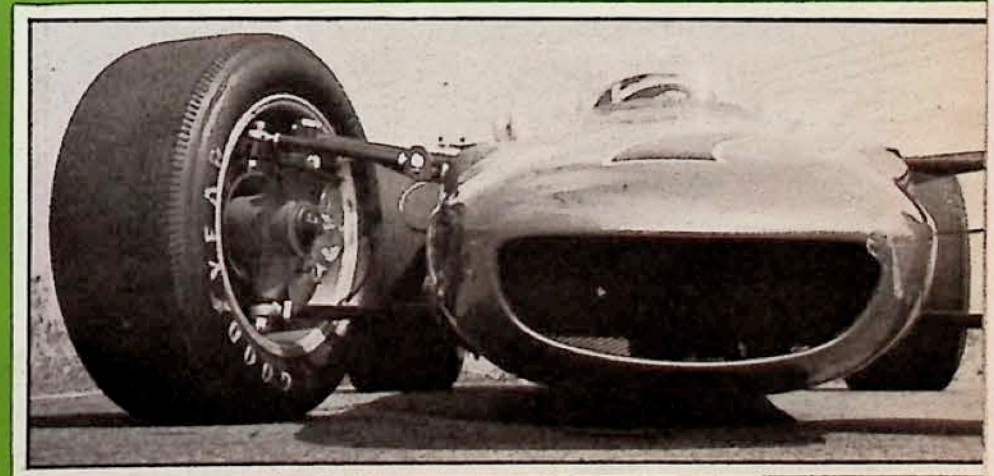


Oil-cooler on LeGrand (above) can be raised or lowered to adjust temperature. Rear suspension on bucks-up Eagle (above right) features infinitely adjustable anti-roll bar, Monroe shock/coil.



McKee configuration uses Armco Type 304 steel on suspension.

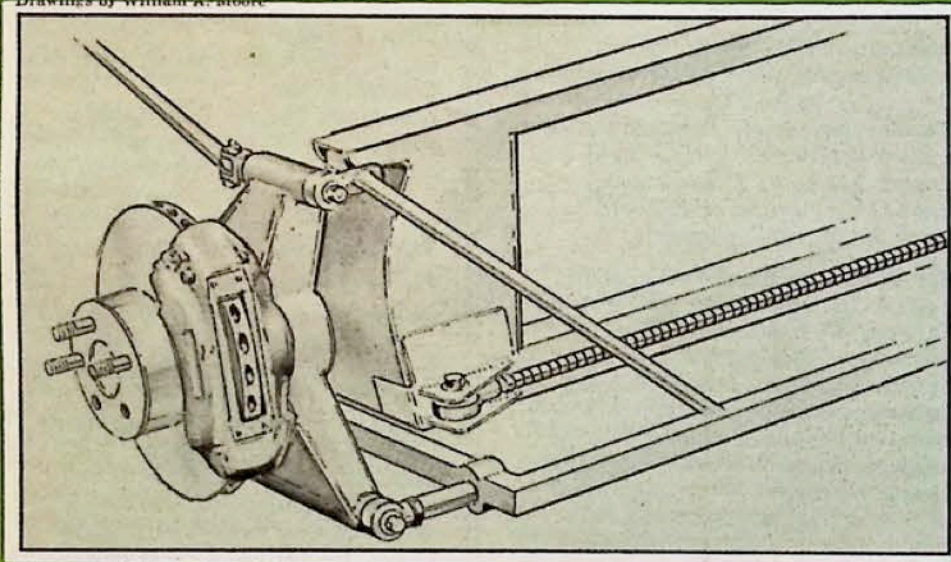
Shocks on Eisert machine are carried inboard out of windstream.



Lou Sell and Dick Smothers will pilot top-price-line Eagle (above). Suspension is uncluttered.

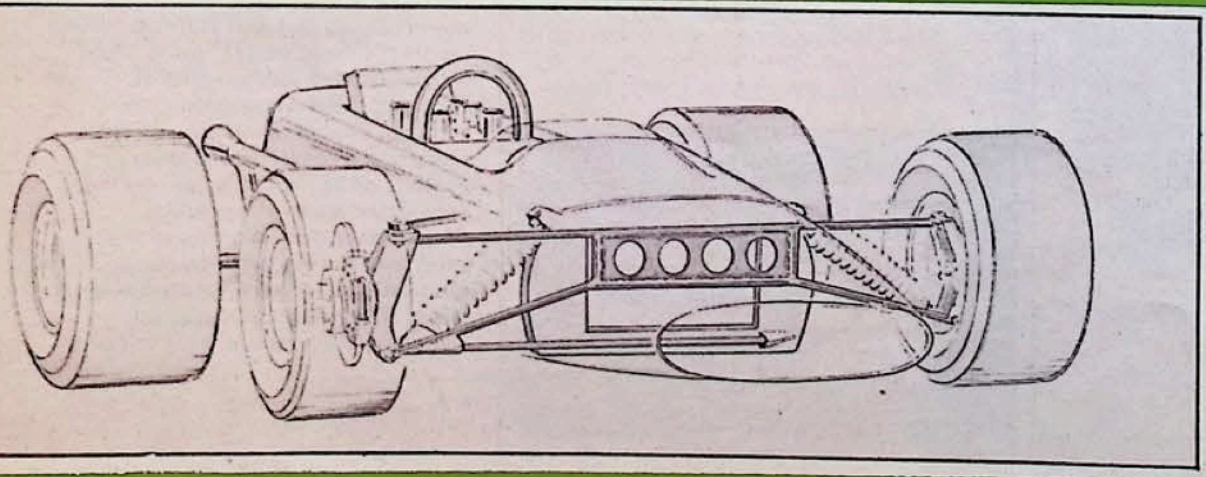


Drawings by William A. Moore



Suspension on Caldwell D-8 is probably most unique of any for '68 circuit.

Front axle (?) of Caldwell layout is about as rigid as you can get without having an I-beam.





The Ultimate Super Car?

A short, happy experience with the fastest car ever to come off a Detroit assembly line. Motown may never be the same again.

by Eric Dahlquist

"Whooom!" When the engine fires it makes this god-awful roar under the car and the din isn't even kept out much by your helmet. Dick Landy has the idle set at about 1100 rpm and when you put the Torque-Flite into low, it lunges against the brakes and you remember that you have to be careful with the Hurst shifter because it doesn't have a positive stop between 1st and 2nd and if you're not careful the B&M modified transmission will skip into 3rd and you'll waste the run. The stage light at the top of the Christmas tree has just winked at us and in another couple of seconds something terribly immediate is going to happen to our body because we made a couple of trial starts a few minutes ago and there's just no mental preparation for the way the acceleration slams you hard against the seat—all of a sudden, without warning—and you can start to feel the suspension make this little weaving motion it does. But this is the real full-pass shot now—just one amber light away from when the Jolly Green Giant lets go of the sling-shot pouch and those big Goodyear slicks with all their 7 pounds of air wrinkle up like old Christmas wrappings and whee—the whole ever-loving 3070-pound collection of steel, plastic and aluminum is catapulted down 1320 feet of the smooth Orange County Raceway asphalt.

The long, thin, red needle on the Jones-Motorola tach swings by six grand like the 20th Century Limited but it hasn't really got our attention because we're trying to think about the gentle drift we seem to be in but that we've been told not to worry about—and pushing back against the G-force

to steer—and that there's a partial crosswind blowing with gusts up to 20 mph and there might be a stronger gust waiting for us at the end of the bleachers. And what are we ever going to say to Landy, if we're around to say it, if the car goes "endo" in a horrendous series of flips like Curtis Turner at Atlanta in '67—with all the dust and pieces coming off the car.

When you let off at the last speed, light wind resistance and compression slow the car down like you just ran into Santa Monica beach and all the time you were wondering about the disc brakes and if they would do the job over 120 and now you hardly use

"Look," said Landy, biting down on his cigar, "if you're going to flip it, you'll flip it. A 15 mph crosswind isn't going to matter one bit."



them. That's all you really remember, that you let off—and now the world is all blurry just as before. On the way back up the return road you notice the telltale on the tach shows you've over-revved the motor by 500 rpm and you feel like a complete idiot for lousing up so simple an instruction. As the car bounces along for some reason what Pete Hutchinson said at Daytona comes back. "You didn't actually think we were going to let Ford get away with the Cobra Jet Mustang? Aha, we've got something coming that will annihilate 'em baby." Hemi Darts and Barracudas? "You'll see," he said with a widening grin—a neo-sadistic, ear-to-ear grin that can only be generated by Pete Hutchinson, understudy to Ronnie Householder, Chrysler's NASCAR boss.

That was in February. By the first of March there was one, a 426 hemi-powered Dodge Dart, the precursor of 49 more, 25 4-speeds and 25 automatics. For a time there was a real question at Chrysler Product Planning whether or not they could sell 50 of these cars at something around \$5000 apiece. Chrysler doesn't give their machinery away—if you want one, you buy one at a dealer just like everybody else. A month later they were deciding about the next batch of 50 and now there's another half-hundred planned. Before long there will probably be more around than Cobra Jets because Dearborn's supercar seems in embarrassingly short supply from the assembly line—though according to the National Hot Rod Association's rules, 500 must have been built already. Ah well, such is racing politics.

Anyway, now Dodge has the hot set-up, right? And, it's a production car be-

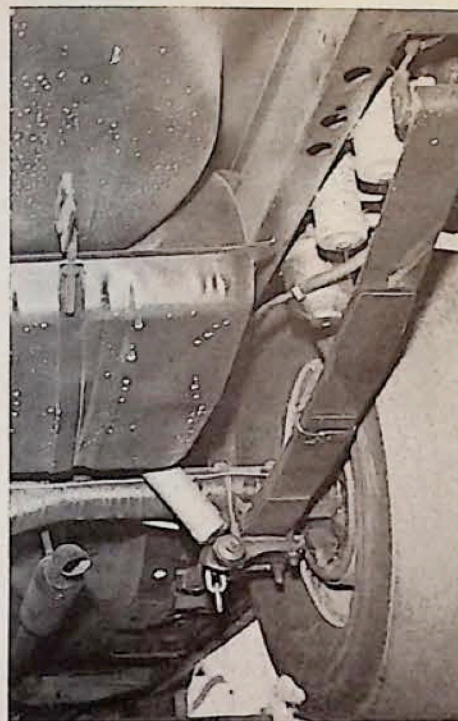
cause it's coming off the lines and one of the strokes from the union gets in and starts it up and drives it to the transporter truck, right? And MT tests production Detroit cars, right? Yeah, but who'd let a magazine writer drive his race car 125-130 mph at the track? Only Dick Landy, that's who.

For one thing, as mass-produced race cars go, the hemi-Dart is put together pretty darn well and it's about the only deal of this variety we've ever heard of that doesn't need to be extensively modified to be competitive. Of course, when Dick Landy gets a car ready for the track, it's right—down to the last nut and bolt. Since he goes around the country as master of ceremonies of the

Dodge Performance Clinic telling the kiddies how to do it, his own car had better be perfection. Besides that, we promised to take it easy, holding the Dart down to an 11.26—125.30 which is somewhere 4/10ths of a second slower and 5 mph short of what the competition has to worry about in Super Stock/B Automatic class. A whole 5 mph slower, imagine?

Really, the only worrisome characteristic on the hemi Dart is that the rear suspension has a deliberately spongy feel because it gets better weight transfer that way but doesn't seem to bother you after the first pass. There isn't power item No. 1 available except the engine but the disc/drum brakes are

up to the job and the steering is not what you would want to jockey around New York City—unless you're Steve Reeves. Yet it is surprisingly lighter than the one off the Cobra Jet Mustang we tried in February. And that brings up another point. This wouldn't really make a bad street car. No matter where you would go, not even on Woodward Ave., passing could never present a problem. Of course, you know where that would lead—Ford announcing a sohc Cobra Rocket and Chevy a Chaparral-powered Camaro and Chrysler—would you go a hemi-Simca? And if this comes to pass we'll just have to think about driving it awhile. Dick, you understand. /MT

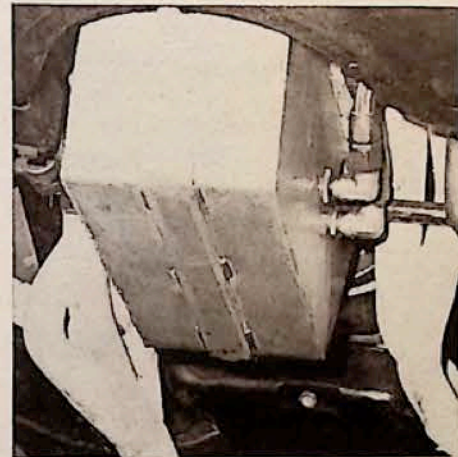


Remember the '50 Olds that raised up when it took off? Landy's Dart reminds you of that picture but speeded up 100 times. Rear spring rates are soft—200 pounds-per-inch.

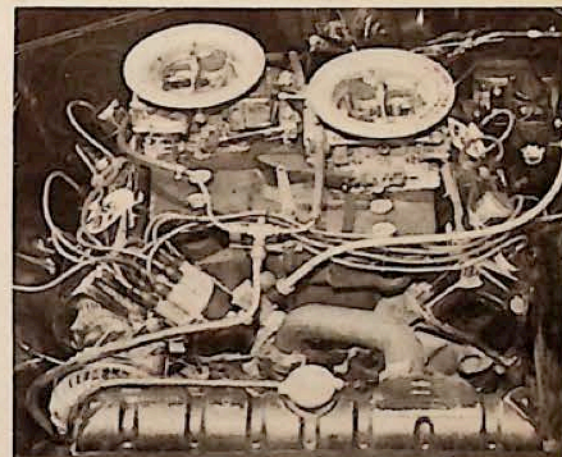
(Right) Window mechanism is manual, like fully. Cloth strap with snap fills the entire bill.

(Below right) 416 hemi unequivocally socks it to you but it's sweet. Engine uses Isky cam and cross-ram magnesium manifold with twin Holleys. An 11.26-second elapsed time and 125-mph speed is not even close to the record but we'll remember it for a long time anyway.

(Below) Deep-sump aluminum oil pan holds eight quarts of Valvoline 30. Windage tray keeps oil off crank.



Photos by Gerry Sittles



Bore & Stroke: 4.25 x 3.750 inches

Overbore: .005-inch

Pistons: Stock 12.5:1. (Note: NHRA rules change allows use of any piston shape providing max. dome cc is 105.4.) Valve clearance may require some milling on piston top. Clearance .008. Right piston, 2836164; left, 2836163

Piston pin: 1.030-inch

Rings: Dykes-type, two compression (end gap .016-in.), one oil (.020-.030-in.) PN 2808423. (These are .005 rings.)

Deck height: See "pistons" above.

Connecting rods and crankshaft: Stock. (Note: Crankshafts are Tufftrided for long wear and should not be polished for extra clearance.) Connecting rod side clearance should be .012-.018-inch.

Main bearings and connecting rod bearings: Clevisite .0015 to .003

Camshaft: Isky 590, 318°, .590-inch lift, 104° intake lobe center. Valve lash is .028-.032-inch cold.

Rocker arms: Stock

Valve Springs: Isky 4105 outer, 906 RH inner (PN 2836104) installed at 1.86-inch cold

Heads: Stock with exhaust valve face cut to 58° for clearance with Isky cam. Volume equals 167.7cc.

Intake manifold: Ram-type, magnesium. Holley carburetors, right list 4235; left list 4236.

Oil pan: Modified for deep sump. K-member must be notched slightly for clearance and then reboxed with identical-thickness steel. Milodon oil pickup system is used.

Ignition: Prestolite 250 transistor with hemi distributor (PN 2444333). Mechanical tach drive uses S-W "T" adapter (PN 669 X K5) to operate Motorola-Jones Tel-Tale tach. Total distributor advance 34-38°, full advance at 800-1000 rpm (with vacuum line disconnected).

Fuel system: Stock fuel pump is used with two Bendix Blue Top electric pumps at rear. Gasoline is routed through Milodon "Cool Can" and 3/8 Carter filter before carburetor. Lubrication: 30W Valvoline Racing Motor Oil with Fram high-capacity racing oil filter.

Transmission: TorqueFlite modified by B&M Automotive incorporates manual shift plate and quicker 2-3 shift. Street hemi torque-converter has been adapted to 440 wedge automatic by using special flex-plate (PN 2466326). Hurst Dual Pattern shifter is used.

Differential: Stock heavy-duty 8 3/4-inch pinion and 4.88 final drive

Wheels & Tires: Front, 4 x 15-in. Cragar wheels fitted with Goodyear 7.75 x 15. Rear, 6 x 15-in. Cragar rims with Goodyear 10.50 x 15 slicks. Recommended air pressure 50 psi front, 10-16 rear.

Suspension: Front stock 6 cyl. torsion bar, rear Factory Experimental leaf springs, 200 pounds per inch deflection. Shocks are std. production front with about 10,000 miles wear and dust shields removed for lightness. Rear shocks are heavy-duty and pinion snubber is shimmed to within one inch of floor.

Headers: 30-inch x 2-inch tubing to 3-inch x 12-inch cloverleaf collectors by Hooker

Total weight: 3070 pounds with 5 gallons of gas.

Performance: 11.26-125.30

Attention Messrs. Virgil Boyd, Roy Chapin, Ed Cole and Bunkie Knudsen: if the inner sanctums in that citadel of Great American Industry, Detroit, Mich., are astir with tension over rising import sales, that tension may soon turn to outright panic. An audacious new protagonist has just been unleashed on the automotive scene by the Bayerische Motoren Werke AG, of Munich, Germany.

Latest offering from the Bavarian craftsmen is the BMW 2002, and it's such a rugged contender, in any class,

rumor has it even *Ring Magazine* and *The Sporting News* dig it for the image rub off. Esthetically, it's rather ungainly, and, from the outside it will be dismissed by many of our countrymen as just another compact. Lucky for us, gentlemen. Because, everyone who gets behind the wheel, even for a few blocks, asks the same question: why can't they build an American car like this? In performance, handling, ride, comfort and — the list grows too long — every other automotive characteristic, the BMW 2002 deals from the top of

the deck, and, in most instances, outshuffles cars costing much more bread.

Imported car sales in 1967 were up 17% over 1966. So far this year they are cornering approximately 10% of the total U.S. new car market, compared to 9% in 1967, and time for concern is upon us. GM and Ford are now both working on compact cars in an attempt to stem the tide, and that brings us full cycle to our original thesis: will they, can they, turn out a street machine engineered as well as the BMW 2002 and compete in the 3

grand range? What about it, gentlemen?

Powertrain & Performance

BMW arrived at the 2002 as a result of several coincidental occurrences. Their 1600 was, and is, immensely successful in the U.S. With the advent of the 1600-2 (2-door), and the 2-carburetor TI option, BMW was moving into the rarified atmosphere of high-performance, superb handling machinery, while remaining in a competitive price market. Americans were discov-

ering this phenomenon and digging it. Then: Smog Control. The 2-jug mill couldn't pass inspection so the next best thing became a substitute, the 2-liter (1990cc) powerplant with one carburetor. Coupled to a 3.64:1 rear end, performance remains typically BMW; vigorous and potent. No complaints are ever heard from the 2000 engine, even when subjected to the roughest treatment. Lug it down in high gear or down shift at high rpms to 3rd or 2nd; you'll never get a whine or growl from engine or drivetrain. We

found we could practically run in any gear or down shift at high rpms to 3rd wind it out in 2nd or 3rd to some far out reaches of engine endurance. Still with no outcry. Our test car wasn't equipped with a tach, an option we highly recommend with the 2002. An engine so vehemently responsive invites overrevving, and when no protest is felt or heard, that tendency easily becomes habitual. Plenty of power always seems to be waiting in reserve, in any gear, except when lugging down in high.

continued



BMW 2002

Model Number Or Target Date For Detroit?

by Bill Sanders

With sublime adroitness and a straight face, BMW deftly puts down Detroit by masquerading their newest bomb as a "Family Sedan." It's got "Family Sedan" comfort, luxury and convenience — but the similarity ends in the first corner.



BMW 2002 continued

BMW meets smog emission controls by using an air injection system on the 2002. It is set up in an ordinary way with adjustments to carburetor and distributor. Engine configuration is a basic sohc BMW design, with 5-main bearings, but with 8 balance weights compared to 4 on the 1600. And, the oil pump is driven off the crankshaft by a chain drive, as on other BMWs, rather than conventionally off the camshaft.

Handling, Steering & Stopping

You keep telling yourself: The 2002 is basically a family sedan, not a sports car. If you can remember that fact when it comes to handling, the credibility gap is a little easier to understand. Cornering is fantastic. On a winding, tight, rugged mountain road the car has no peer in its class. On an actual road racing course it performs with some race machines—up to a point. You still have to remember it's a sedan! One of the two bad features (that's all we could find) on the 2002 is the steering wheel. It's much too large for good handling, and is positioned at a bad angle, a situation one never fully gets used to. In actuality, the 2002 has a slight understeer when engaged in the usual, spirited driving it was designed for, but the large wheel often creates the sensation of oversteering. On a mountain road with many tight turns, we noticed a slight, temporary oversteer when entering an extremely sharp turn in 4th gear at high speed—60 to 70 mph—but this can be corrected by downshifting and judicious use of the throttle. On the

road course, excessively hard cornering brought the inside rear wheel slightly off the road, but that situation never develops even under the most rugged highway or street driving. Some wheel hop is also evident during extremely fast acceleration. Our test car was equipped with optional Michelin XAS radial tires and we recommend them for the additional price as they make a tremendous difference in ride and handling. Independent suspension at all four wheels adds immeasurably to the handling characteristics of this car, and we ask repeatedly, in vain it seems, why can't our own companies, with their vast resources, develop an independent suspension like this for the family sedan?

Shift lever on the 2002 is in an ideal spot for quick, easy-to-manipulate shifts. BMW pedals still go through the floor rather than being suspended, as is the case on most new cars. This seems to necessitate less pedal pressure and makes operation easier. Pedals are an adequate size although the accelerator could be a little larger and at a less steep angle. Brake and accelerator are positioned for easy heel and toeing. Braking is also an excellent characteristic of the car. Some swerve was noticed when stopping from 60 to 0 mph, with only a slight tendency to lock up. Front discs pull down quite evenly and straight. Brake swept area to weight ratio is quite good.

Comfort, Convenience & Ride

Even with 4-wheel independent suspension and sports car handling, the 2002 lays a comfortable, though pleasantly firm, ride on you. Big, bucket

seats are well designed and, with an extensive front/rear adjustment, give an excellent seating location for the shortest chick or tallest guy. Front/rear adjustment, coupled with multiple reclining position backs, seem to give the two front 2002 seats more positions than a 6-way power seat system. Visibility is expansive all around, with low window sills and high windows. Dimmer switch and high beams are incorporated into a lever located on the left side of the steering column. Turn indicator is on the right. The only other bad feature of the 2002 has the turn indicator and windshield washer/wiper combined on the same lever. Often, while attempting to flick the turn indicator without removing the right hand from the wheel, you manage to have the windshield washed and wiped also—unintentionally.

An extremely quiet ride is an attribute not usually found on a small car. Disturbances from wind and road are at an absolute minimum with windows up. Vent window handles are actually knobs and easy to operate for precise window adjustment. Ventilator fan is effective, although rear windows need to be opened slightly on inordinately hot days. Opting for the well designed, useful sunroof will compensate for any lack of cooling and we recommend that extra also. With sunroof open at high speeds, wind disturbance and buffeting was insignificant.

Ignition switch is recessed and located at a spot on the steering column that makes it difficult to reach. If you happen to be a heavy smoker, you may also find the ashtray too small. This BMW body is endowed with good trunk space and tire and tool kit location under floor panels makes packing easy and keeps luggage clean. High liftover makes loading somewhat difficult, especially for women. Quality control is ultra fastidious for a car in this price range, giving one more gold star to a faultless machine.

Americans who accidentally stumble into a BMW dealer and test drive the 2002 are in for a surprise. Keep your fingers crossed, fellas—maybe the word won't get around right away, say until about the year 2002. /MT

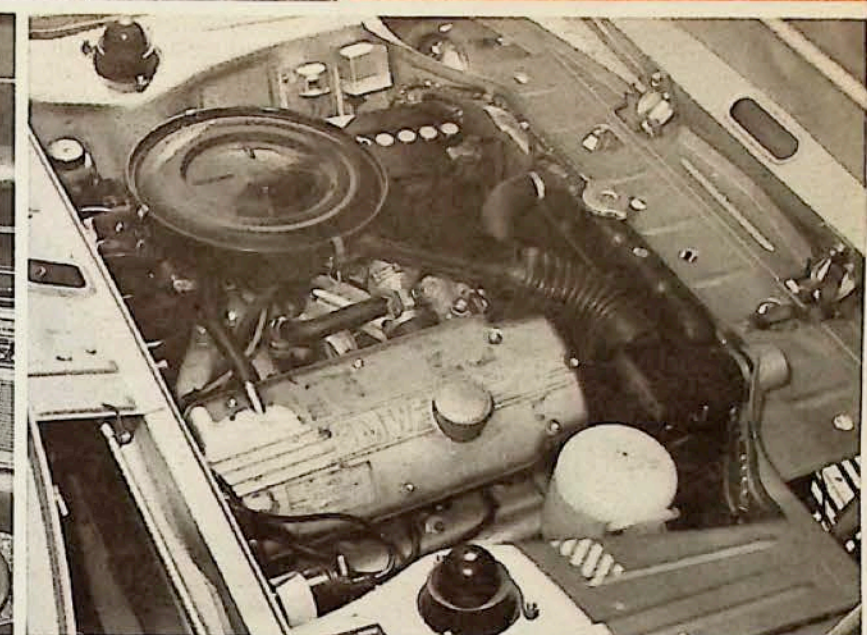
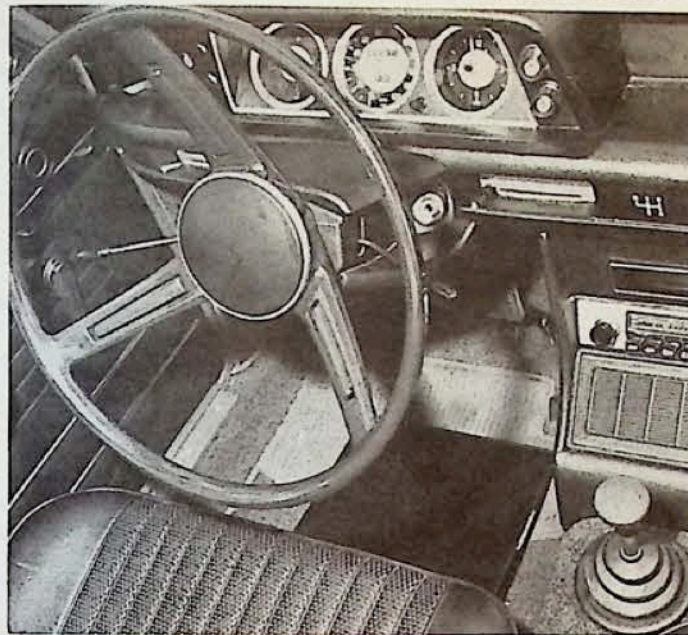
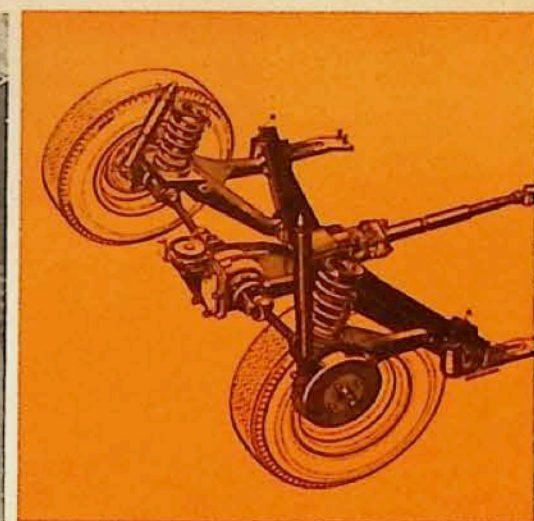
photos by George Foun, Gerry Stiles

OPTIONS & PRICES

Price of car as tested: \$3477 (P.O.E. West Coast base price \$2908). Standard Accessories and Prices (included automatically): Leatherette Upholstery: \$45. Power Brakes: \$45. Safety Belts: \$25. Bumper Guards: \$8. Chrome Tip Exhaust Pipe: \$2. Michelin XAS Radial Tires: \$59. Reclining Seats: \$48. Torsion Bar Stabilizers: \$20. Optional Accessories and Prices: Manually Operated Sunroof: \$135. Polaris Paint (Silver Gray): \$42. Blaupunkt AM/FM Radio: \$140. Tachometer: \$40. Velour Floor Mats: \$33. Trunk Mats: \$15. Right Hand Outside Rear View Mirror: \$8.50. Locking Gas Cap: \$4.



A test of the reclining bucket seats and who wants to read further? Trunk is large with spare hidden under floor panel. Under hood, new air induction system is visible. Large diameter steering wheel is positioned at awkward angle for efficient handling in tight spots.



PERFORMANCE

Acceleration (2 aboard)	
0-30 mph	3.2 secs.
0-45 mph	6.8 secs.
0-60 mph	11.0 secs.
0-75 mph	18.1 secs.

Passing Speeds	
3rd gear 40-60 mph	7.2 secs. 527.04 ft.
4th gear 40-60 mph	9.2 secs. 673.44 ft.
3rd gear 50-70 mph	7.1 secs. 624.80 ft.
4th gear 50-70 mph	9.0 secs. 792.0 ft.

Standing Start 1/4-mile:	
75 mph	18.8 secs.

Speeds in Gears:	
1st	27 mph @ 6000 rpm
2nd	50 mph @ 6000 rpm
3rd	77 mph @ 6000 rpm
4th	101 mph @ 6000 rpm

MPH per 1000 RPM:	16.9 mph
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Stopping Distances:	
from 30 mph	34 ft.
from 60 mph	121 ft.

Mileage Range	17.7-26.8 mpg
Average Mileage	23.5 mpg

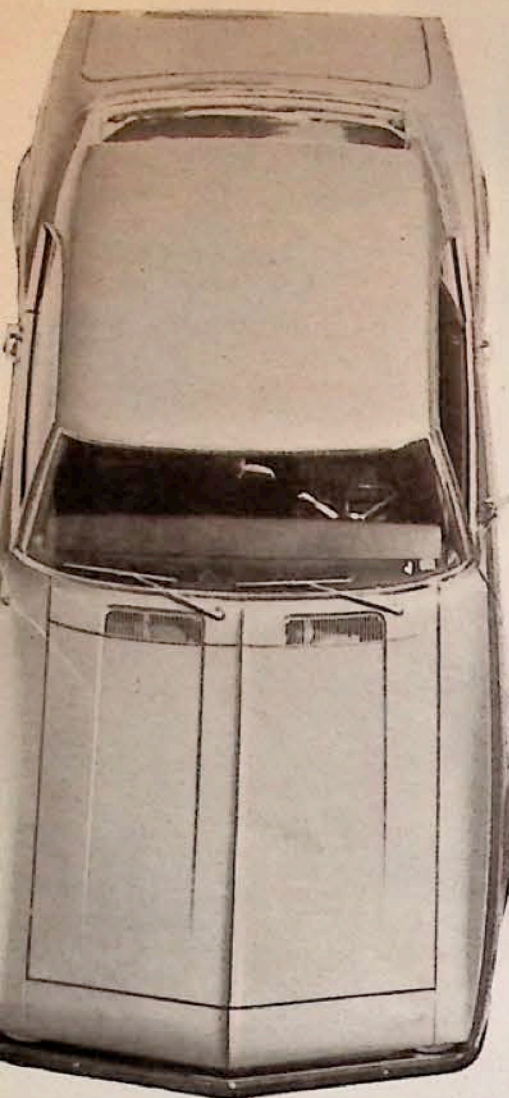
SPECIFICATIONS

Engine: 4 cyl in-line sohc. Bore & Stroke: 3.50 x 3.15 ins. Displacement: 121.5 cu. in. Horsepower: 113 @ 5800 rpm. Torque: 116 lbs. ft. @ 3000 rpm. Compression Ratio: 8.5:1. Carburetion: 1 Solex 40 PDSI. Transmissions: 4-speed synchromesh. Final Drive Ratio: 3.64:1. Steering: worm and roller. Steering Ratio: 17.6:1. Turning Diameter: 34.1 ft. curb-to-curb. 3.5 turns, lock-to-lock. Tires: Michelin XAS 165SR-13. Brakes: 9.4-in. disc front, 7.9-in. drum rear. Suspension: Front: MacPherson struts, lower A-arms, coil springs, tube shocks. Rear: Semi trailing arms, coil springs, tube shocks. Body/Frame: unit steel construction. Dimensions, Weights, Capacities: Overall Length: 166.5 ins. Overall Width: 62.6 ins. Overall Height: 54.0 ins. Wheelbase: 98.4 ins. Front Track: 52.4 ins. Rear Track: 52.4 ins. Curb Weight: 2210 lbs. Fuel Capacity: 12.1 gals.



Whether cornering on a road course (far left) or making panic brake stops (above), the sports car that masquerades as a family sedan unabashedly displays its noble heredity. Credit for such superb handling must be given to costly inde-

pendent rear suspension that features diagonal trailing arms. Wheels are sloped to negate constant track and camber changes, so common to cross-shaft, rigid axles. Coil springs and tube shocks (see above) aid in giving comfortable ride.



A little goodie from the far reaches of the Chevrolet Sports Department that's just got to be an automatic contender.

Practically nobody in Detroit even admits that there is a car called the Volkswagen but lo, just about the time VW announces their "Stick-Shift" automatic (see p. 70) Pete Estes, General Manager of Chevrolet and Vice President of GM, reveals the Torque-Drive, a 2-speed torque-converter transmission that "eliminates the clutch pedal, offers comparable economy to the regular 3-speed manual and has a list price of only \$65." An automatic transmission for 65 bucks. That's not a bad deal, especially compared to the going beetle tab of \$135 (that also includes a completely redesigned rear suspension). Well, when it finally got into the window sticker list it was really \$68.65 but that's about as close as you can expect the Establishment to come.

In practice, the first thing you notice about the Torque-Drive-equipped Camaro is the steering—or lack of much of it—while negotiating the first turn and nearly knocking off an elderly lady and a row of parked cars. After a few miles and some more turns you'd be surprised how fast you adapt to the standard steering. But 5 turns lock-to-lock is a lot to ask—the '50 Chevy my brother Charlie had did better than that. This was supposed to be an economy Camaro, so it came with manual steering. We can't see why, though, in a relatively light car like this a faster ratio, along with some road feel, couldn't be supplied. The Chevrolet Zone Office neatly sidestepped the problem by installing a power assembly which we will have to admit is everything the standard box is not except cheap—add \$84.30, please.

The Torque-Drive is the greatest thing since the cotton gin. It is easy to work, foolproof, fun and retains some of the physical involvement of manual shifting with almost none of the exertion. The closest thing it can be compared with is the old Powerglide because it is one—suddenly it's 1950. A cutaway drawing of the T-D shows it is indeed the familiar 2-speed automatic with the automatic valve body, governor, vacuum modulator, high-speed downshift mechanism and other trifles deleted. The whole deal is very clever, but it begs this simple question: Why, since it is very similar to a regular automatic, can this one be marketed for under \$70 when the other is a \$175 option?

Torque-Drive offers three gears: 1st (2.1:1), High (1.83:1) and Reverse. High is for normal driving, 1st, for extra dig

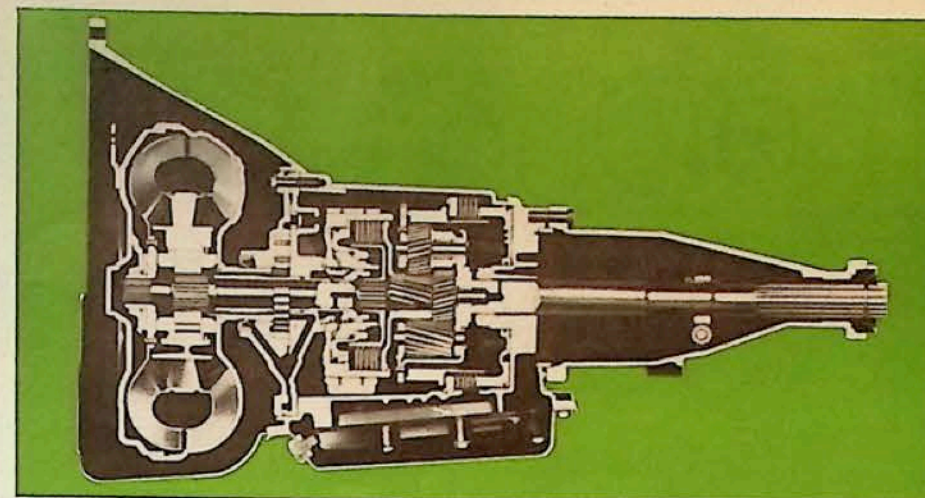
and reverse, well, for reversing. Simple enough. The factory doesn't say you have to shift and you don't, but they've made it very easy if you want to. With almost any other column selected automatic you can name—and most of the console jobs as well—it is not difficult to overshift into neutral. This is a feat, if oft repeated at speed, that may lead to your undoing. With T-D, gear positions are very distinct and there is a little trick, positive-stop to keep you from up-shifting into neutral by accident.

Even with the big, torquey 250 CID 6 (\$26.35 extra) the plan is to start from rest in low because the final drive ratio is a rather big 2.73:1. Not that the engine won't pull high, but it feels a little like squeezing into an overripe tomato and 1st is pretty lively at the stop lights. It comes as no great surprise that the Camaro 6 with or without automatic is not a prime candidate for the drag racers' sleeper-of-the-year award. Yet, an 18.70/74.19 mph at Orange County Raceway hinted that the installation of something around a 3.90 rear end ratio along with a quicker distributor advance curve and a set of exhaust headers would expand the immediate education of a few V-8 owners.

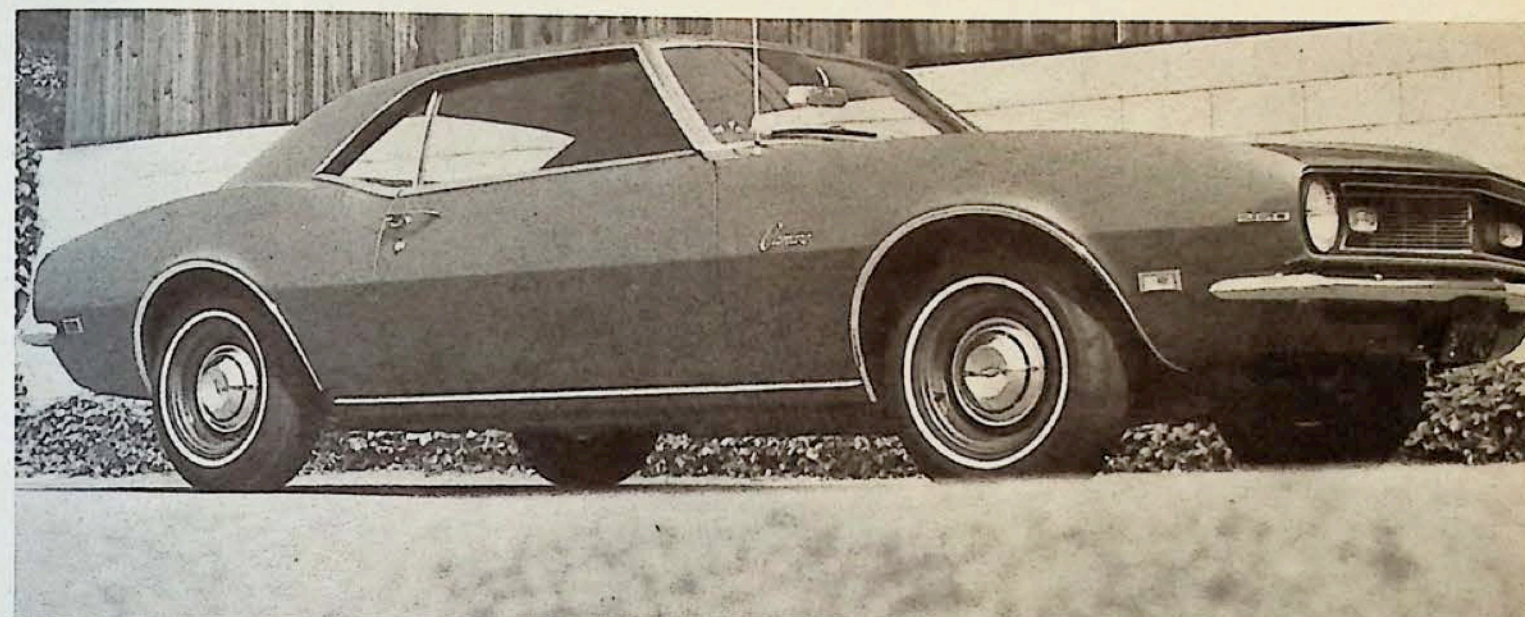
Walter Mitty racing potential or whatever, the real worth of the Camaro 6 automatic plainly is that it represents a great little integrated driving package—a welcome relief from the power-mad supercar whose acceleration response is so intense and overwhelming it takes on the character of a partially controlled ballistic missile. Not only that, but in a stripped machine like this you begin to see how superfluous such things as a console and deluxe buckets are when there is a noticeable increase of interior space without them. Sure, the brakes are not of the aircraft-carrier-arresting-hook-type and the car seems to float at around 95-100 mph but you can forgive these things because the machine is so well balanced otherwise. Not a wide-ovalled tire or a stiff suspension-that-feels-like-advanced-rigormortis-has-set-in anywhere and the little machine fairly flies through the esses. Even the fresh air ventilation worked well, allowing comfortable window-up draft-free driving and that is a first for an American car without air conditioning.

About the only negative item in construction was that your foot would sometimes catch on the underside of the wide brake pedal during quick stops. Economy as envisioned by the

public relations gang was about 20 mpg but we knew better than this, expecting 14-16 and surprised at getting as high as 17.5. Price was just the opposite—we thought it would be modest but it wasn't. Somehow an economy car with a tab of almost three grand (\$2901.90 f.o.b. Detroit) comes off badly in comparison with a comparably equipped VW for \$800 less. This, plus the knowledge both vehicles will be of approximate value after a year or so of depreciation, is a hard pill to swallow. Just the big 6 and the Torque-Drive would come to \$2683 which is more like it. Aw, but there's that darned steering that needs power. Come on, you guys in Flint how about a good, quick production manual? You want my brother Charlie to buy a bug or something?



(Above) Lay a cutaway of the Torque-Drive over the Powerglide and it looks pretty much the same except that some of the parts are missing. (Below) Our car was Rallye Green—the soul of greenness—moss on an Irish castle. Unreal!



Photos by Randy Holt

The 250 cube 6 has enough torque to bowl over banana trees and will even do a decent job on the highway scene.



SPECIFICATIONS

Engine: Conventional OHV six. Bore & Stroke: 3.875 x 3.53 ins. Displacement: 250 cu. in. HP: 155 @ 4200 rpm. Torque: 235 @ 1600 rpm. Compression Ratio: 8.5:1. Carburetion: 1 Rochester single barrel. Transmission: 2-speed semi-automatic. Final Drive Ratio: 2.73:1. Steering: Semi-reversible recirculating ball nut. Turning Diameter: 41.0 ft. curb-to-curb. 4.8 turns lock-to-lock. Tires: 7.35 x 14. Brakes: 4 wheel hydraulic drum, dual system, 9.5-in. front and rear. Suspension: Front: Independent coil. Rear: Salisbury axle with two single leaf springs. Body/Frame: Integral with ladder-type front section. Dimensions, Weights, Capacities: Overall length: 184.5 in. Overall width: 72.3. Overall height: 50.9. Wheelbase: 108.0 in. Front track: 59.6 in. Rear track: 59.5 in. Road clearance: 5.1 in. Curb weight: 3130 lbs. Oil capacity: 4 quarts. Fuel capacity: 18 gals. Cooling system: 12 quarts.

OPTIONS & PRICES

Retail price F.O.B. Detroit \$2901.90. Options: 250 "6," \$26.35; trim group, \$42.15; AM radio, \$61.10; white-wall tires, \$31.35; Torque-Drive automatic, \$68.65; power-steering, \$84.30.

PERFORMANCE

Acceleration (2 aboard)

0-30 mph 5.5 secs.
0-45 mph 9.0 secs.
0-60 mph 13.6 secs.
0-75 mph 21.7 secs.

Speeds in Gears

1st 52 mph @ 4000 rpm
2nd 96 mph @ 4000 rpm
3rd NA
4th NA
MPH per 1000 RPM: 19.1 mph

Standing Start 1/4-mile

74.19 mph, 18.70 secs.

Passing Speeds (1st, high gear)

40-60 mph 6.2 secs.
50-70 mph 8.5 secs.

Stopping Distances:

from 30 mph 32 ft.
from 60 mph 169 ft.
Mileage Range: 14 to 17.5 mpg

Camaro Two- Step

by Eric Dahlquist

The Dune Buggy Phenomenon!

Text and Photos by LeRoi Smith

Now the automobile enthusiast can have everything—a sports car of Grand Prix agility, an off-road scrambler second to none.



EDITOR'S NOTE: To many observers, the overwhelming rush of popularity concentrated around Fun Cars seems to have inundated the country overnight. Practically every remote corner of the nation is now accessible, whether by virtue of 4-wheel or 2-wheel drive, or even via the equally popular trail motorcycle. As on-the-scene reporters of everything automotive, the editors of MT are witness to varied fads. The Fun Car is none such.

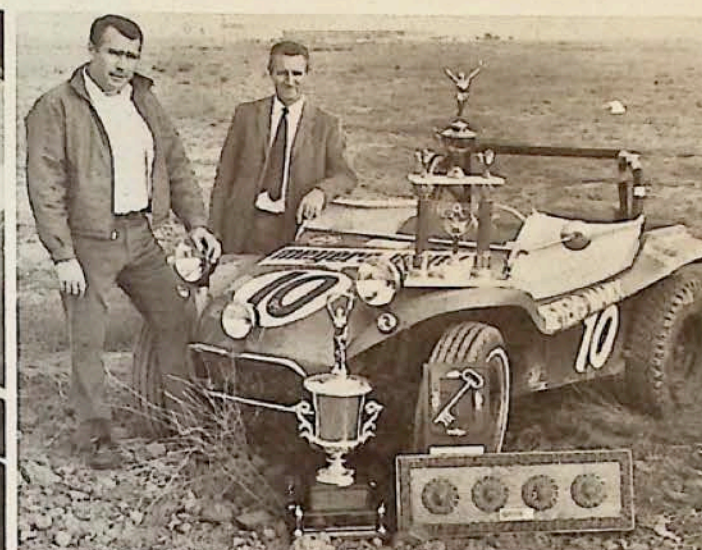
Largely based on reworked Volkswagen components, the Fun Car is firmly here to stay. It is inexpensive to build and operate, a perfect do-it-yourself project. It holds limitless appeal to all members of a family, and just may turn out to be most ideal "commuter" car of them all. Women are especially susceptible to its charm, due largely to the small size and extreme ease of driving.

There is a distinct difference between a Fun Car and a Dune Buggy. The former usually has a well defined and appealing body, while the latter is strictly "pipe racks," designed for the most pragmatic off-road travel. To illustrate the Fun Car's appeal and versatility, we have se-

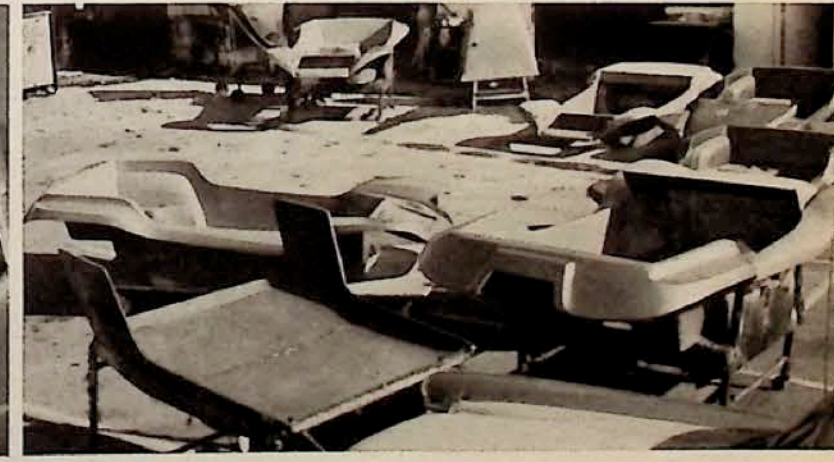
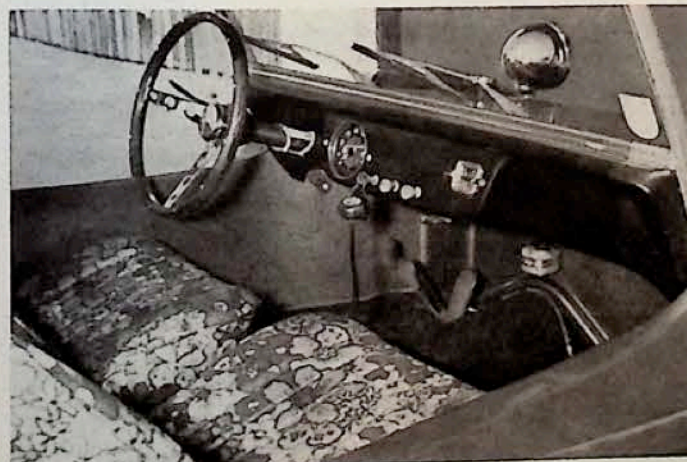
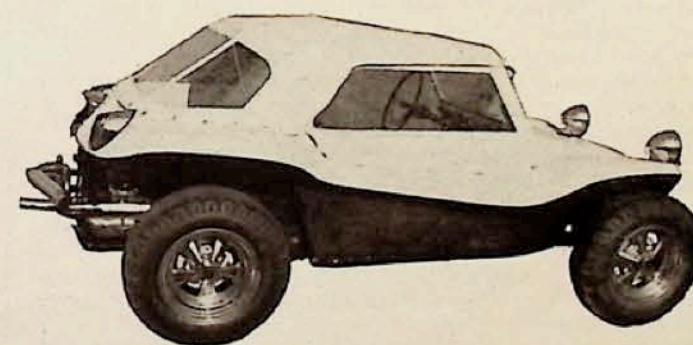
lected the most famous one of all, the Meyers Manx—a car that really must be credited with causing much of the enthusiasm. At last count there were over 32 almost direct copies of the Manx on sale (although Meyers holds a design patent on the vehicle), with another 30 unrelated designs admittedly inspired by Meyers' effort.

An innocent sketch on a Newport Beach, Calif., kitchen tablecloth in 1963 has become America's greatest do-anything car. It's called the Meyers Manx and it came about quite by inspiration. There was good old Bruce F. Meyers, propped against the breakfast table, faced squarely with another ho-hum day of designing exotic fiberglass sailboats. A gorgeous sun-drenched day obviously meant for bounding across limitless sand dunes. "Why don't you quit dreaming," interjected wife Shirley "and build that thing?" Oh, has there ever been such an understanding helpmate?

Fortunately for people like us, obsessed with the love of things automotive and mechanical, Bruce took the advice, albeit from a personal standpoint. An old 1-stall garage was large enough to throw together a fiberglass mold and make a one-off body. What



(Above) Will the real Bruce Meyers please stand up—after he finishes polishing the beak of his one and only Manx. (Above center) Of course it was only fitting that the first Mexican 1000 Rallye was won by Vic Wilson, left, and Ted Mangles in a stock Meyers Manx—the original production dune buggy. (Above right) And then there was Ted Trevor at Pikes Peak in a Corvair-powered Manx that devastated the under 3000cc sports car class as well as some bigger jobs. (Below) Would you believe interior flower-power? Manxes are becoming so plush Meyers is going to have to offer an off-road version. (Below right) The body beautiful rolls in ever larger quantity from the factory. (Left) Up and away! So beautiful.



neither Bruce nor Shirley bargained for was the hysteria this little dune buster would unleash on an unsuspecting public.

A dune buggy it was envisioned at first, simply because Bruce was tired of relying on the old VW bus for trips to Southwestern sand piles. Besides, who ever heard of a VW bus sand buggy? But to Art Center alumnus Meyers, just any old hatched pile of iron would not do. There were myriad designs afoot in the then current buggy fleet, all ugly to the point of immorality. What was needed was something that looked more like a car—well, not exactly like a car. Maybe something with more dash, more verve, something a guy could build for less than the Denver mint yet look like a Detroit stylist's better idea.

Results of those first after-hours was a kind of fiberglass bathtub. To appendages at either end could be attached Volkswagen chassis and power components, more than enough for any dune buggy. Trouble was, first this friend and then that one saw the car and wanted duplicates. It was painfully obvious the machine, as designed, could never stand the problems of increased production. Bruce went back to the bedroom drawing board and created a kit car, a bag full of goodies that could be attached to any old idle VW chassis, transforming it at once into a do-everything scatmobile.

The problems for Bruce F. Meyers (and Company) were just beginning. For instance, there was the little matter of production. Being a perfectionist, Bruce absolutely refused to allow a sub-standard body leave the shop. Then, again, that single mold was hardly sufficient to produce the quantity of shells being ordered, and there was the situation of working at the boat trade all day and with dune buggies all night. The only possible solution was to start making buggies fulltime, in a regular production facility.

Meyers' first dune buggy was produced in October, 1964. He had applied for a patent in February, 1964. When we first visited the Meyers operation nearly three years ago, production numbered one or two bodies a day. Since that time a strange and wonderful transformation has permeated the car enthusiast's vehicle requirements. A single 1-stall garage has burgeoned into a complex manufacturing facility, with peak production running upwards of 70 kits per week. Meyers moved into a new \$50,000 building in April in Fountain Valley, Calif. All to the dismay of Bruce Meyers. After all, how can one be out thrilling to a dash across tide-packed sand when big business calls?

Meyers is perhaps the most improbable automobile manufacturer in the business, and a manufacturer he is, to be ranked right behind Detroit, Shelby and Checker. To the utter frustration of a newly acquired business consultant, BFM insists on meeting top brass in a pair of grease-stained coveralls. The executive office, wood paneled and outfitted in the best Madison Avenue style, is a place where old tire carcasses from grueling cross-country races are stored. And that new Buick Riviera in the parking lot, considered because it will add dignity to the position of a company president, languishes from disuse. No one would suspect a successful automobile manufacturer of banging around in a crusty old race-thrashed dune buggy, right? Even the company emblem is a Meyers-ism; a Manx cat marching uprightly, armed with a dull, chipped sword.

Surrounded on every side by sophisticated transportation such as the world has never known, the Manx is solidly entrenched as the rave and envy of motorists worldwide. Detroit engineers marvel at how practical it is, Italian designers keep pictures of it on their wall, sports car experts claim it outshines the best from overseas. Volkswagen salesmen find it one of the most subtle new car sales tools in the business, and wrecking yard owners love it (a wrecked VW is often worth more than a used one, where the Manx is known!).

About 60 other manufacturers have come out with similar styled bodies in attempts to compete with Meyers or to take advantage of the design's popularity. As a result, Meyers has filed suit against the largest of the competitors for infringing on Meyers' design patent. Forty-five of the manufacturers have been notified of the suit.

Not everyone loves a Manx, however. Take the 4-wheel-drive enthusiasts, for instance. Where that all-wheel-drive vehicle plows through sand and mud and snow, the Manx rides over it; while the 4-wheeler leaves great clawed scars where it has torn up a hillside, the Manx tracks are hardly discernible; where the 4WD machine is likely to dislocate a vertebra the Manx is smooth as an ocean liner. The problem has become so acute that most off-

road competition events either ban the VW-based buggy or give it a special class. At Pikes Peak, the entire Sports Car Division was eliminated following the Manx debut.

Ted Treavor of Crown Mfg., Costa Mesa, Calif. (makers of Corvair/VW engine swap adapters) built up a Manx a couple of years back for sports car slalom racing. With an 80-inch wheelbase and 75% of the weight on the rear wheels, Ted cleaned up on the imports, winning 29 out of 31 events against Cobras, Sting Rays and Lotuses. Anyway, along came the annual July 4th bash up Pikes Peak, so he put together a special machine for the long hillclimb. Bill Thomas prepared a supercharged Corvair with enough horsepower to completely dominate the division, posting times better than any of the sports cars and better than all but eight of the race cars! On race day a fuel pump failure put the car out of contention two miles from the finish line, so the slalom car was substituted and won in the under-3000cc class.

Perhaps more dramatic was the Manx victory last November in the inaugural Mexican 1000 Rallye. Against a field of 68 of the most impressive off-road vehicles ever assembled, including cross-country motorcycles, a Manx (driven by Vic Wilson and Ted Mangels) sped across nearly 1000 miles of the most destructive terrain in North America. From Tijuana to La Paz, Baja Calif., the previous record of 31 hours non-stop was clipped by nearly 4 hours, much to the delight of dune buggy enthusiasts. There were six VW-powered Manx in the rallye plus two with Corvair engines and two with a Porsche.

Actually, dune buggy is something of a misnomer when describing a Meyers Manx. Although sand dune competitions are popular on the West Coast, and VW-based machines make up nearly 80% of the large turnouts, the Manx is really more of a bush buggy (that's what it is called on Chuck Connors' "Cowboy in Africa" TV series). That's how we have come to know it too. We've watched this car since the humble inception, and have probably logged more diversified miles in it than any other test vehicle. More recently, the Manx is known as a fun car.

In the first place, a Manx is like no other production automobile on the market. It is not the soft riding, plush transportation vehicle we've come to accept as Detroit standard. Nor is it a snarling, torque-crammed American "sports" car. It is the very epitome of the maximum performance car. You strap it on, rather than get into it; directional control is a matter of thought transfer, much like a jet fighter plane; throttle and brake response is nothing less than a grand prix racer.

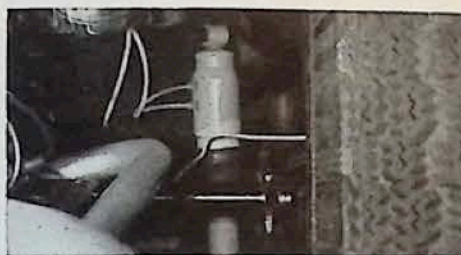
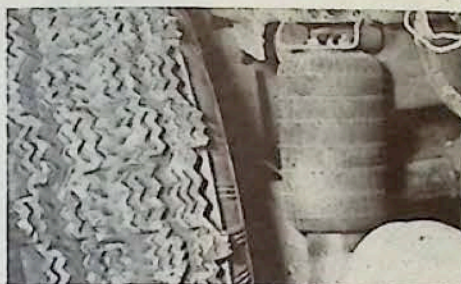
Two years ago we towed a loaded Manx up to Montana for a back-country fishing trip. Because of the car's high ground clearance—which can be raised or lowered through use of air shocks—and flat underpan, we traveled into country inaccessible even to 4-wheelers. We drove over 800 miles with a flat front tire and never knew it, because all the weight is at the rear. During this initial trip, we scaled mountain passes near the 12,000-foot mark and crossed large snowfields as with a sleigh. It just didn't seem possible, but the little 40-hp engine would grind anywhere, and still jump out at 70 mph on the intervening highways. With all the off-road activity, gasoline mileage was over 22 mpg! Try that in your 4WD sometime!

For a combination town-and-country car, it is unbeatable, with the agility of a Mini-Cooper and the ruggedness of an Army truck. Completely highway legal, it is deceptively smooth to handle throughout the speed ranges, but the steering takes some getting used to. Because of the very light overall weight (just over 1200 pounds) and short wheelbase, the machine has a variable feel; understeer at lower speeds changing to noticeable oversteer at the really high speeds. It darts and gives the impression of one of those super fast go-karts. Point this baby somewhere, and that's exactly where you're gonna go.

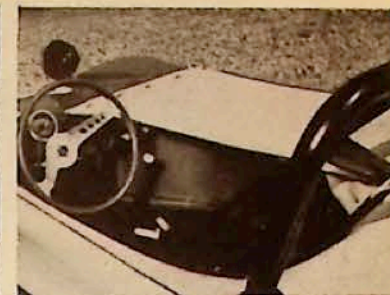
Stopping a Manx is something else. It's almost too good in this respect, and takes practice to master. While it is possible to lock the wheels with stock tires, the bigger tires get so much relative traction that panic stops from 80 mph consume just slightly more than 200 feet! In comparison, a typical Detroit compact will require nearly 300 feet. With standard VW brakes, there is very little fade; with optional discs at the front, braking should be second to none.

The basic problem of a Manx, and yet one of its distinctive charms, is the problem of simply getting in. Rather like the old gull-wing Mercedes Benz 300SL, entry can become a study in physical contortion. Without a top, one merely steps in and sits. But with either the fold-up fabric or fiberglass top, it's a matter of fanny first and follow what may.

Full weather protection is available through construction of



(Above) El Camino air-shocks fit Manx nicely or (Middle) Air Lift air bags enabling access to that real mountain greenery (Top) Pikes Peak express at speed, detail.



TECHNICAL DATA: MEYERS MANX

Performance	Volkswagen 1500	Porsche Super	Corvair (modified)
Acceleration in seconds.			
0-30	4.2	2.8	2.1
0-40	7.7	4.1	3.0
0-50	14.4	6.5	3.9
0-60	22.7	9.3	4.8
0-70	38.0	12.2	5.6
0-80	---	18.1	7.1
0-90	---	25.2	8.0
0-100	---	38.0	9.2
Standing Start			
Quarter-Mile	21.0/58	16.8/78	10.7/121
seconds/mph			
Speed in Gears			
1st — mph @ rpm	25 @ 4500	26 @ 5500	30 @ 5000
2nd — mph @ rpm	41 @ 4000	48 @ 5500	55 @ 5000
3rd — mph @ rpm	63 @ 4000	74 @ 5500	80 @ 5000
Top Speed mph	70	105	128
Mileage Range			
	30-35 mpg	20-25 mpg	12-18 mpg
Specifications			
Bore & Stroke	3.27 x 2.72	3.25 x 2.92	3.56 x 2.94
Displacement — Cu. In.	91.1	96.5	176.0
HP @ RPM	50 @ 3900	88 @ 5000	225 @ 5500
Torque — Lbs.-ft. @ rpm	70 @ 2400	86 @ 3700	205 @ 4500
Compression Ratio	7.8:1	8.5:1	10:1 (turbo-supercharged)
Carburetion	1 Solex	2 Zenith 32	1 Weber DOCE
Transmission	VW (4-speed)	VW (4-speed)	Corvair (4-speed)
Final Drive Ratio	4.38:1	4.38:1	4.38:1
Steering		VW worm and roller	
Turning Diameter		2.75 turns lock-to-lock	28.8 feet
Brakes		9.0 x 1.57-inch cast iron drum (F)	9.0 x 1.18-inch cast iron drum (R)
		155.5 square inches swept area	
Fuel Capacity		10.6 gallons	
Curb Weight — lbs.	VW — 1235	Corvair — 1310	
Wheelbase — inches	80.0		
Front Track — inches	56.5		
Rear Track — inches	57 to 62 depending on tires		
Overall length — inches	VW — 175.8	Corvair — 188.5	
Width — inches	63		
Height — inches	50		
Options: A great variety of options are available for Manx, including: roll bar, hard or soft tops, engine skid plate, wide-base wheels and special tires, long-range driving lamps, bucket seats, camping module, rear seat pads, etc. Write to manufacturer for complete listing.			

zippered side curtains. One foul weather drawback that might bother the finicky is the minimal fender protection. Mud and water picked up by oversized rear tires will spray forward alongside the body, and if the sidecurtains are not fitted...

Everything about the Manx is designed to make use of available stock Volkswagen components: Tail lights, instrument gauges, gas tank, pedals, even the windshield wipers. The only non-VW items necessary are windshield and accessory headlights.

The body is available in two basic kits, each with six choices of standard colors and five MetalFlake. Kit A consists of the reinforced fiberglass body, a 'glass nosepiece (hood) and pre-formed Cylolac instrument panel. This base kit sells for around \$500 and weighs just 95 pounds (lighter bodies may be built on order for competition). The B kit, far and away the most popular, weighs 145 pounds, sells for around \$650, and includes kit A components plus windshield, headlights, fender welting, various nuts and bolts, etc.

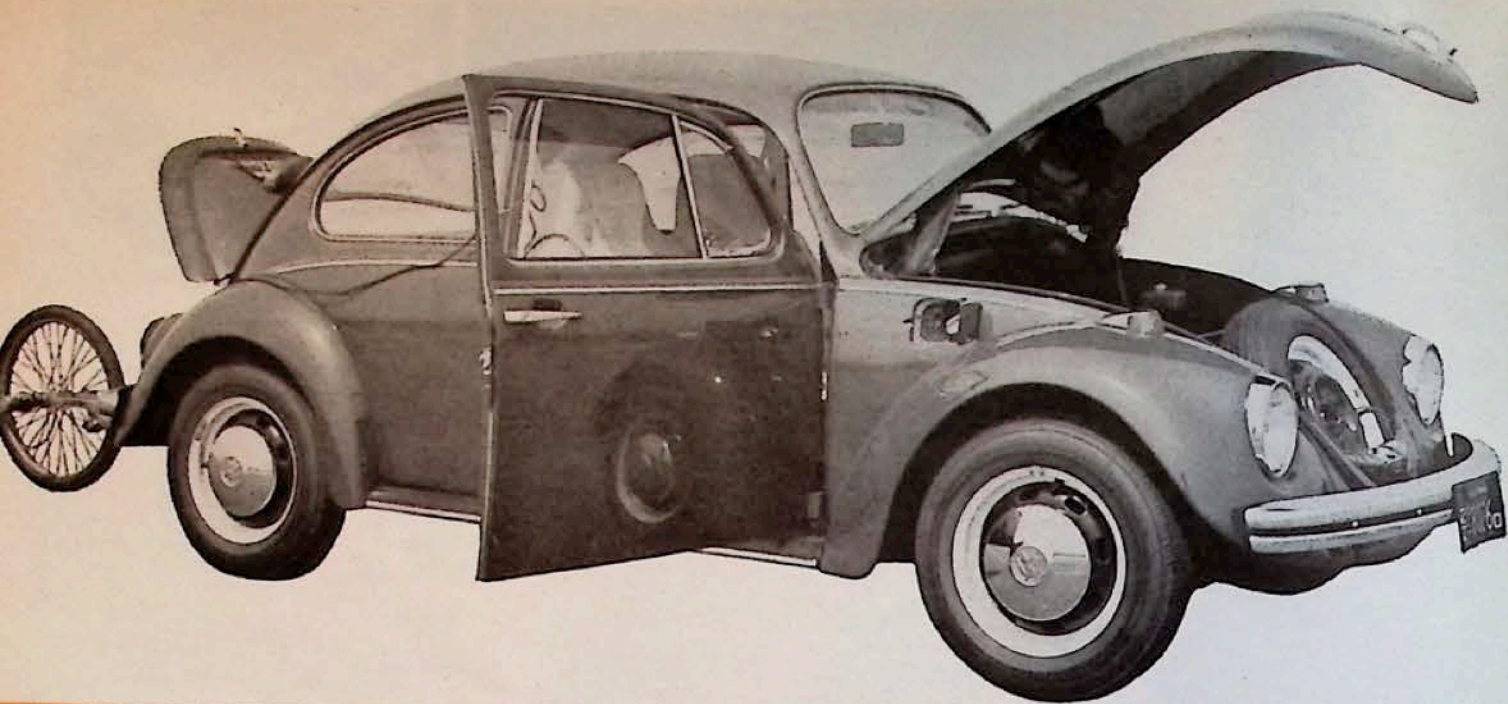
Depending upon what VW chassis and engine is obtained (prices for wrecked VWs range from \$300 to \$800), you can own a Manx for anywhere from a low budget do-it-yourself project for \$1000 or a sharp later model VW chassis-engine setup with a few extras for about \$1800.

As to the engine, you can be the judge. VW engines and transmissions of 1961 and later are recommended as they are 40-hp

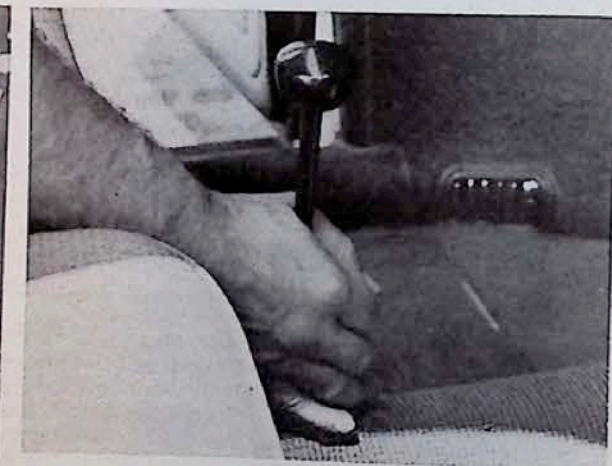
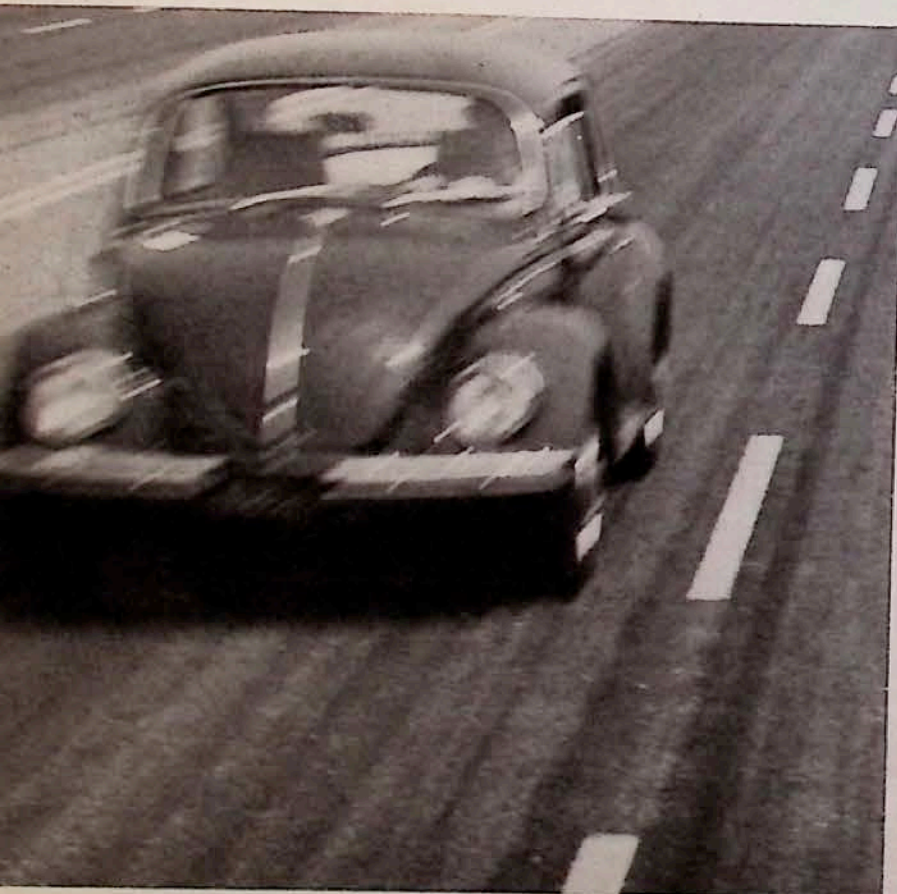
and with synchromesh. A stock 36- or 40-hp VW will cruise at 65-70 mph, but without the considerable wind buffet attendant with a sedan. There are many power options possible with this versatile engine, and displacement may be increased to a reasonable 1700cc's through use of Corvair cylinder barrels. Or there is the possibility of a Porsche engine, which means much better response throughout the speed range and a top end of near 110 mph. With a modified Corvair, you've gotta be a hero handler to hang on.

Worthy of mention is another type chassis being constructed for Manx body kits. Made by Conferr of Burbank, Calif., the new floorpan has been designed to accept a stock VW front suspension and the entire rear suspension/engine assembly from a Corvair. Obvious advantage of this combination is selection of American powertrain parts, and the possibility of using a Corvair automatic transmission, the latter having proved excellent for off-road use. Conferr built cars for television star Dick Smothers and actor Steve McQueen.

We think highly of the Meyers Manx, but it is one of those rare mechanical contraptions that defy total description—you've got to drive one to believe in one. Of course, by then you're so hooked you can't live without a Manx in the family garage, and there goes that promotion. After all, who ever heard of a bank president driving around in a dune buggy? /MT



Declutching the BUG



An automatic Volkswagen — who would have thought it in 1949? Better yet, who could foresee the beetle as a rival of Ford and Chevy? It's easy in 1968. For one thing there's a sign in the back window, only a brake pedal and the big sales figures. But, of course, German engineering didn't quite surrender everything to shiftlessness. If you grab the stick right, you can pick your gears with full power on.

by Eric Dahlquist

So here goes another year and the Volkswagen keeps right on rolling, putting down even Ford and Chevy occasionally — by now it's almost automatic.

The Hollywood Freeway is where it's at. And the Santa Monica, San Diego and Pomona. And Merritt Parkway and the Long Island Expressway. But not so much in Detroit. Motown's establishment can't really believe it's happened. At 5:30 from the GM building they drive out Woodward Ave. toward the great executive ghetto that wanders through the carefully defined primeval splendor of Bloomfield Hills, Mich., and it is almost impossible that in just three hours time, beyond the looking glass in the forever blue, smog filtered California afternoon the ritual of going home will be grinding through its zillionth stop-action replay. And this day as in the ones before, inexorably, evermore of those tawny, long-haired secretaries and the pale bank clerks and hippies and aerospace engineers will be filling the air with that familiar ticky 4-cylinder, air-cooled sound — the sound of the Volkswagen. Thousands of them. All jammed into 4-lane parking lots, four — sometimes six — in a row. Two abreast, three abreast. Every color that ever came out of Wolfsburg is here and a few more that would make factory people blow their minds. Flat out No. 1 in So. Calif. for January, '68 but this is nothing new. Eighth in total sales, nationally ahead of Rambler, Chrysler, Cadillac and Lincoln — unreal in a country where you have to average in places like Sioux City, Iowa, where they think buying a foreign car is something on a par with burning your draft card.

The big poo bahs in Detroit haven't yet fully analyzed the Beetle's attraction and there's no hurry because they've still got Sioux City. It's really pretty funny when you think about it. Good old Charlie Wilson said "What's good for General Motors is good for America," and he meant it. Keep buying those nine million cars a year no matter how practical they are, no matter how much money you lose in depreciation, no matter where they fit in the crowded metropolis setup. Just keep on buying, dumb, unwashed masses and don't look upon false overseas goods or you'll be suspect. You want the U.S.A. to go bankrupt or something? "We figure," a Chevy executive said in 1965, "that there is a fringe minority of 5% in this country that will always buy a foreign car no matter what. The VW appeals to these nuts and we're not going to bother competing in so small a market."

And so it went, and still goes. Beetles to the under 25 fringe minority who are suddenly the majority. Beetles for the college generation nuts who

are incidentally the thought-leaders and do not swallow Detroit's apple pie, we-know-what-our-customers-want-better-than-they-know-themselves philosophy. Beetles to the people who have suddenly realized they've been swindled with useless overhang, hornswaggled by bloated, gas-gulping horsepower they will never need, cheated by planned obsolescence, sucked in by phony economic cycles.

Aha, cried Detroit, you left wing comrades, just wait until Volkswagen has to comply with the Federal air pollution and safety standards, see where your low price goes then. Everybody knows what happened then, how VW took the standards very seriously, more seriously in fact than many of their whining American counterparts, and built a machine loaded to the gills with all that cute little trick stuff that made Detroit look like raving lunatics for ever doubting. The final *fait de complé* was the long awaited automatic. That was the one soft spot in the Teuton's armor, here came the Japanese in with their spirited Toyota and Datsun and they had automatics for those little suburban cuties you see on the deodorant ads who are afraid to face the rigors of a foolproof 4-speed manual. More than this there is generally a wave of automatic fever sweeping across Europe and those who buck the current will flounder in the salesrooms.

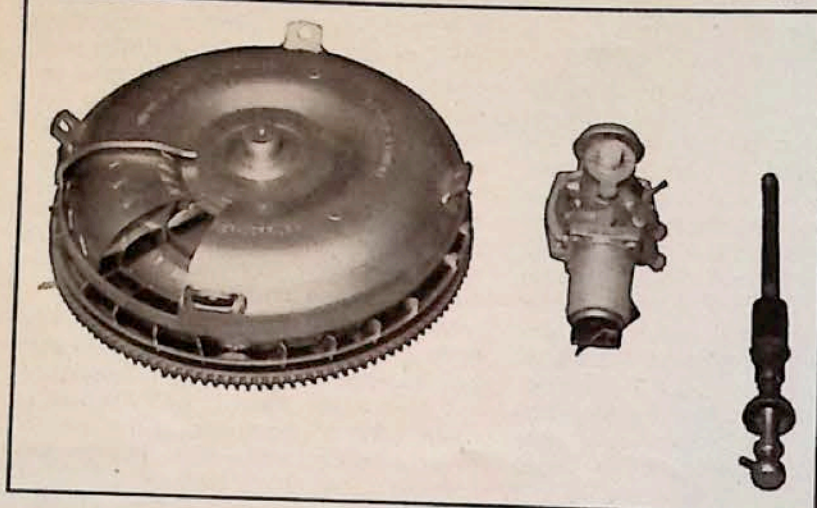
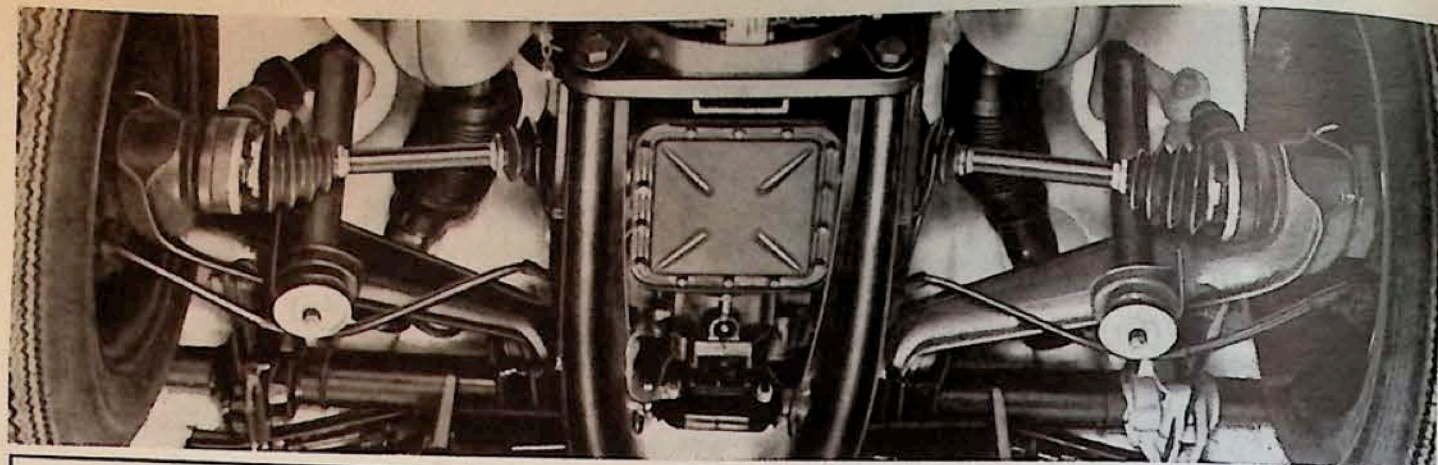
And so it came to pass that one of these new 1500 VW "stickshift" automatics fell into our hot little hands. Astutely, even as Henry Ford had anticipated the confusion and apprehension of going from a more to a less complicated clutch/shift arrangement as the Model T to A transition, Volkswagen decided to show everybody how their new baby operated, how it could be used like a full automatic or run through the gears like a real sports car. A TV commercial perchance. Unfortunately the commercial was wrong. Most of the time the hands of actor and actress involved rested languidly on the little shift lever — a shift lever which is the sensor for the electromagnet that actuates the vacuum operated clutch servo. That's how it works, you see. There's a normal single-plate clutch-disc and pressure-plate (bolted to a Borg-Warner torque converter) that vacuum disengages upon a signal from the shift handle. The driver makes a gear selection as he would with a normal transmission and, 1/10th of a second later, the clutch re-engages. The transmission offers four ranges: L or load range for heavy loads or hills, 0-34 mph; 1, for normal in-town driv-

ing, 0-56 mph; 2, normal driving range 0-80 mph.

Of course, we had seen the ad and knew how everything functioned. We leaped into the car, put the shift lever into neutral, turned the key on, to start the engine, put the shift lever into reverse (which is in the same time-honored spot as in the familiar "H" pattern 3-speed standard shift) by pushing down and forward, released the brake and back we went, right? Wrong. Nothing happened. We revved the engine a couple of times and still nothing happened. Hmm? Back through the sequence again. Still nothing. Great, we broke the car before we got out of the parking lot. We throw both hands up in disgust — chirp — the car jumps backwards. Voilá, you must keep your bloody paw off the shift lever if you want to move. Strike another blow for creative, instructive advertising.

With almost annual recent escalations of horsepower, the lowly beetle has become a minor-league hole-shot artist at traffic lights — but the automatic takes a step back on this march to acceleration whip-lash. The torque convertor, automatic transmission fluid reservoir, vacuum-operated clutch and its attendant mechanism added into the poundage of the extras demanded by the safety standards means a car assaulting the scales at 1940 pounds compared to 1735 for a '67 with a full tank of gas. In terms of quarter-mile acceleration this equates with an elapsed time of 21.43 seconds at 61.55 using powershifted low and second gears. Second gear starts were nearly a second slower and high gear was the price of yet another second. Putting in a new set of Champion L-82Y sparkplugs and replacing the air-cleaner with a velocity stack made from a plastic drinking glass with bottom cut out lowered the e.t. to 20.99 seconds.

Okay, drag racing isn't the VW automatic's forte just as the transmission is not the whole story of the car. Perhaps the most interesting piece of new engineering on the '68 and one which will doubtless go unnoticed by most is that the old swing axles of antiquity have been superseded by a trailing arm, half-shaft rear axle setup similar to Porsche. So similar in fact, that the bigger motor will now just about drop in now. Besides the engine swapping potential, more immediate benefits accrue. For opens the axles and constant velocity universal joints at either end are identical to Porsche's and therefore will last forever in a VW's unstressed life. In application, the negative camber of the rear wheel is increased slightly



Aha, that's neo-Porsche suspension under there Americana. Some pieces are actually the same and the cornering potential comes pretty close too. The car may not be as quick in the quarter as a standard, but in the esses it's adios mother. The semi-automatic system works like this: when anything touches the shift lever (on right), an electric signal is sent to the solenoid (center) that activates a vacuum servo, releasing clutch. Torque-converter is, if you'll pardon the expression, a small Borg-Warner unit. As you might expect, everything will last for decades.

DECLUTCHING THE BUG *continued*

during upward movements of the suspension, meaning any unusual weight or lateral force can never cause the wheel to "tuck under" as the phrase read ominously in the Corvair lawsuits. For as relatively short as Volkswagens are, use of large 15-inch wheels and the well executed torsion bar arrangement have always delivered an unusually good ride and the new rear suspension seems to upgrade it further, although the steering seems slightly stiffer.

In concert, the transmission/suspension refinements truly work wonders for a car that had its springing character altered somewhat last year (this still carries on as is in the standard shift version). VWs have always been classic examples of oversteering rear-engined vehicles but the half-shaft arrangement has changed this for a slight, steady understeer. On really exuberant cornering, the beetle's tail can be brought out but it is progressive and easily controlled with little roll. Considering the general improved handling characteristics, it appears a safe bet that the standard shift models will enjoy the new layout soon. In several impromptu dices with 4-speeds the automatic's weight penalty was no apparent handicap and the torque converter indeed a plus since it allowed the engine greater revving flexibility in the fluid coupling. If Volkswagen ever works a

Vehicle: Volkswagen Stick-Shift Automatic

SPECIFICATIONS
 Engine: 4 CYL. OHV. Bore & Stroke: 3.27 x 2.72 in. Displacement: 1493 cc (92 cu. in.). HP: 53 @ 4200 rpm. Torque: 78 lbs. ft. @ 2600 rpm. Compression Ratio: 7.5:1. Carburetion: 1 1-bbl. Solex. Transmission: 3-speed semi-automatic with vacuum operated clutch servo. Final Drive Ratio: .089:1. Steering: Worm & roller type. 19.0:1 gear ratio. Turning Diameter: 36 ft., curb-to-curb. Tires: 5.60 x 15. Brakes: Lockheed drum type. 9.5 in. diameter drum, 155.5-in. swept area. Suspension: Front: independent, trailing-arm, torsion-bar. Rear: swing axle, torsion-bar. Body/Frame: Unit, welded construction. Dimensions, Weights, Capacities: Overall length: 158.6 in. Overall width: 61.0 in. Overall height: 59.1 in. Wheelbase 94.5 in. Front track: 51.4 in. Rear track: 53.4 in. Curb weight: 1985 lbs. Fuel capacity: 10.5 gals.

OPTIONS & PRICES
 Stick-Shift Automatic; radio
 Price \$2029.95 West Coast poe.

PERFORMANCE

Acceleration	
0-30	6.3 sec.
0-45	12.4 sec.
0-60	22.0 sec.
0-70	39.0 sec.
Standing Start 1/4-mile:	
62 mph	20.99 sec.
Passing Speeds (2nd gear and 2nd & 3rd.)	
40-60 mph	12.8 sec.
50-70 mph	25.0 sec.
Speeds in Gear:	
1st	34 mph
2nd	56 mph
3rd	80 mph
Stopping Distance	
from 30 mph	41.1 ft.
from 60 mph	145.0 ft.
Mileage Range	21-25 mpg
Average Mileage	23 mpg
Speedometer Error:	
Electric Speedometer	30 45 50 60 70 80
Car Speedometer	28 42 47 56 66 85

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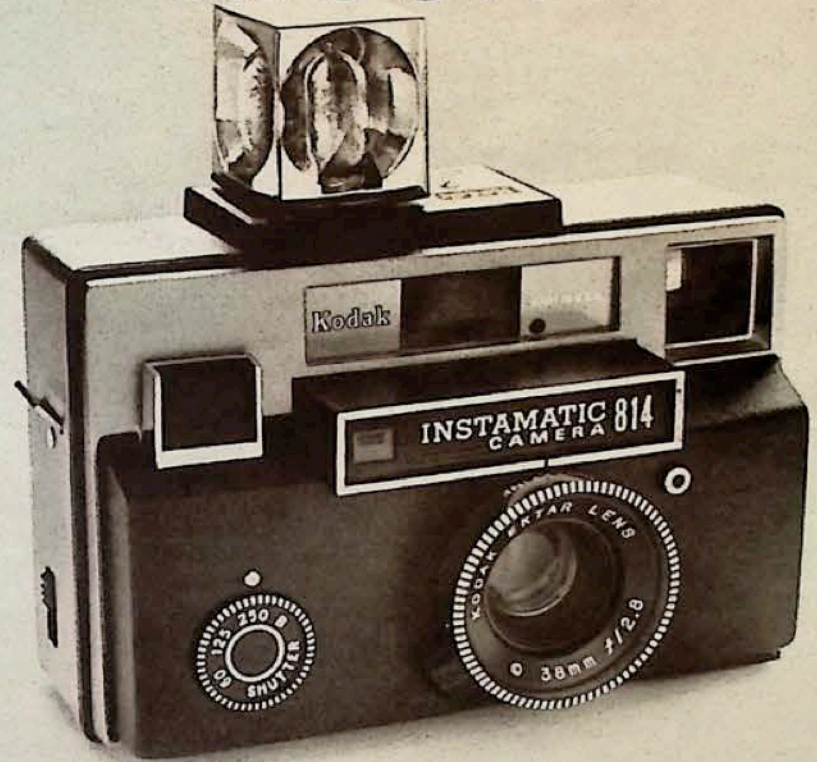
Whatever you do don't waste time pulling out the fresh air ventilation system. You can see how they goofed but wonder why. A fresh air box in the trunk takes air in through the plenum and directs it into the windshield. You get a hell of a breeze blowing over the back of the glass and the very top of your head but none on your face where it's needed. A second basic ingredient of every fresh air system is somewhere for incoming air to exhaust to. The VW has none and since the car's sealing qualities are well established, it is a problem—like having your own portable hot house on certain days.

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Kodak

Meet the sharper shooter.



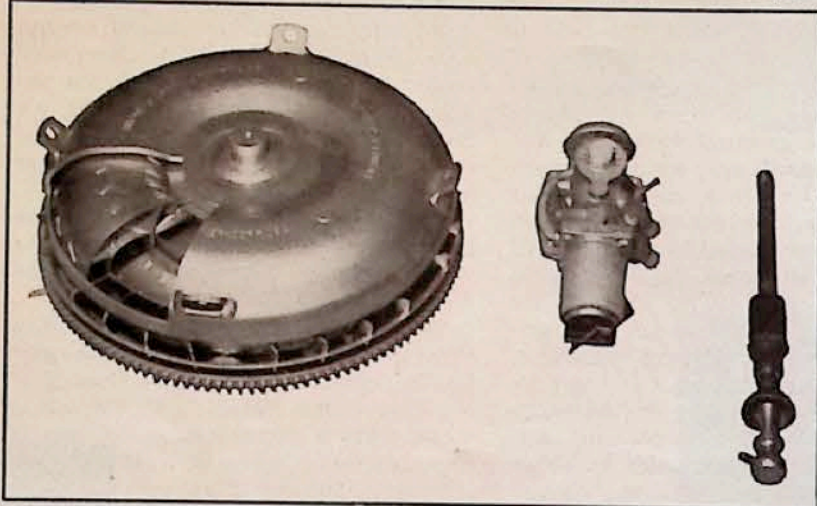
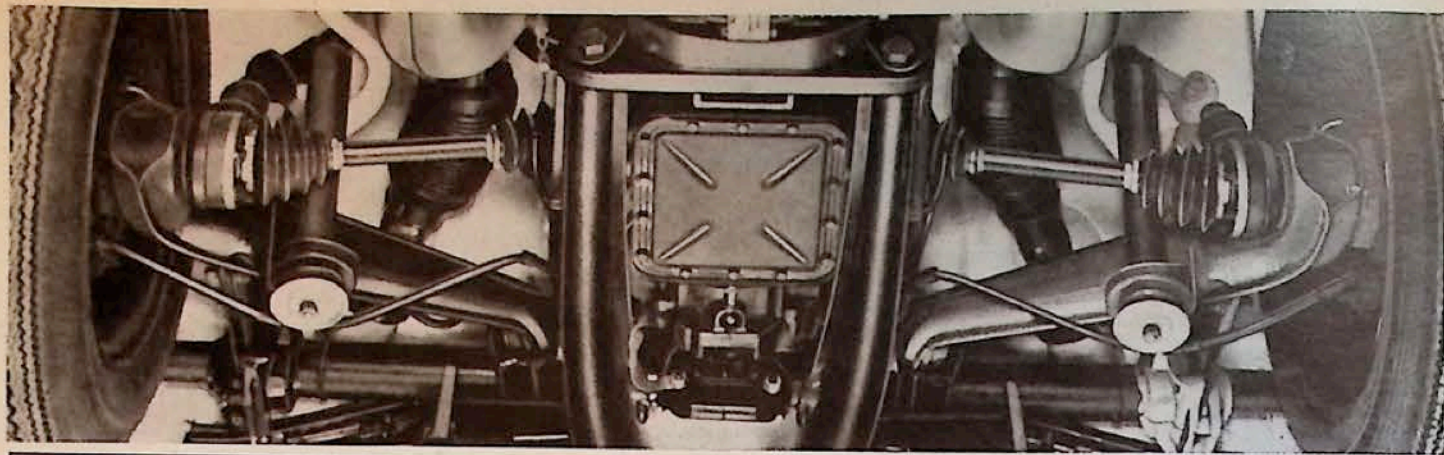
The brand-new Kodak Instamatic 814 camera lets you shoot sharper, clearer pictures your very first time out. And for two reasons. One, it has the superb new super-sharp 4-element f/2.8 Kodak Ektar lens. Two, it does practically everything for you automatically.



Just drop in the film cartridge. Automatically, the new "814" adjusts for the speed of the film. Adjusts for the level of the light, too, with its sensitive CdS exposure control—tells you if the batteries are okay—warns you when to use flash. For easy shooting, both film and flashcube advance automatically. And the lens-coupled rangefinder

helps you get a sharp shot every shot. See this sharper shooter, less than \$140, at your Kodak dealer's. Remember—no experience necessary! Price subject to change without notice.

Kodak Instamatic® 814 Camera.



Aha, that's neo-Porsche suspension under there Americana. Some pieces are actually the same and the cornering potential comes pretty close too. The car may not be as quick in the quarter as a standard, but in the esses it's adios mother. The semi-automatic system works like this: when anything touches the shift lever (on right), an electric signal is sent to the solenoid (center) that activates a vacuum servo, releasing clutch. Torque-converter is, if you'll pardon the expression, a small Borg-Warner unit. As you might expect, everything will last for decades.

DECLUTCHING THE BUG *continued*

during upward movements of the suspension, meaning any unusual weight or lateral force can never cause the wheel to "tuck under" as the phrase read ominously in the Corvair lawsuits. For as relatively short as Volkswagens are, use of large 15-inch wheels and the well executed torsion bar arrangement have always delivered an unusually good ride and the new rear suspension seems to upgrade it further, although the steering seems slightly stiffer.

In concert, the transmission/suspension refinements truly work wonders for a car that had its springing character altered somewhat last year (this still carries on as is in the standard shift version). VWs have always been classic examples of oversteering rear-engined vehicles but the half-shaft arrangement has changed this for a slight, steady understeer. On really exuberant cornering, the beetle's tail can be brought out but it is progressive and easily controlled with little roll. Considering the general improved handling characteristics, it appears a safe bet that the standard shift models will enjoy the new layout soon. In several impromptu dices with 4-speeds the automatic's weight penalty was no apparent handicap and the torque converter indeed a plus since it allowed the engine greater revving flexibility in the fluid coupling. If Volkswagen ever works a

Vehicle: Volkswagen Stick-Shift Automatic

SPECIFICATIONS

Engine: 4 CYL. OHV. Bore & Stroke: 3.27 x 2.72 in. Displacement: 1493 cc (92 cu. in.). HP: 53 @ 4200 rpm. Torque: 78 lbs. ft. @ 2600 rpm. Compression Ratio: 7.5:1. Carburetion: 1 1-bbl. Solex. Transmission: 3-speed semi-automatic with vacuum operated clutch servo. Final Drive Ratio: .0.89:1. Steering: Worm & roller type. 19.0:1 gear ratio. Turning Diameter: 36 ft., curb-to-curb. Tires: 5.60 x 15. Brakes: Lockheed drum type. 9.5 in. diameter drum, 155.5-in. swept area. Suspension: Front: independent, trailing-arm, torsion-bar. Rear: swing axles, torsion-bar. Body/Frame: Unit, welded construction. Dimensions, Weights, Capacities: Overall length: 158.6 in. Overall width: 61.0 in. Overall height: 59.1 in. Wheelbase 94.5 in. Front track: 51.4 in. Rear track: 53.4 in. Curb weight: 1985 lbs. Fuel capacity: 10.5 gals.

OPTIONS & PRICES

Stick-Shift Automatic; radio
Price \$2029.95 West Coast poe.

PERFORMANCE

Acceleration

0-30	6.3 sec.
0-45	12.4 sec.
0-60	22.0 sec.
0-70	39.0 sec.

Standing Start 1/4-mile:

62 mph 20.99 sec.

Passing Speeds (2nd gear and 2nd & 3rd.)

40-60 mph	12.8 sec.
50-70 mph	25.0 sec.

Speeds in Gear:

1st	34 mph
2nd	56 mph
3rd	80 mph

Stopping Distance

from 30 mph 41.1 ft.

from 60 mph 145.0 ft.

Mileage Range 21-25 mpg

Average Mileage 23 mpg

Speedometer Error:

Electric Speedometer	30	45	50	60	70	80
Car Speedometer	28	42	47	56	66	85

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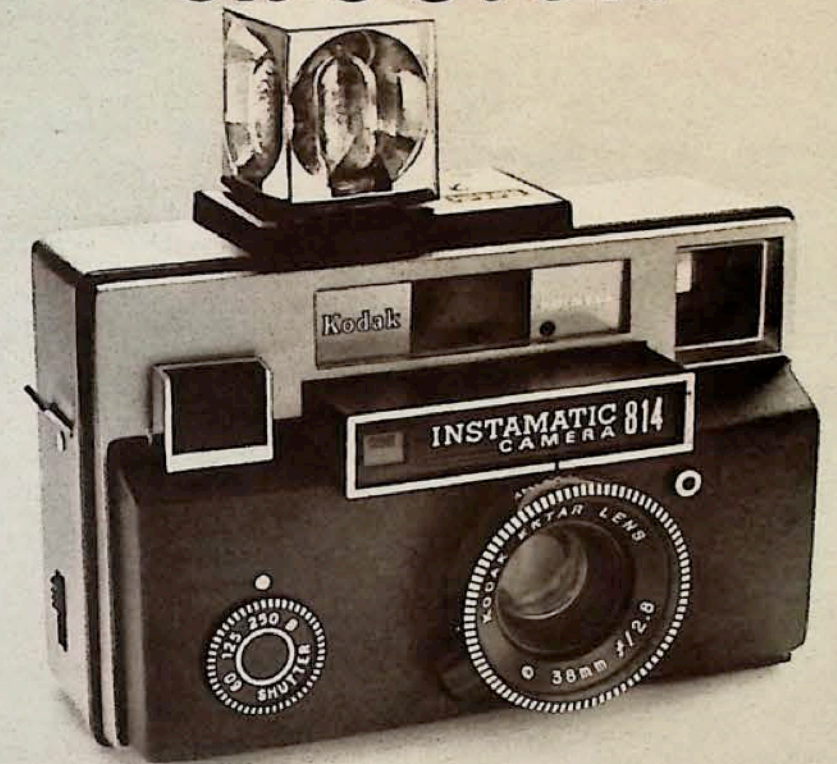
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Kodak Instamatic® 814 Camera.

Motoring trips often end up with a cash tally about three times as high as the original estimate. It's an unpleasant feeling to end up in some tank town with your car broken down and cash reserves depleted. But it happens to hundreds of unlucky, slightly careless vacationers every year. Mostly, you'd call it unrealistic planning. The final, total cost of a vacation almost never agrees with the paper figure you worked out in advance, but it should come pretty close. Here's how to keep expenses in line with your budget...

Reducing Minor Breakdowns

Ask a hundred drivers what kind of extra expense they faced on cross-country vacation and the most common reply is *tire trouble*. A skinned-out tire can be replaced at home for about \$15 to \$30, with either a high-quality recap or new unit. Why pay \$40 to \$60 to some desert-outpost type operator? So the first rule is, *Don't start out with thin tires!* If your route will cover several thousand miles, any tire with more than half the tread gone should be replaced.

Minor tune-up, like the replacement of points and spark plugs, costs less than \$10 per job in your home town. But in some midnight auto repair shop along the road the tally will be at least double. If your engine seems to skip a beat now and then, or sputters out the exhaust pipe, these are strong hints for plug and points replacement. Do it now.

The electrical system really takes a beating on open highways. The battery is force-fed with more current than it can store, and if the voltage regulator begins malfunctioning, you'll quickly burn out a battery, damage a generator or alternator, and end up with a replacement cost of up to a hundred clams. To avoid that kind of mechanical disaster have the regulator tested and reset, check the generator for output, and inspect that battery. If your car is more than two years old, the battery is going downhill. At three years you're pressing your luck. Four-year-old batteries are about as reliable as balloon tires in a cactus patch—they can go at any time. That \$10 battery at home will run about \$25 on the open road. There are two reasons for this: first, you'll pay full retail price with freight added; second, outlying stations often make it a practice to stock nothing but high-priced replacement parts.

The few steps outlined above don't really add up to much expense at home. You'll need to give each area some attention soon, anyway, so why not take care of it before some road-shark torpedoed your wallet?

Cutting Operating Costs

Just as a matter of brief review, here are some factors that need emphasizing

How to Cut Vacation Costs by Car

by V. Lee Oertle



each year about this time:

1) Fuel economy will not be improved by burning premium gasoline in an engine tuned for regular.

2) Using regular grades in an engine tuned for premium is not only false economy—it might be downright damaging to internal parts. A *slight* ping is acceptable, but a hard ping can definitely cause damage over an extended period.

3) Tire life can be materially increased on a long journey by adding about 4 psi over normal—particularly when heavier vacation loads are carried. The fastest way to ruin a good casing is to run it underinflated several pounds. Tire engineers say that you'll lose 18% of your wear-life with soft tires. Check tires daily, each morning when they're cool. Run them a few miles to warm them up, then check them again.

4) Don't make the common mistake of *over-tightening* the brakes just before leaving home. That would create a slight drag that heats up linings and leaves them glazed. Instead of better brakes, you'd end up with heat-fade at a much earlier stage. A normal adjustment is best, and not too hard on that wrench! Don't rest your foot on the power-brake pedal on long downgrades. Just the light touch of a shoe-toe on that power brake creates a slight drag on brakes. The result is unnecessary build-up of heat, which robs linings of strength when you need it most. Use that automatic transmission correctly. Place it in either 1 or 2 positions for long downgrades and save the brakes.

Handling The Lonely Outpost

Sometimes it can't be helped—you'll end up in a small town needing lubri-

cation or some kind of rack service. It's not claimed that every lonely gas station is just a tourist trap, because many of them are honest and efficient. But some are not, and those few can cause a lot of worry. Always hang around and watch the car. Look in on the serviceman every few minutes. If you leave the car on his rack and depart for a game of golf or a downtown restaurant, you'll deserve just about what you get.

Some older stations still use bulk oil. Reject it in favor of major-brand *canned* oil. Remember to stand close by and *watch him* add it to your engine. Sometimes a customer pays for two quarts and gets only one. That sort of thing is not completely eliminated yet.

Using Motels?

There isn't much point counselling anyone to "plan ahead and make reservations ahead of time." These days, we've got to take vacations when we can. On the other hand, finding a motel after dark is a dreary business that can cost plenty. First of all you'll worry a lot, drive farther than you planned, and make your passengers nervous with constant complaints about the lack of vacancies. If you get there after seven or eight in the evening you'll probably find only the most expensive rooms available. Instead of \$12 to \$15, the room tab might be \$20 to \$25. Even higher, in resort areas. Here are some tips to help you save money along these lines:

1) The best way to side-step no-vacancy signs is to stop early each day. If you get to the motel before four or five o'clock you'll have a greater choice of rooms, at lower rates. You can leave early the next morning to keep a tight driving schedule, if necessary.

2) If the budget is *really* tight, it's better to pay an extra two or three dollars for a room with kitchen facilities.

3) If you own a station wagon, you can often back it up to the motel room door. Rent a room for two, let two or three sleep in the wagon, depending on the age of the kids. That way, you'll have hot showers and bathroom for the entire family for the price of a 2-person rate. The fact is, you'll often encounter motels with only *small* rooms.

Trying The Off Season

Resort operators are delighted to give lower rates on all services either *before* the general summer season, or *after* September 1. The actual cut-off date for lower winter rates can be anywhere from Labor Day weekend to September 10. Facilities are less crowded at that time and the whole family will enjoy their vacation a lot more. Dining rooms won't be overflowing with tourists. You'll get better service all around at rates as much as 20% below summer prices.

/MT

photo: George Foon

Quiet

Tires are supposed to be quiet. But some tires—especially those made with nylon cord—aren't quiet. They develop flat spots after standing for a while. Nylon cord stretches when hot then cools flat when it rests on the ground. And the flat spot thumps when you start off again. Makes an otherwise smooth riding, quiet car feel and sound like a lumber truck on cobblestones. You avoid that with Dynacor rayon cord tires. They don't flat spot. Dynacor, the tough new breed of rayon, makes the quietest, smoothest running tires of all. Not just quiet when you start out... but quiet for your entire trip. The auto makers know it well. Most of their new cars come equipped with Dynacor cord tires. They have another important reason for going with Dynacor... safety. They know that no other cord equals Dynacor in the combination of smoothness, ride control, durability and dependability it gives to a tire. When you need a new tire, get a quiet one. Just look for the tires that are labeled "Dynacor rayon."

Quiet—
you get it from tires
made with

DYNACOR

RAYON TIRE CORD

American Viscose Division

**10% more
flat-out
power**



**Raceway tested
for highway use,
since 1931**

What makes RISLONE CONCENTRATE different? It's the new *total oil additive* that's guaranteed to give you a new surge in power within 10 miles, or your money back. That's because RISLONE *actually* works to dissolve gum, sludge and varnish deposits. Other additives only coat these power-robbing deposits with a temporary film of lubricant. RISLONE permanently frees sticky valves and lifters, eliminates once and for all the causes of lost power and compression.

To prove it, we asked Ted R. Willy, owner of the nationally known, Willy's Carburetion & Ignition Laboratory, Chicago, Illinois, to test RISLONE. Result? "The addition of a can of RISLONE to the cars tested produced a notable increase in the operating efficiency of each engine... and a 10% or more increase in horsepower." Add RISLONE when you change oil... and every time you need oil. At Service Stations everywhere.



For Free RISLONE Racing Decal send a stamped, self-addressed envelope to Racing Division.

The Shaler Company, Waupen, Wis. 53963

ANTI-SKID BRAKES

continued from page 41

torque reactions were used to trigger the Alexander Kerr anti-lock system, which was specially suited to simple front suspension applications. Most of the research on mechanical sensing methods has been devoted to the use of a flywheel, driven either by the wheel directly or by the car's driveshaft. The flywheel serves as a "memory." Under normal deceleration it follows the wheel speed down, then up to road speed again. But if the speed of the road wheel drops too rapidly, a sign of lockup, the flywheel meanwhile "remembers" the wheel's correct rate of deceleration, tending to continue at that rate. Machinery connecting the wheel and flywheel reacts to this speed differential and sends suitable signals to the brake release arrangement.

Flywheels were used by all the early rail and aircraft anti-lock systems: those of Westinghouse, Goodyear, Messier, Hydro-Aire and Dunlop. Bendix experimented with a flywheel system in the early '60s, for cars, and the two devices now offered for trucks by Kelsey-Hayes and Jacobs use flywheel-type lock sensing. Lockheed of Britain used a belt drive from the propeller shaft to spin a single flywheel for its 1962 rear-wheel-control system.

Dunlop's Maxaret, in production since 1966 for the Jensen FF, has been the most commercially successful flywheel-controlled system for cars. In its early demonstrations on disc-braked Jaguars it proved very effective, but with its aircraft background and a separate unit for each wheel it was far too expensive. But then along came Ferguson Research with its excellent 4-wheel-drive layout, which feeds all the wheel speeds to a central differential control and allows a single Maxaret flywheel sensor to be used. This was the arrangement adopted by all the later Ferguson test vehicles and by the production Jensen FF (for "Ferguson Formula").

Like most other flywheel-sensor devices, the Maxaret shafting between wheel and flywheel incorporates a spring-loaded roller riding in a vee ramp. The roller stays in the crotch of the vee normally, when the flywheel is easily following the wheel's velocity changes, and rides up the sides of the vee only when very high deceleration, at or over one g., indicates that lockup is occurring. The motion up the ramp can be used to operate vacuum or hydraulics directly or to trigger them electrically through solenoid valves.

One firm, Teldix, has developed a mechanical lockup sensor that works on a different principle. Within a cylindrical housing small enough to be

mounted next to a disc brake caliper, inside the wheel, Teldix has concealed a direct-reading mechanical accelerometer, immediately responsive to excessive wheel deceleration in relation to road speed. It generates a control signal which is used to actuate the brake's solenoid valves, making each wheel's anti-skid corrector a self-contained system. Among the mechanical sensor systems, the Teldix is best able to approach the ideal of 14 to 22% tire slip that provides the shortest stopping distances.

But mechanical sensors are by no means the last word on the subject. Electronics are playing a major role in several systems now vying for production. They could never have been considered for such applications if it were not for the staggering advances in transistors and microcircuitry that have brought down both the size and cost of the simple "computers" that are needed to do the job.

The electronic systems have their own versions of the "memory" supplied by the flywheel. Often they use a voltage proportional to wheel speed to keep a capacitor charged. When anti-lock is required the capacitor is isolated so that it "remembers" the original voltage, i.e., wheel speed, and supplies it to the computer which continually compares it with the voltage changes that occur as the wheel is slowed. From the relation between the two voltages, in the simplest terms, the computer decides how much anti-lock action needs to be taken and issues the necessary electrical commands.

Various kinds of inputs to these computers can be used. The electronic equivalent of the Kerr system was the torque-sensitive transducer used at each wheel of the 1958 Firebird III. The signal from this transducer reached a peak when wheel braking traction was at a maximum at the 1/8-slip point — making it a very good measuring stick for use by the GM-designed computer aboard.

A useful input can also be provided by a generator with a voltage output proportional to wheel speed. Goodyear worked with such a system in the early '50s, and Bendix also tried one experimentally. Currently Eaton Yale & Towne is using a "velocity transducer" driven at the transmission by the speedometer drive takeoff, where it produces a voltage proportional to the average of the speeds of the two rear wheels. A capacitor provides the memory for the miniscule Eaton computer that's proven fully capable of signaling the brakes to keep the tires in the maximum-grip region.

Other electronic systems use sensors, geared to the wheels, which produce fixed numbers of electrical pulses

continued on page 105

Opel Rallye Kadett. Manufacturer's suggested retail price: \$2325.26, includes Federal Excise Tax, suggested dealer delivery and handling charge. Transportation charges, accessories, optional equipment (chrome wheels on model shown below \$62.30 additional), state and local taxes additional.



The Mini-Brute shows its stripes.



Buick's Opel Rallye Kadett.

The economy import that's literally built for the toughest driving you can dish out—in rallies or otherwise.

Look under the stripes to see what we mean. Standard features include: An 80 horsepower (1500 c.c.) cam-in-head engine (equipped with an alternator instead of a generator). Available: a 102 (1900 c.c.) cam-in-head version. Special ratio 4-speed console mounted transmission. New heavy-duty clutch, drive line and rear axle. Power assisted front disc brakes. New, stronger front suspension and steering. A completely new rear suspension with coil springs—three link and track bar design. Roller bearings for all four wheels.

And then there are the obvious good things. Radially ply tires. Simulated wood three-spoke steering wheel. Special console-mounted instrument cluster, including oil pressure and ampere gauges and electric clock. 0.1 mile odometer. Tack. Fog lamps. Comfortable front bucket seats.



You can find out more about the Rallye Kadett (like which of the four exclusive Rallye paint colors you prefer) and the five other Mini-Brute models at your nearest Buick-Opel Dealer.

Here are a few examples of the way Opel Kadetts have shown their stripes. With records in some of the world's most punishing 4-10 day car contests—over all types of roads and through all kinds of driving conditions—these rallies are severe tests of a car's durability. And Opel Kadetts outlasted all other cars in their class.



Rallye Monte Carlo
January 11-22, 1967
1st in class—Lambart

Tour d'Europe
September 1-10, 1967
1st in class—Beck
2nd in class—Lambart

Rallye dei Fiori
February 22-26, 1967
1st in class—Beck/Heuser
2nd in class—Lambart/Vogt

Tour d'Europe
September 4-16, 1967
1st in class—Falkenberg/Maarfeld
2nd in class—Arend/Spork

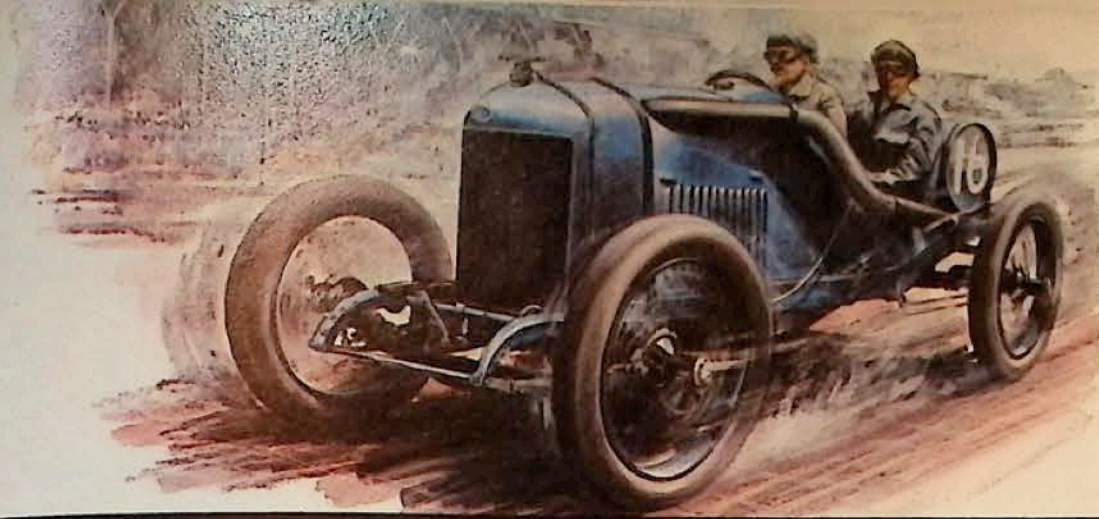
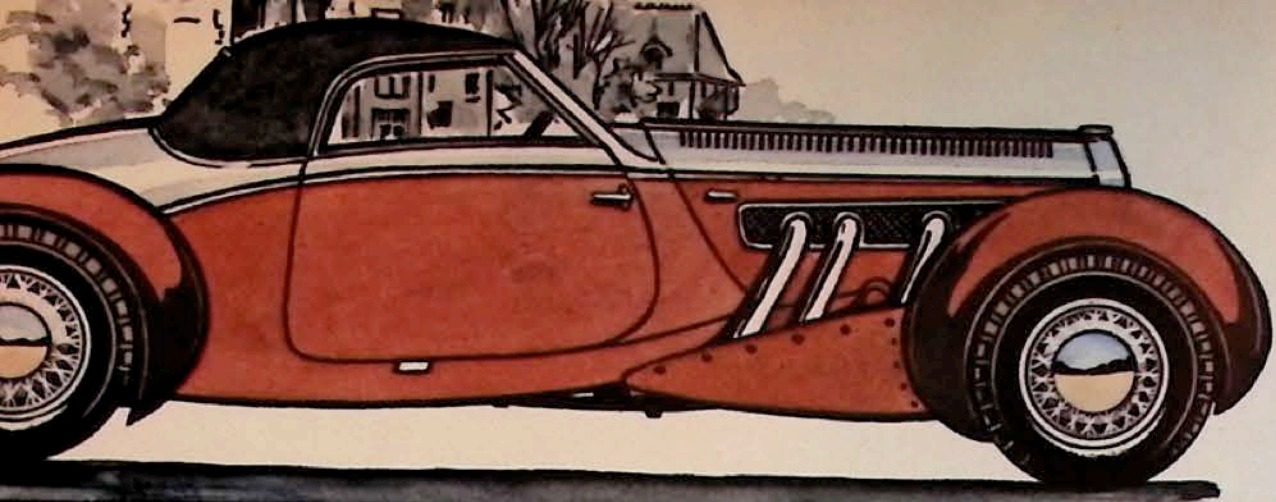
Buick's New Opel Kadett.

Best catch of the day!

We'd like to put in a plug for Budweiser, the only beer in America that's Beechwood Aged. That won't make the fish bite better, but it sure makes a difference in the beer you take along.

Incidentally, if you'd like to get your hooks on this Budweiser "Growler" lure (catches fish ... opens bottles and cans), send \$1 and your name, address, and zip code to: Fishing Spoon, Dept. O, Box 359, St. Louis, Mo. 63166. Offer void in states where prohibited by law.





STORY by RALPH STEIN / ART by CARLO DEMAND



Delage

Status Symbol of an Era

It wasn't until 1940 or so that I became familiar with a Delage — a D8/120 which was the proud property of a friend. This was a magnificent convertible bodied by the notable French firm of carrossiers, Letournier et Marchand. This elegant equipage, with outside exhaust pipes curving from the side of its hood, a well-padded top of brown mohair and big, upholstered seats of soft brown leather, had as svelte a body (with long tear-drop fenders) as anyone in this country had ever stopped to drool over. But in spite of the great weight of its lush bodywork and appointments, this big Delage was an impressively fast car for its day — over 90 mph. It was, mind you, no Bugatti or Alfa-Romeo, and I could, in fact, out-accelerate it in my 4½-liter Invicta. But it could outpace a 4½-liter Bentley and practically any American car of the immediate post-war years. Expectedly, its steering and roadholding abilities — even 30 years ago — were incomparably better than nine-tenths of today's Detroit productions.

The D8/120 had a straight 8, push-rod engine of 4.7 liters (282-cu.-in.) which developed over 120 hp (some claim as much as 140 hp) at 4000 rpm. It had hydraulic brakes and an independent front suspension which used a transverse spring and a split front axle similar to that on today's Ford trucks. Its 4-speed Cotal electric gearbox was shifted by means of a miniature lever-in-a-gate device up near the steering column. Although extremely easy to use, the Cotal box precluded close ratios — so that 3rd speed was a mite too low for quick downshifts for cornering and passing.

The first straight 8 Delage — the D8 — was first shown as early as 1929. It almost immediately became the favorite carriage of the *haut monde* — if not of the very wealthiest of that elegant sector of society. The really rich went for the rather more expensive Hispano-Suiza. In fact, the Delage looked so much like a Hispano that it was hard to tell one from the other unless one came close enough to see the oval blue badge inscribed "Delage." Some people even mounted Hispano storks on their Delage radiator caps.

continued on page 92

"Of all the oils I might have picked—and I've tried a lot of them—," says Gurney, "I settled on the new Castrol XLR racing oil because this multigrade oil is fortified with Liquid Tungsten to give superior performance under the most severe service. I recommend Castrol XLR for any car, racing or not, if the owner really cares about his power plant."

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Falstaff



RACING'S GREATEST EVER?



JIMMY CLARK

by Leo Levine

It was May of 1958 and the leaves on the trees of the Ardennes were dripping with rain as we sat in the pits and watched a group of Porsches and Alfas stream past. It was the preliminary race to the Grand Prix of Spa, which at that time was just another more or less minor sports car event, and I can't even remember why we were there; maybe it was because some of the restaurants in the area are so good.

For the first few laps we watched idly, but then a right-hand drive Porsche with British plates attracted our attention. It was only a 1600 Super and yet it was dicing for the lead with the Porsche Carreras and Alfa Veloces, despite being a good 10 or 15 miles slower on the straights. The program said the driver's name was Jimmy Clark and that he was from Scotland, and we had never heard of him. Then the sun came out, the track began to dry, the slower drivers in the faster cars moved up and Clark finished fifth. But while it was wet, we had seen something: it was obvious that whoever this kid was, he would be a winner if he ever got the experience and a fast car. We had no idea just how much of a winner he would be.

He drove in the main event, too, horsing a big D-Type Jaguar around the ultra-fast circuit while Masten Gregory won and Archie Scott-Brown, who was one of Jimmy's heroes, was killed. Clark placed eighth, and the sight of the plume of smoke from Scott-Brown's wrecked car gave him a permanent distrust of the Spa circuit. It was Clark's first race outside Scotland and it was the day a small part of the world at large first noticed him. Later on, despite the memories of his initial appearance on the ground where they once fought the Battle of the Bulge, he won the Grand Prix of Belgium four times on the same circuit.

We have a penchant, when it comes to measuring others, for retreating into numbers. It is the easy way out, relieving us of the necessity of explaining the abstract, and it gives us a thin justifi-

Photo: Rainer Schlegelmilch

fication for our opinions. The number in Jimmy Clark's case is 25. He won that many World Championship Grand Prix races. No other driver has done that. If you want to use numbers to explain what kind of a person he was, 25 is as good a number as you can find. Another one is 32. That's how old he was when he died on a wet track in the woods south of Heidelberg in another unimportant race.

The fact of Clark's death is no great surprise. Many racing drivers have been killed in the past, and, unfortunately, more will die in the future. What makes it so shattering is that Clark was the best. He was The Man Who Did Something Better Than Anyone Else, and as such we all (subconsciously at least) attributed to him certain occult powers. He developed an aura, a mystique; he became the untouchable man standing on the mountaintop, lonely up there, knowing that hundreds and even thousands of others were seeking his position. Perhaps that was the reason he kept his distance from the rest of the world; somewhere inside he felt if anyone got too close, they would discover the secret of his talent. He didn't know what it was either, but he was going to make sure no one else found out — and would be able to drive as fast.

How quick was he? Once he reached maturity as a driver, I don't think anyone ever outran him, as long as Clark had a car that was equal to those of his opposition. For one lap, or two laps, yes, but never for an entire race. In the early 1960s while he was getting his feet wet in single-seater equipment, he did it on sheer ability. Then, at some point between losing the 1962 World Championship because of a mechanical failure and losing Indianapolis the next year because of the oil incident, Clark discovered something. He realized that he didn't have to beat *them*, but rather they had to beat *him*. Armed with this enormous psychological advantage, he was even tougher.

From Spa and the Porsche to Indian-

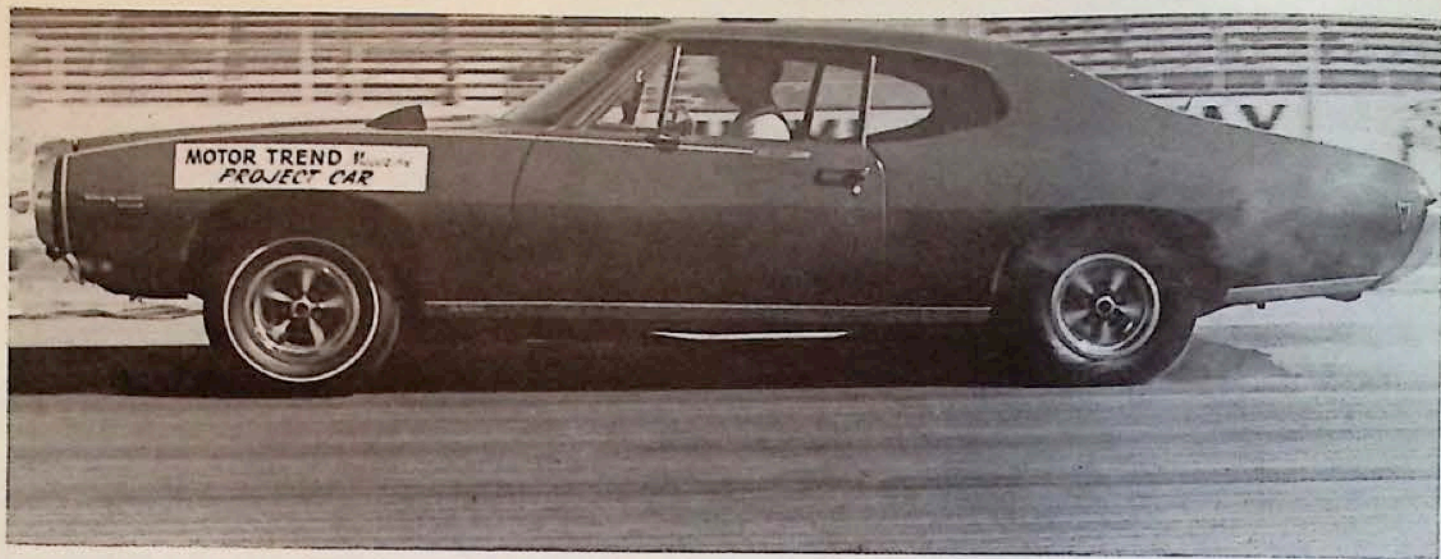
apolis and two world championships the legend grew, and it grew relatively slowly at first. Clark had none of the built-in isolation of Juan Manuel Fangio's language barrier and he had none of the commercial flamboyance of Stirling Moss, nor was he as articulate. His natural reserve and his unfamiliarity with his surroundings were what kept him seemingly aloof at the outset. Later, after he had been misquoted by various newspapers, he avoided all but a few writers. And all the while the numbers piled up, race after race, victory after victory.

Then his reserve became part of his charm. By now the acknowledged champion, his very reticence added to the mystique. He didn't have to be garrulous. He had a ready smile, and he had all those numbers to speak for him. The numbers were good enough for most persons. Those who wanted more found Clark was selective in his choice of friends, and even in his choice of acquaintances.

Then he was gone and we were reminded that none of us is untouchable. That is what made it so shocking, even to the man on the street who knew only that he was some Scotchman (sic) who once won at Indianapolis. When the news of his death arrived in the so-called "inner circle" of racing people in this country there was an immediate reaction as soon as the first shock had passed. It must have been a mechanical failure, everyone said. This was a tacit refusal to admit that Clark was capable of making a mistake, a refusal on our part to admit to ourselves that the man on the mountaintop was nothing more than a human being, and that the laws of tire adhesion are immutable.

If he died because of a mechanical or material failure, his death would be even more of a tragedy, but it doesn't make any difference. It is something like golf; when someone asks your score they don't want to know how, just how many. He is dead and that is really all that matters.

/MT



The supercar: third generation

Some sons try to achieve more success than their ancestors. This one might succeed.

In April, the 350-cu.-in. Tempest, after having been Bobcatted by Milt Schornack and Dave Warren of the Royal Pontiac competition department in Royal Oaks, Mich., proved to be an unadulterated street racer of honest ilk. Since then, it has been nursed through another couple of hundred dollars' worth of alterations, most notable being an adaptation of the GTO's Ram-Air package.

On the small, lightweight 350 engine, all of the GTO's Ram-Air component parts were installed. Even the 400-cu.-in. GTO heads were brought down to a minimum volume of 61cc and spring heights were set at 1.776.

A Ram-Air cam with a 308-degree duration on the intake and 318-degree duration on the exhaust was installed.

Carbs were again jetted 6% richer than on the basic Bobcat. For the Ram-Air package, hood scoops were in-

stalled and the air cleaner was modified. To complete the breathing modifications, Doug Headers are used.

Transmitting this new power are a Schiefer clutch and pressure plate with a stock flywheel for durability. The rear axle ratio was changed from the 3.91:1 unit to a new 4.33:1.

With all original accessories still intact, and the car in good street condition, weight is only 3505 pounds, far below the average supercar—a property which also makes the car quite roadworthy away from the dragstrip.

While the purveyors of the Tempest Bobcat project want us to refer to it as the Mini-GTO, we feel our original cognomen is more appropriate—Son of GTO. At least, for a late generation supercar that will outperform its elders, it certainly is more just.

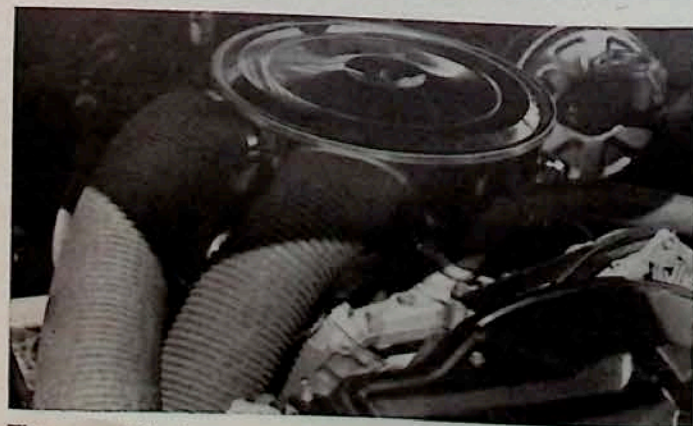
For quarter-mile runs, two different sets of M&H, A-140 compound tires

were used—800 and 850 x 14s, then 900 and 950 x 14s. Though the engine was quite capable of turning tighter, shift points proved to be most effective at 5900.

In short, times with 800 and 850 x 14 tires were consistently in the 13.20s at 105 to 106 mph, and with 900 and 950 x 14s they were better: 13 'teens and as fast as 107.27. Enough said. /MT

QUARTER-MILE TIMES AND SPEEDS

800 and 850 x 14 tires	900 and 950 x 14 tires
13.23 @ 106.13	13.14 @ 107.27
13.22 @ 106.00	13.16 @ 107.01
13.27 @ 105.50	13.20 @ 106.64
13.24 @ 105.75	13.14 @ 106.64
13.25 @ 106.38	13.19 @ 106.88
13.28 @ 105.38	13.18 @ 107.27



The crux of the Tempest Bobcat's modifications is the GTO's Ram-Air installation adapted to Tempest's 350-cu.-in. powerplant. That also means external changes like hood scoops.



Mohawk's high mileage fiberglass wide track

Mohawk's new XR-70 Wide Track delivers *three times* the mileage of ordinary wide tires. And it outperforms every one of them, every mile of the way. If you know what driving is all about, we don't recommend any other tire.

The XR-70 is a 2-plus-2 belted-bias tire. Two plies of extra strong nylon, bead to bead. Two belts of fiberglass under the tread. The way Mohawk uses fiberglass, this tire performs magnificently.

The tread is stabilized, minimizing tread loss from squirming. It's this steady tread print, plus the deep tread of Mohawk's slow-wearing Buta Syn rubber, that triples tire mileage. Tread stability also improves traction. You'll notice faster starts, quicker stops.

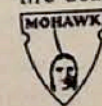
While other wide tires lift their tread edges when cornering, the XR-70's fiberglass belts keep the full tread

width at grips with the road. Aquaplaning is dramatically reduced. The belts keep the grooves open, let water flow through without build-up.

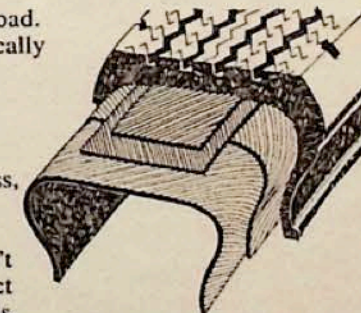
In nylon and fiberglass, Mohawk uses two of the strongest of all ply cord materials. You can't buy a safer tire to protect you against road hazards.

Mohawk spent two years developing the XR-70—the first wide track that won't wear out its welcome. In your choice of white or red stripe sidewall, in a complete range of 70 series sizes—there's one to fit your car. It sure looks like a winner.

We suggest you see for yourself. See your Mohawk tire dealer.



THE MOHAWK RUBBER COMPANY
Akron, Ohio 44309



MOHAWK XR-70



Here's a new Beetle-Baiter that's snug as a Bug.

Toyota Corolla 1100

It may be out of line to compare Toyota's new Corolla with an antecedent, the ill-fated Tiara, which was well-rated for economy and performance back in '64. Like Corolla, the somewhat larger, similarly powered Tiara was priced in the \$1600 range, but flunked the U.S. consumer test and was quietly phased out. The Corolla, however, can hardly be considered Tiara's replacement. For one thing, respect for the quality of Japanese engineering had not yet reached its current, and rightful, zenith. For another, it is quite probable that this country was not quite ready for still another assault on monster (in sales) Volkswagen. Lastly, the Corolla is an all-new car, and Toyota is apparently gambling on a more receptive market climate for its spunky little entry.

Powertrain & Performance

From a cold start, the Corolla is not impressive. The 4-cylinder 65.8-cu.-in. overhead valve engine cranks up quickly enough, making the hand choke almost superfluous, but she's rather balky in low gear, uncertain in second. By this time you should be out of your driveway. Give the Corolla a mile or so of warm-up, and you'll find life can be full of surprises. We did.

Sixty stompin' horses love their work, so a tendency to whine at higher speeds may merely be excitement, but engine noise isn't excessive, and it winds up pretty high without protest. This mill puts out plenty of torque, too (61.5 lbs.-ft. @ 3800 rpm); more than enough for Toyota's new baby to pull its own weight and, possibly, a bantam trailer. We didn't try that, but did load up on three hefty passengers with no apparent strain. We wonder how much additional weight load, as well as less tire wear, could be achieved if the 12-inch wheels were slightly larger.

Toyota claims an 85-mph top speed for Corolla, and they're right—if you

can wait a minute or so. With a compression ratio of 9.0:1 to allow optimum hp on regular gas, the factory is modest about fuel consumption, pegging it at 30.0 mpg. Our 29.9 was recorded under hard driving conditions. Average was 31.0-32.0.

Handling, Steering & Stopping

Cruising at 75, we were impressed with a secure sense of control and minimum vibration, partly attributable to the 90.9 wheelbase, rather long for a car this size. But the Corolla really comes into its own on bad roads and crowded streets, where handling characteristics can make a joyful experience of twisting in and out of tight places. The precise, predictable steering requires no muscle, and downshifts are flawless. A mild understeer is evident in hard cornering situations, and handling for the most part is a well engineered feature for a car in this price range. One is tempted to navigate tight corners in gear, sans brakes, for a no-lean turn.

An unplanned rainstorm led us to conclude that Corolla, in the parlance of a different breed of horsepower, is a mudder. No slip, no slide, no stall—engine and brakes proved as weather resistant as the interior, and the well-designed suspension held the road as well as some heavier and more expensive pseudo-sports machines.

The 7.9-inch hydraulic drums do a top drawer braking job: an impressive 20 feet at 30 mph, 128 feet at 60 mph with no swerve, no fade, no problem.

Comfort, Convenience & Ride

American drivers will find the bucket seats adequate. Not too large, not luxurious, but comfortable. And they recline fully. We were surprised by the pleased reaction of domestic-oriented passengers to the cozy back seat, and a frequent question boiled down to, "How did they put maxi-room into that

mini-body"? Leg and head room are more than ample for four big people or five little ones, and detail is excellent, although some drivers may miss an armrest. The steering wheel seems rather large, but—unlike many imports—there's no chance of getting your hand caught between wheel and door.

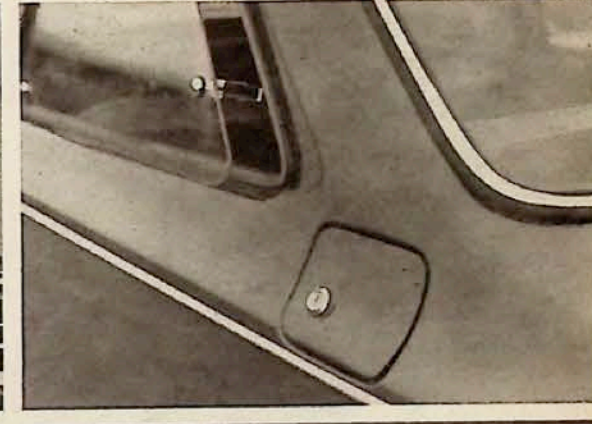
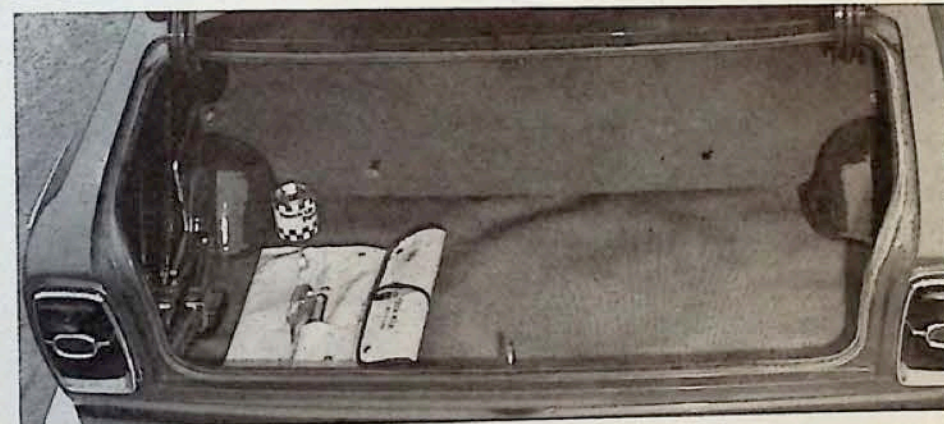
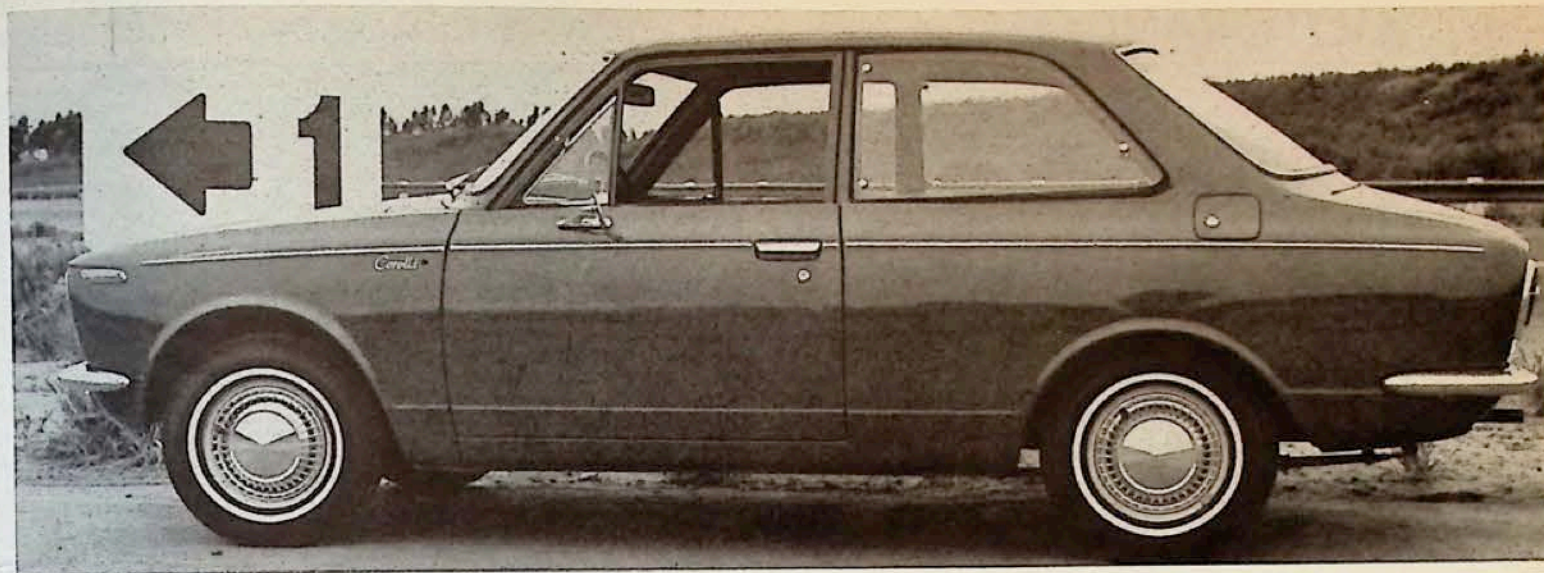
It's a safe bet that Toyota's chief designer is a smoker. Why else would the ashtray be situated so close to the wheel that, with a slight move of the right hand, you can flick an ash and never take your eyes off the road? Too bad he couldn't eliminate the window noise, which is evident at speed. The standard safety requirements—belts and harness, recessed steering column, padded instrument panel, door locks, backup and running lights—are all tastefully integrated.

Clearly one of the best features of the Corolla is its smart, contemporary styling, with some attendant practical benefits: minimal wind resistance and superb visibility. Wind wings and a good ventilation system help the cooling process on warmish days. On cold nights, the potent little heater-defogger does a man-size job of keeping the cockpit snug.

Plus and Minus Features

Performance-acclimated drivers will hardly be enthusiastic about cold starts, acceleration in lower gears, or passing in any gear. It's not love at first sight. Motor Trend staffers, however, who first tended to dismiss the wee car with benevolent smiles, later willingly traded their big cars for fun runs around town.

With its tiny (\$1600) price tag and cabin comfort, the nimble Corolla may have a lot going for it, especially as a Campus Commuter. It's economical, maneuverable, easy to park—and has an esoteric appeal that should turn on the "in" crowd. All it needs is enough people to try it on for size. And wear it well.



Evidence of Toyota's thoughtful attention to detail is found in clean-cut Corolla styling and in neat trunk compartment, which includes tools and touch-up paint.

PERFORMANCE

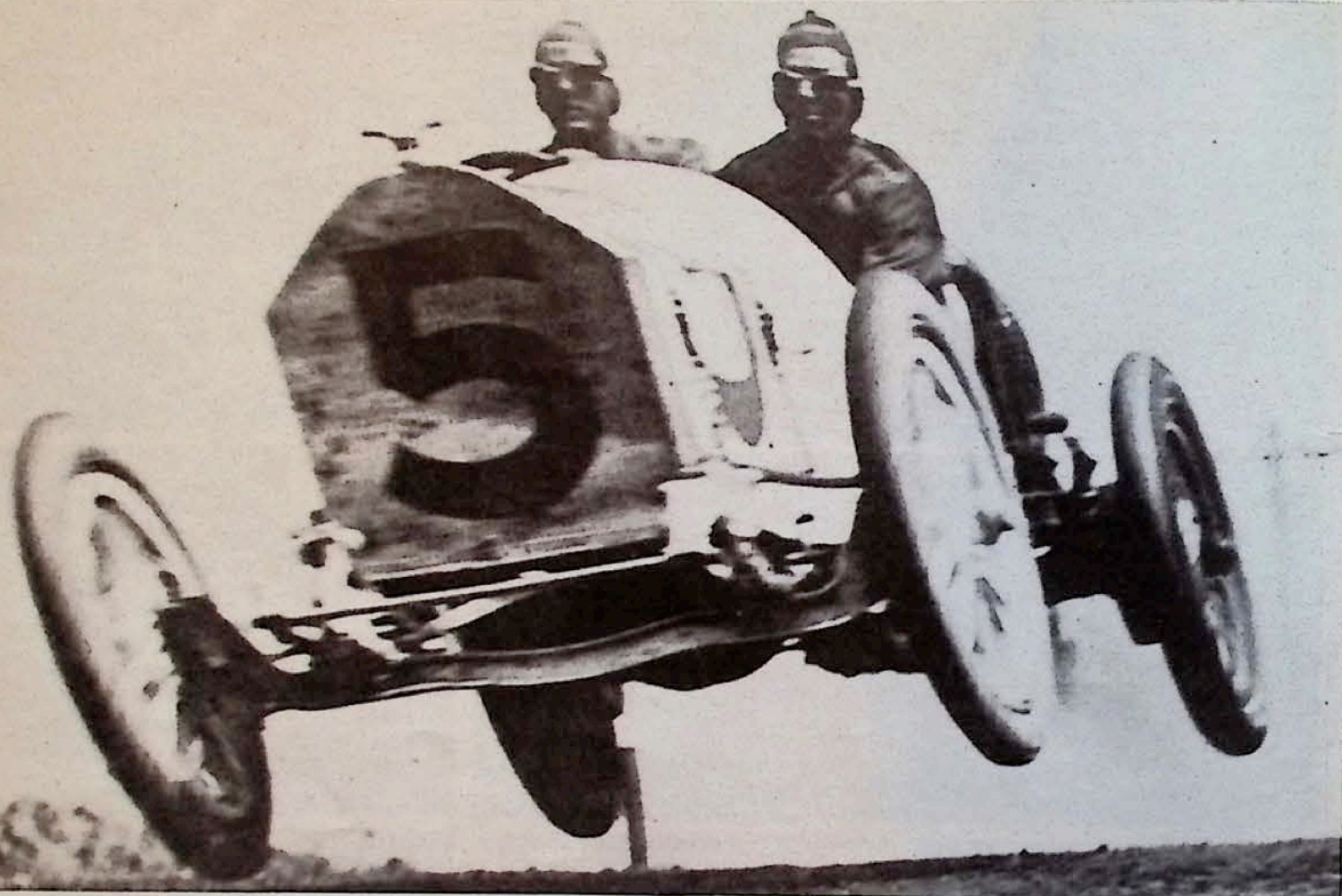
Acceleration	5.6 secs.
0-30 mph	12.0 secs.
0-45 mph	20.2 secs.
0-60 mph	37.5 secs.
0-75 mph	
Passing Speeds	
40-60 mph	15 secs. 1098 ft.
50-70 mph	16.8 secs. 1478 ft.
Standing Start 1/4-Mile	
62.45 mph	21.51 secs.
Speeds in Gear	
1st	20 mph @ 5000 rpm
2nd	36 mph @ 5000 rpm
3rd	54 mph @ 5000 rpm
4th	60 mph @ 4000 rpm
MPH Per 1000 RPM	15.0 mph
Stopping Distances	
from 30 mph	20 ft.
from 60 mph	128 ft.
Mileage Range	29.9-32.0 mpg
Average Mileage	31.5 mpg

SPECIFICATIONS

Engine: 4-cylinder ohv Displacement: 65.8 cu. in. Bore & Stroke: 2.95 x 2.40 in. Compression Ratio: 9.0:1 HP: 60 @ 6000 RPM Torque: 61.5 lbs.-ft. @ 3800 rpm Carburetion: Down Draft 2-bbl. Transmission: 4-speed all synchromesh. Rear Axle Gear Ratio: 4.222:1 Suspension: Front, independent, coil springs, telescopic shock absorbers, struts, & lower wishbone; rear, semi-elliptic, transverse leaf springs; and telescopic shock absorbers. Brakes: 7.9-inch drum hydraulic, all 4 wheels. Tire Size: 6.00 x 12, 4-ply. Overall Length: 151.4 in. Overall Width: 58.5 in. Overall Height: 54.3 in. Wheelbase: 90.9 in. Front Track: 48.4 in. Rear Track: 48.0 in. Curb Weight: 1545 pounds.

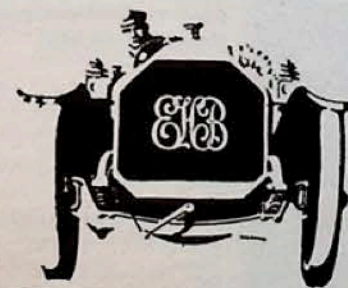
Photos by George Foss & Gerry Stiles





ROBERT BOSCH CORP.

(Above) Winner Gil Anderson's Stutz becomes airborne during the 1913 Elgin National Road Race in Illinois. (Right) The current vogue for car owners' initials recalls the popularity of monograms made in 1911 by the famed belt and buckle firm of Hickok. (Below) Lois Wilson and Bryant Washburn are the romantic pair in a specially-built Packard speedster used for the 1919 Paramount movie "It Pays To Advertise." (Below right) An inflatable male figure to protect women driving at night has recently appeared in stores. Not exactly new, as a similar device was used in 1921 to guard against car theft.

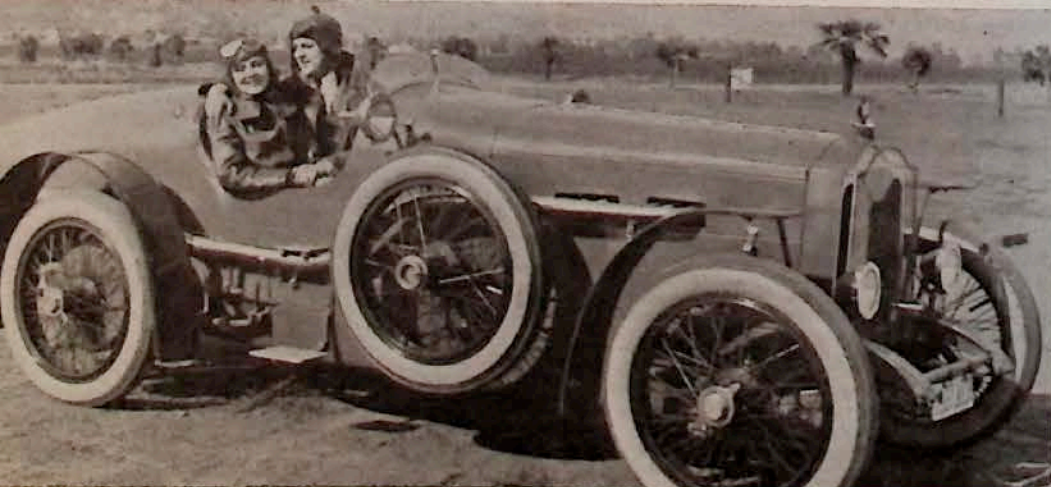


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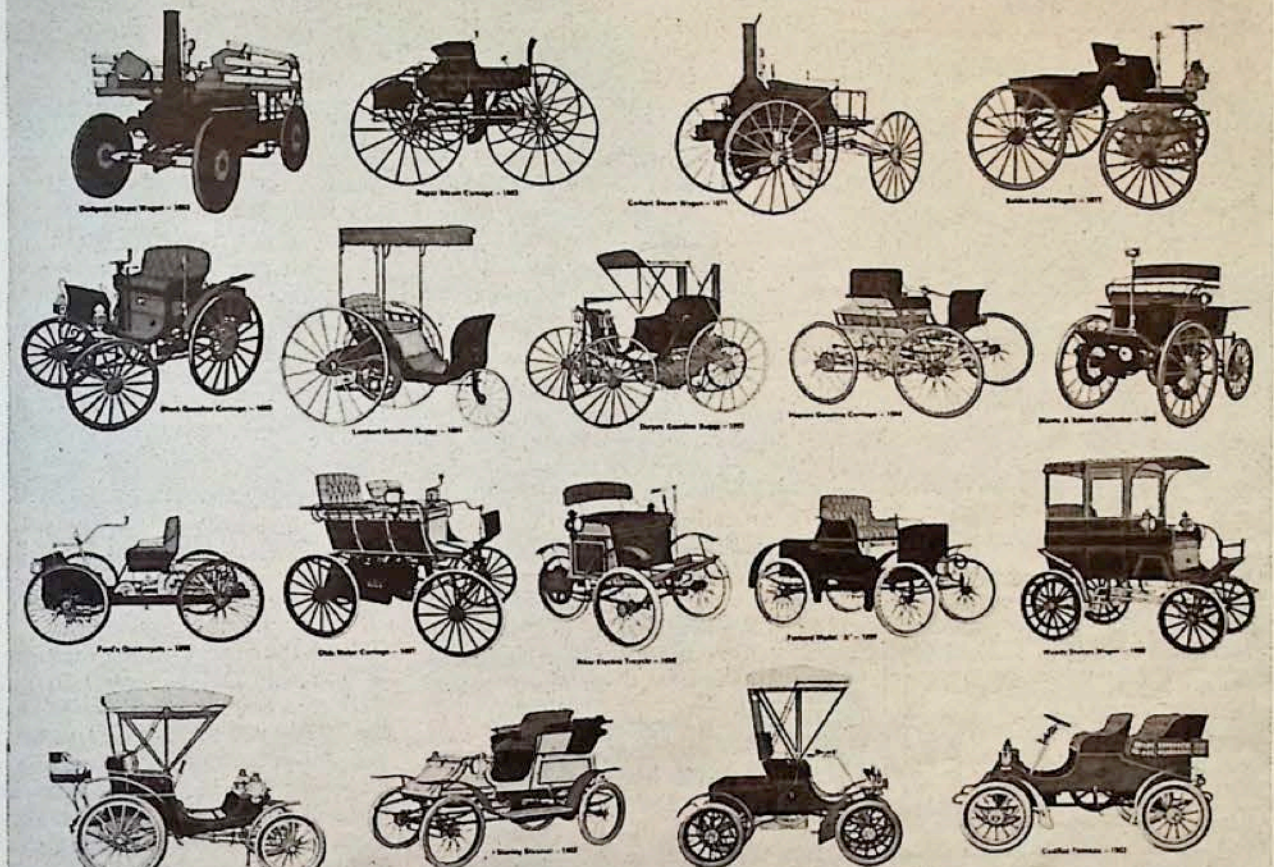
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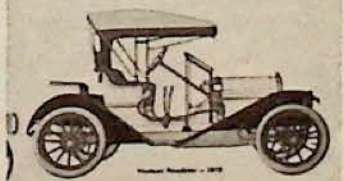
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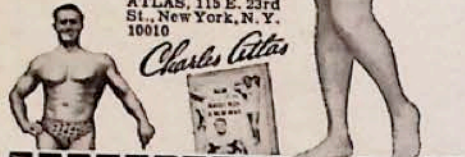


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DELAGE

continued from page 81

All of the very great French coach-builders built bodywork for the D8 — Saoutchik, Letournier et Marchand, Binder, Fignoni et Falaschi. If you go back to look at issues of that plush French magazine, *L'Illustration* in the Thirties, you'll see many photographs of lissome young women posed with D8 Delages at *Concours d'Elegance*. For the Delage was the car you bought your girl friend if you were a well-heeled Frenchman.

The D8 (which had a 240-cu.-in. engine) was far from being a mere show car clothed in elegant bodywork. In 1931, the D8 *Grand Sport* in sporting form attacked the 24-hour record at Montlhery and averaged 109.619 mph and broke world records for its class. In a later attempt, a D8 *Grand Sport* averaged 112 mph for 12 hours. These speeds were attained with perfectly standard chassis. The bodies used were, however, 2-seaters of tissue-paper lightness.

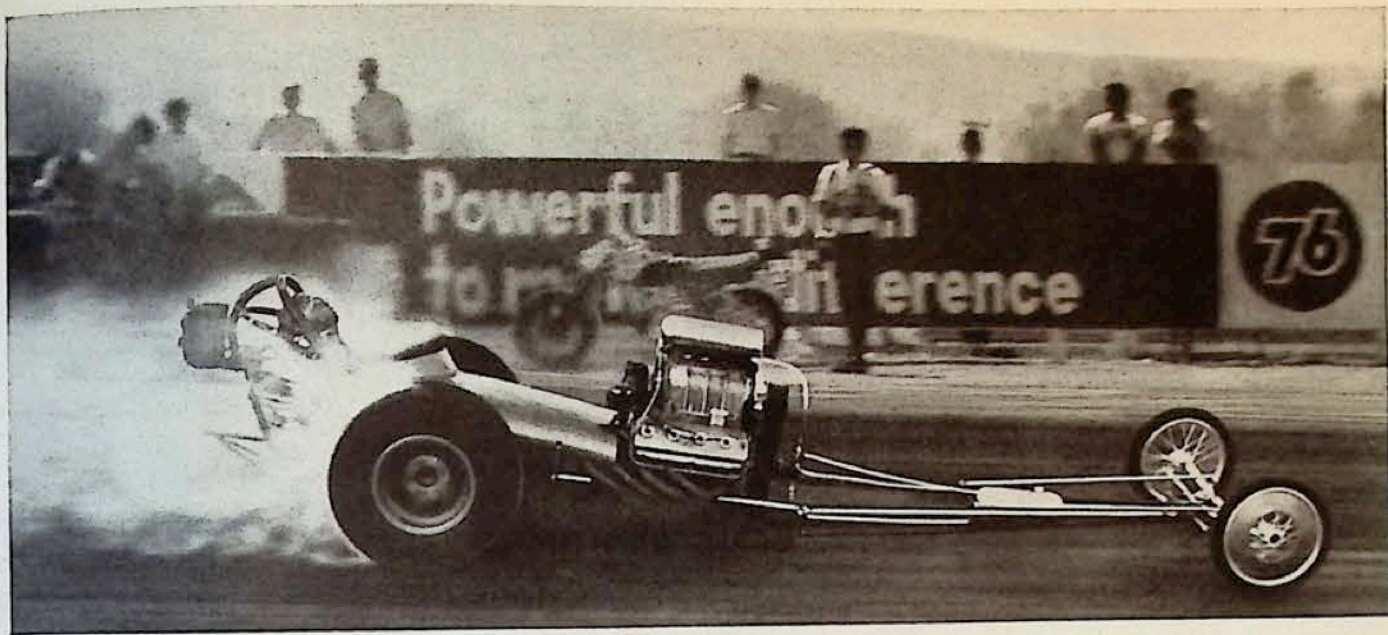
The D8 became even more sporting. Between 1932 and 1935 new models, the D.8.S. and the D.8 SS raised the speed of the original D8 from a somewhat stodgy 80 mph to over 100 mph. This was done by lightening and lowering the chassis and by increasing engine horsepower to 145. Compression was raised to 7.5:1 and rpm went from the D8's 4000 to 4500. Although these newer D.8. SS and SSS handled like super-sports machines and could be ordered with "short" 122-inch wheelbase chassis, it was never Delage's intention that they be anything but fast, luxurious tourers, in spite of the fact that some owners entered them in races and high-speed rallies. Louis Delage built other machines for racing purposes. Some of the greatest racing cars

that ever took to the world's racing circuits bore the blue Delage oval.

Louis Delage left the engineering staff of Peugeot in 1905 and with three employees started building cars of his own with de Dion engines in 1906. His success, due in part to his racing wins, was immediate. By 1907 he had 85 employees. Five years later they numbered 350. In 1911 his *Voiturettes* came in first and third at Boulogne. In the French Grand Prix in 1913 two 6¼-liter Delages driven by Bablot and Guyot didn't do better than fourth and fifth, but one of these driven by Rene Thomas won the Indianapolis "500" a year later. This is the car at the upper right in Carlo Demand's illustration and it is now, in superb new condition, the property of Mr. Ed Roy who painstakingly rebuilt it from a derelict pile of parts.

Thomas, in 1924, drove another Delage to the world's land speed record — 143.24 mph at Arpajon. This was a V-12 monster with a 645-cu.-in. engine.

But the most exciting race car which Louis Delage ever had built was the one designed by M. Lory for the 1926-1927 1500cc Grand Prix formula. Its supercharged straight-8 engine had twin overhead camshafts and developed 170 hp at 8000 rpm. Never has there been a more fascinatingly complex engine. Lory was certainly lavish with the number of gears and bearings he used. The train of gears which drove the overhead camshafts, the magneto and the oil pumps numbered 20. No less than 60 ball and roller bearings were used on the nine main bearing crankshaft, on the connecting rods and on almost every other revolving bit of metal in the engine. Eighteen were used on the camshafts alone. In 1937 when the crack English driver — Richard Seaman — rebuilt a 1500cc Delage, he was able to extract 195 bhp from the engine, which 10 years earlier had been rated at 170 hp. /MT



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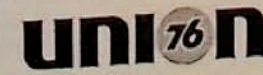
CLASS	ELIMINATOR	WINNING E.T.	WINNING SPEED	GASOLINE
Top Gas	Jack Jones	7.85 secs.	199.10 mph	Royal 76
Super Stock	Joe Fisher	12.14 secs.	112.64 mph	Royal 76
Stock	John Barkley	14.84 secs.	92.30 mph	Royal 76
Street	S. Kaneshiro	10.37 secs.	131.57 mph	Royal 76
Competition	Bill Douglas	9.55 secs.	142.85 mph	Royal 76

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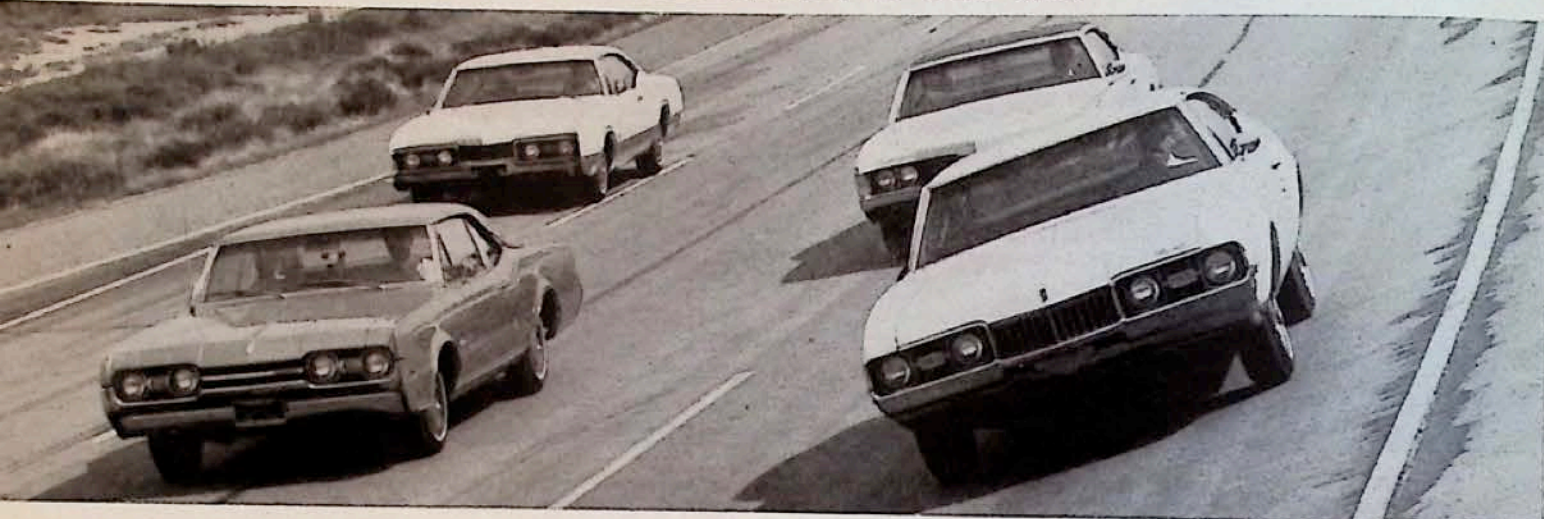
STEVE'S BLACKSMITH GARAGE

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NOW YOU CAN HAVE IT TOO:

Econoperforleration*

OLDSMOBILE HAS ADDED IT FOR 1968



by Bill Sanders

To the east, the Superstition Mountains loomed ominously over the flat Arizona desert, keeping the silent secret of the "Lost Dutchman" mine with its wealth of untapped gold. To the west, a few miles from the General Motors Desert Proving Grounds, in Higley, Arizona, Norton's Corner Tavern, where you can get a full course spaghetti dinner every Monday night for 29c, stood silent in the afternoon heat.

Only mad dogs and Englishmen are supposed to go out in the noon day sun—but here we were on the mile straightaway that bisects the high-speed, 5-mile circle test track. One mile north. Turn around. One mile south. That's the way it went. Correct for wind velocity and any other elements that might create a difference in economy or performance. We were in Phoenix, at the invitation of Oldsmobile, comparing their Youngmobiles. '67s vs. '68s. In 1967, Olds introduced a new powertrain combination, a unique approach to economy and performance, called the Turnpike Cruising option. This year the system has been greatly improved, with lower rear end ratios, redesigned transmissions and new engine camshafts. We wanted to determine just how significant the improvements were by an actual, controlled comparison. Results were impressive. Oldsmobile engineers did their homework well. As the accompanying chart shows, they were able to improve fuel economy, and, at the same time, increase performance.

Our test pitted a 1967 Delta 88 against its '68 counterpart and a '67 Cutlass Supreme against a '68. All four cars were fitted with 4-bbl. carburetors, and identical tire sizes were used: 7.75

*Economy, Performance, Acceleration

x 14 for the Cutlass comparison and 8.55 x 14 for the 88 test.

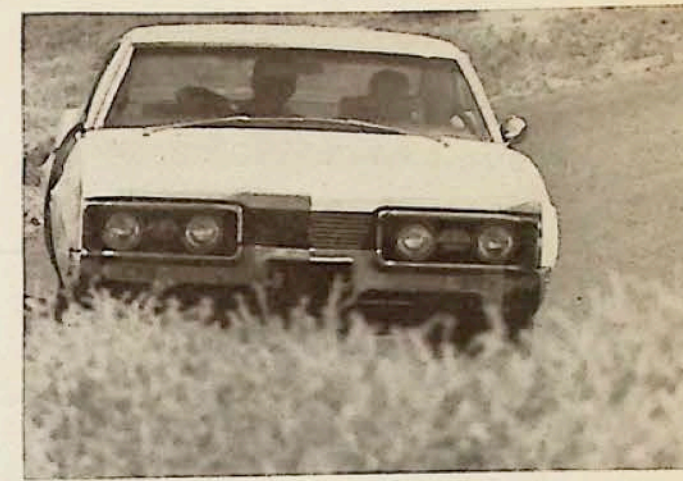
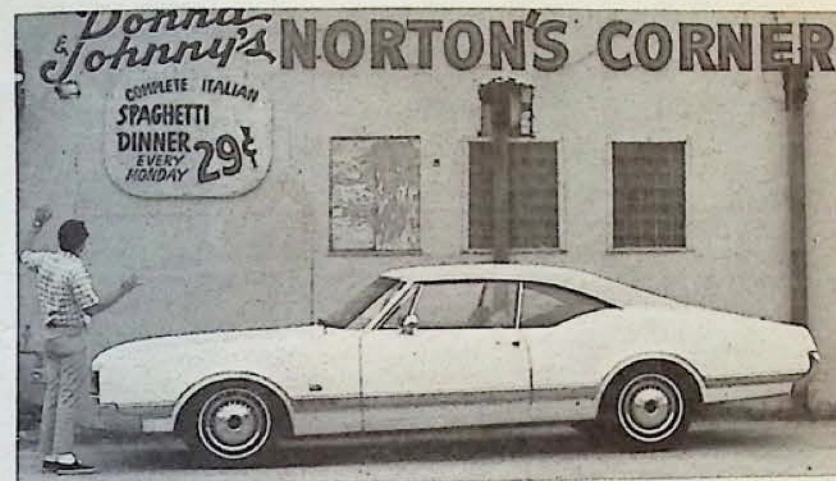
Modifications have been made throughout the entire powertrain. Starting with engines, Oldsmobile engineers decided to increase displacement, reasoning that a larger engine turning at lower rpms would be just that much more efficient in terms of engine friction and less fuel consumption. They chose to apply this principle of reducing rpms rather than trying to limit engine displacement, contrary to a popular feeling that larger engines inevitably consume more fuel. Displacement of both engines has been increased with maximum torque of the Cutlass increased 30 lbs.-ft. and the 88, 40 lbs.-ft.

But what about performance? By upping displacement and designing engines for mid-range torque instead of top-end horsepower, Olds has succeeded in raising performance levels while reducing fuel consumption. Key to this development is the camshaft, which completely alters the performance characteristics of the engine. Designing a special "low duration" cam for each V-8, peak horsepower has been adjusted back. But, peak horsepower is of little importance, as maximum torque is increased. As a result, 1968 engines develop more torque at all speeds throughout the driving range. The difference represents the increase in performance, putting the power to the rear wheels where you can really feel it by the gain in throttle response. Laying a stretch of rubber in the '68s is almost automatic; in the '67s it ain't happening. With the increase in torque and consequent reduction in engine rpms, Olds engineers have also realized a significant reduction in engine noise,

resulting in a quieter engine under all driving conditions. The difference in engine disturbance was quite apparent after driving one of the '67s for a while and then switching to the '68. Also affecting economy and performance between the '67s and '68s were the two types of smog devices used. The '67s used the belt drive, air pump injection system that dragged off additional horsepower. Our '68 models were fitted with the new combustion control system which uses pre-heated air with slight modifications to the carburetor and distributor, and without the additional belt drive.

One of the most important aspects of the powertrain's overall performance characteristics, acceleration, left something to be desired on the '67 models. By adding lower rear end ratios and a variable stator, switchpitch torque converter automatic transmission in '67 for better economy, acceleration went on the sacrificial chopping block. Automatic transmissions on the '67 models were subject to less creep at idle because of the variable stator, but getaway response was rather sluggish. In order to increase initial acceleration, transmissions have been revised for greater torque multiplication. This has been achieved by eliminating the variable pitch stator and increasing the transmission's converter ratio. Ratios are different for each powertrain combination.

Finally, rear end ratios have been reduced again for 1968. Olds engineers were aware from the beginning that a low rear axle ratio was the most important factor in improving fuel economy. A lower axle ratio reduces engines rpms at low to medium speeds, an ideal condition for minimizing fuel



consumption as a result of less engine friction. By going the bigger displacement route, with the "low duration" cam, Olds was able to reduce rear end ratios even more than they had in 1967 and still maintain performance and acceleration while reducing fuel consumption (see chart for rear axle ratios). Axle ratio in the Cutlass wasn't dropped as low as the Delta series because the F85 Cutlass uses a standard 2-speed automatic transmission, while the Delta has a 3-speed trans.

With the combination of bigger engines, redesigned transmissions and lower rear end ratios, the drop in engine speed through all rpm ranges is significant. In the Delta 88, engine speed has been reduced 17% under 1967. A 10% reduction was realized in the Cutlass.

To maintain complete uniformity throughout all phases of the testing, we decided to have one man do all the driving, and Dick Haas, an Olds test driver, who is first cabin when it comes to accuracy, was chosen to do the honors. First phase consisted of the economy comparison and included fuel consumption for speeds from 30 mph to 80 mph, plus city and highway driving over a measured course. We also wanted to run with air conditioning on and off throughout the entire test to graphically illustrate the power drain that option can create. As can be seen on the accompanying chart, fuel consumption and acceleration are both altered substantially when running with air conditioning on.

Mighty GM has thousands of dollars worth of exotic test equipment at their desert proving ground, so we decided to take advantage of as much of it as we could. Measuring fuel consumption

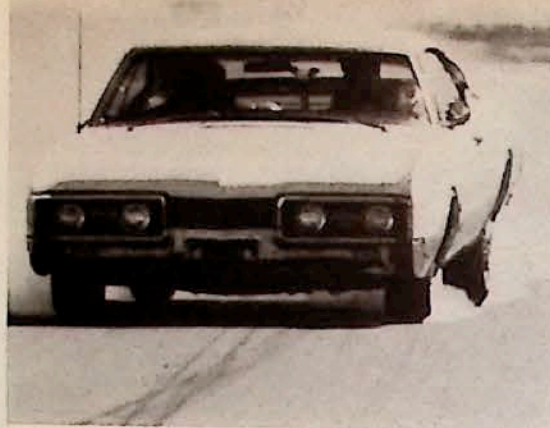
in the economy phase, we used a "Fuel Board" which is cut into the fuel line between gas tank and fuel pump and is carried in the front seat. The fuel board measures flow in pounds per square inch and consumption in cubic centimeters. Our test was conducted on the straightaway, which runs north and south. A run is made each way to compensate for wind, and the average tallied. To demonstrate the accuracy of our tests, there are approximately 3785.4 cubic centimeters in one gallon, so one cc more or less doesn't affect total gallon consumption that much. And, most GM testers allow a difference between runs of up to 12 cc's. But not the meticulous Mr. Haas. He allows only 2 cc's difference between runs. His dedication to detail consumed many additional hours and prolonged our stay in Phoenix for a whole week, which actually wasn't too bad.

Before starting either the economy or acceleration comparison, each car, as it was being run, was given two 5-mile laps around the high-speed track to get engines at a normal operating temperature. As can be noted on the chart, fuel consumption drops dramatically as speeds progress downward from 80 mph to 30 mph.

Both city and highway tests were run on the straightaway under simulated conditions, and each car was put through the same pace. The city traffic driving schedule was developed in Detroit over a number of years, a city that has many one way streets, so the test reflects that type of driving: constant running and a minimum of stops. Gas consumption during city driving in an area such as Los Angeles would probably be greater. City driving consisted of the following maneuvers: Turn the

meter on the fuel board 'on' for 5 seconds; accelerate, @ 6 feet per second, to 25 mph; hold speed at 25 mph and stop, @ 6 feet per second, at the .3-mile marker; accelerate to 30 mph, @ 6 feet per second, stop at the 1-mile marker, @ 6 feet per second; idle for 10 seconds, then turn the meter 'off.' That operation is then repeated in the opposite direction. A similar procedure is used for the simulated highway driving condition, except higher speeds are used and duration is sustained longer. It is interesting to note, that during a weekend of actual highway driving with the 1968 Delta 88, our gas mileage ranged between 11.8 mpg and 17.1 mpg with an average of 14.7 mpg with and without air conditioning. Our simulated highway driving consumed an average of 16.4 mpg without air conditioning and 14.6 with air turned on for the 1968 Delta 88, proving the simulated highway course is a close approximation of the real thing.

In the second phase of our comparison, we used the normal MT tests, which included acceleration, passing, 1/4-mile acceleration and braking. To measure speeds in gears at shift points, we used only the speed and rpm of the actual shift and didn't record the speed for top gear. That accounts for only one speed for each Cutlass, as that car only has a 2-speed transmission. Using the elaborate GM test equipment, we were able to record the actual shift point, which varied minutely with each transmission. Speed per 1000 rpm in top gear was also extended from the usual 1000 rpm and included speeds at each graduation of 1000 rpm up to 4000 rpm, or 3500 rpm in the case of the 1968 Delta 88. We also recorded transmission converter



"If you want to test cars, go west young man." Horace Greeley said something like that, and it's still true. Four Oldsmobiles were stomped, tromped, weighed — and put through an obstreperous regimen under the big sky of GM's outdoor laboratory. Results were predictable — '68s outperformed '67s in every category.

ECONOMY	CUTLASS F85				DELTA 88			
	Without Air Conditioning		With Air Conditioning		Without Air Conditioning		With Air Conditioning	
	1968	1967	1968	1967	1968	1967	1968	1967
Fuel Consumption at speeds (average) (2 aboard)								
30 mph	21.2 mpg	19.1 mpg	19.1 mpg	17.0 mpg	20.8 mpg	18.2 mpg	18.5 mpg	16.7 mpg
50 mph	20.7 mpg	17.9 mpg	18.3 mpg	16.6 mpg	19.7 mpg	17.3 mpg	17.5 mpg	15.6 mpg
70 mph	16.9 mpg	15.0 mpg	15.1 mpg	13.8 mpg	16.2 mpg	14.5 mpg	15.3 mpg	13.4 mpg
80 mph	14.3 mpg	13.1 mpg	13.4 mpg	12.7 mpg	14.3 mpg	12.7 mpg	13.3 mpg	11.5 mpg
City Driving	14.7 mpg	13.9 mpg	13.3 mpg	12.9 mpg	13.0 mpg	10.7 mpg	11.8 mpg	9.8 mpg
Highway Driving	17.4 mpg	15.6 mpg	15.5 mpg	14.1 mpg	16.4 mpg	14.5 mpg	14.6 mpg	13.4 mpg
PERFORMANCE								
Acceleration (2 aboard)								
0-30	3.81 secs	4.68 secs	4.19 secs	5.15 secs	3.75 secs	4.10 secs	3.82 secs	4.50 secs
0-45	6.67 secs	7.70 secs	7.22 secs	8.59 secs	6.15 secs	6.56 secs	6.53 secs	7.10 secs
0-60	9.89 secs	11.22 secs	10.76 secs	12.48 secs	9.47 secs	10.26 secs	9.80 secs	10.97 secs
0-75	15.31 secs	17.04 secs	16.07 secs	19.16 secs	13.30 secs	14.54 secs	14.00 secs	15.85 secs
Standing Start 1/4-mile								
Time	17.44 secs	18.16 secs	17.83 secs	19.10 secs	16.93 secs	17.55 secs	17.15 secs	18.02 secs
Speed	80 mph	78.5 mph	77.5 mph	75 mph	85.5 mph	81.0 mph	83.5 mph	79.0 mph
Passing 40-60 mph								
Time	4.74 secs	5.28 secs	5.03 secs	5.82 secs	5.04 secs	5.64 secs	5.45 secs	6.25 secs
Distance	354 ft	396 ft	387 ft	435 ft	371 ft	416 ft	403 ft	459 ft
50-70 mph								
Time	5.92 secs	6.59 secs	6.26 secs	7.17 secs	5.65 secs	6.23 secs	6.10 secs	6.57 secs
Distance	536 ft	596 ft	563 ft	647 ft	504 ft	553 ft	535 ft	574 ft
STOPPING DISTANCES								
30-0	27 ft	32 ft			27 ft	36 ft		
60-0	136 ft	145 ft			150 ft	162 ft		
SPEEDS IN GEARS AT SHIFT POINTS								
1st mph @ rpm	66 @ 4400	66 @ 4850			49 @ 4150	40 @ 4050		
2nd mph @ rpm					84 @ 4100	70 @ 4150		
CONVERTER STALL SPEED								
1968	2400 rpm	2450 rpm			2250 rpm	2150 rpm		
		(with switch pitch)				(with switch pitch)		
		1950 rpm				1260 rpm		
		(without switch pitch)				(without switch pitch)		
WEIGHTS								
1968	3791 lbs.	3633 lbs.			4488 lbs.	4561 lbs.		

SPECIFICATIONS	1967 Cutlass Supreme	1967 Delta 88	1968 Cutlass Supreme	1968 Delta 88
Bore & Stroke	3.938 x 3.385	4.125 x 3.975	4.057 x 3.385	4.125 x 4.250
Displacement — Cu. ins.	330	425	350	455
HP @ RPM	320 @ 5200	365 @ 4800	310 @ 4800	365 @ 4600
Torque: lbs.-ft. @ RPM	360 @ 3600	470 @ 3200	390 @ 3200	510 @ 3000
Compression Ratio	10.25:1	10.25:1	10.25:1	10.25:1
Carburetion	1 4-bbl.	1 4-bbl.	1 4-bbl.	1 4-bbl.
Transmission	automatic	automatic	automatic	automatic
Final Drive Ratio	3.08:1	3.08:1	2.78:1	2.56:1
Steering	Power	Power	Power	Power
Steering Gear Ratio	20.7:1	21.7:1	20.7:1	21.7
Turning Diameter, Curb-to-Curb	41.2 ft.	45.4 ft.	41.2 ft.	45.4 ft.
Wheel Turns, Lock-to-Lock	4.3	3.8	4.3	3.8
Brakes	Front Disc	Front Disc	Front Disc	Front Disc
Price as Tested	\$3818.61	\$5702.05	\$4582.36	\$5516.71

ECONOPERFORLATION continued

stall speed, with the switch pitch stator connected and disconnected on the '67s, to illustrate how redesigning has changed transmission operation between the model years. Another interesting point relates to the weights of the four cars. All were weighed, with a full tank of gas, during testing. While the 1967 Delta 88 outweighed the '68 model by 75 pounds and was beaten by its lighter counterpart, the 1968 Cutlass weighed 158 pounds more than the '67, but was still able to do a better job in every category. A great mileage spread existed between test cars also. Odometer readings at the beginning of testing were as follows: '68 Delta 88, 22,070 miles; '67 Delta 88, 14, 200; '68 Cutlass, 3300 miles; '67 Cutlass, 12,900 miles.

Results of the "Great Phoenix Experiment" were predictable to a great extent. With bigger engines, redesigned transmission and lower axle ratios, the 1968 cars performed better than their adversaries. Probably the biggest surprise was the amount of power loss caused by the use of air-conditioning — and, a full course spaghetti dinner for 29 cents? /MT

Photos by Gerry Stiles



'Off track, cars went sightseeing to far-away places with strange sounding names. On track, decelerometer, fuel board and electric speedometer filled front seat, leaving little room for testers.



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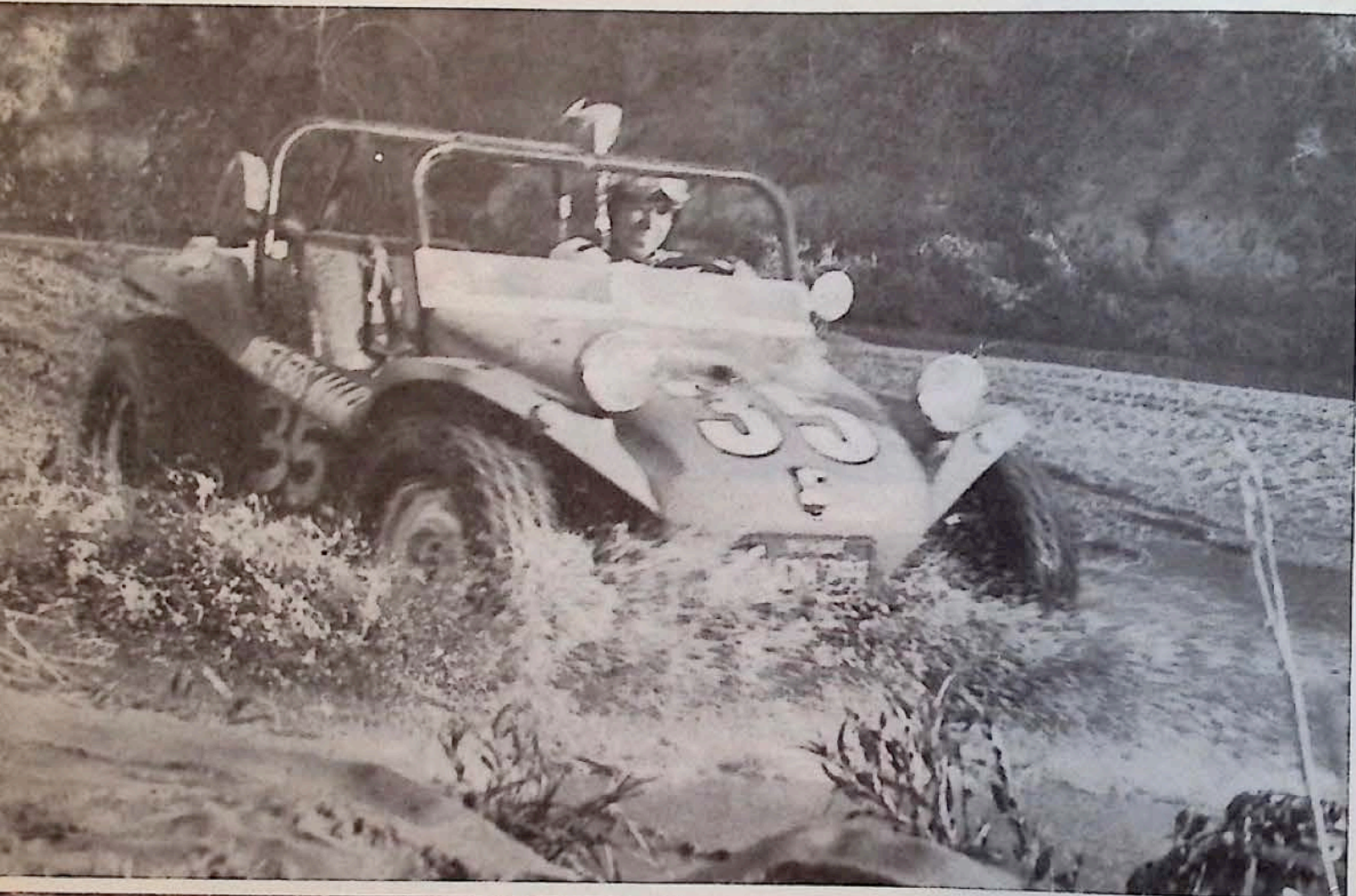
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Off-Road Racing



Redoubtable Meyers Manx (above), the car that started it all, leaps wide rivers at a single bound and, after a wash job, drives home on the street. Vic Hickey's Baja Boot (left) is sponsored by Hurst Performance Products and features a lot of GM engineering. Tires are 12.4 x 16. Hot Rod Magazine Tech. Ed., John Thawley, entered Porsche-powered special (left, below) driven by Charles Beck. Stroppe-built Broncos (below) are always plentiful, show well.



Four-wheel drive obstacle racing and subsequent forms of off-road racing that have become popular were pioneered at Riverside, Calif., three years ago in the first annual National 4-Wheel Drive Grand Prix. Early in April this year over the rugged terrain of the Santa Ana River bed in Riverside, the International 4-Wheel Drive Association of Individuals & Clubs, Inc. staged its fourth National 4-Wheel Drive Grand Prix. This year's event included the popular dune buggies in separate major classes. Thirty vehicles, including Jeeps, Ford Broncos, experimental vehicles and dune buggies, ran two rugged 2-mile courses over rough terrain, sand dunes, through water and mud in races that saw vehicle battle vehicle. Times averaged six minutes for both courses combined. The first one across the finish line won — there was no handicap. A round-robin system of eliminations was used and those vehicles and drivers able to withstand the rugged, grueling pace of three days of racing picked up cash and a trophy for their efforts. More than 6000 fans, paying the \$2.50 admission price, jammed the lofty hillside banks that formed natural "bleachers" along the Santa Ana River. They were treated to plenty of action and saw smoothly operated races sanctioned and supervised by the National Off-Road Racing Association (NORRA). The day after the race NORRA president Ed Pearlman's office in Woodland Hills, Calif., was flooded with calls from off-road racers, off-road vehicle manufacturers and distributors who wanted information on NORRA's Off-Road Vehicle and Equipment Show in Las Vegas at the Stardust Auditorium Convention Center June 11-14, concurrent with NORRA's Stardust 7-11 Off-Road race over a 355-mile desert course. There is no doubt that the off-road racing explosion has begun.

(Turn page for more Motorsports)



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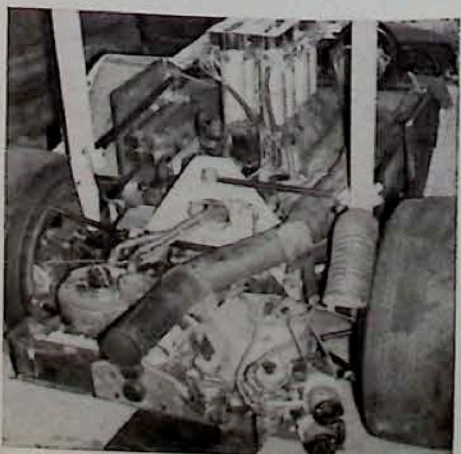
The Almost Race at Riverside

Ok, Mexico City has already happened and Moises Solana has already won it with an out-of-the-box M6 B McLaren but everybody was waiting for Riverside (the second race on the tour) because, well, Jim Hall was going to be there with his '68 Chaparral and you really can't talk about Group 7 racing without Jim Hall. Or Mark Donohue. Mark captured the U.S. Road Racing Championship last year and seemingly was a contender for a quick action replay in '68 with not only a new McLaren but a big-block, porcupine Chevy and greatly modified Hilborn fuel injection. As far as Riverside was concerned, the single most enticing topic was engines — Hall's and Donohue's. Which is not hard to understand since they were the first examples of the much rumored all-aluminum 427 Chevrolet has quietly made available to the Hall, Penske (who owns Donohue's

car), McLaren and Surtees aggregations. On paper, a 427 CID powerplant weighing 30 pounds less than the fabled small-block 327 looked like the all-time hot setup but there was the question of reliability. New, all-aluminum engines have often been fickle performers. Donohue got his "alloy" rat motor from Traco just before Riverside and the durability question evaporated in a qualifying lap of 1 minute 19.4 seconds, slightly faster than the previous track record set by Dan Gurney last November in his Eagle-Indy car. And Donohue is not known for being the traditional quick qualifier, either. That was Friday. Saturday, Jim Hall perforated Donohue's 1-day-old-balloon with an even swifter 1.19 flat, exhibiting a magnitude of power and cornering never seen before. Anywhere! Hall was nearly one full mph (118.81) ahead of Donohue (117.884) and almost three in front of



It looks like the race is still going on (above) but it wasn't. Donohue (6) lapped almost everybody. Jim Hall (left, below) had Rochester-engineered, fuel-injected aluminum 427. With automatic trans car sat on the pole.



3rd place man Lothar Motschenbacher (115.985) in a Gurney-Weslake McLaren. Boom!, pass the purse to Jim Hall, stick-shift automatic and all. On Sunday Hall came out to make a few warm-up laps with the rest, parked his car for a minute afterward, restarted it and -puff!- the transmission lunched right in front of the entire world. The Chaparral was immediately pushed to the relative privacy of the Firestone garage and the crew began dismantling it though only a miracle could put it on the starting-line on time and all the miracles allotted to Texans this week were used up. Besides, Donohue was bent on winning the meet Hall or not — preferably not. You could tell it when the flag fell. Old Mark stuck his foot to the floor and zoomed out of sight, eventually lapping everyone in the place except Motschenbacher. And he would have lapped him too if the ignition ballast-resistor hadn't let go two laps from the end. Total loss of ignition might have proved the downfall of lesser drivers but Donohue realized instantly that if he turned the ignition key to "start" it would bypass the open circuit. Of course the starter wasn't much to write home about after two laps at 117 mph but maybe Chevrolet will give him a new one to show good faith. Purses of \$4800 don't go too far these days. /MT

Top Ten Finishers:

Mark Donohue, McLaren/Chevy	60 laps
Lothar Motschenbacher, McLaren/Ford	60 laps
Sam Posey, Caldwell/Chevy	59 laps
Chuck Parsons, Lola/Chevy	59 laps
Moises Solana, McLaren/Chevy	58 laps
Swede Savage, Lola/Ford	58 laps
Jerry Entin, Lola/Chevy	58 laps
Don Wester, Porsche	55 laps
Leonard Janke, Lola/Chevy	54 laps
Tony Settember, Lola/Chevy	53 laps

Auto Racing July Calendar of Events

JULY	
3-4	NASCAR GTC Race No. 9 — Daytona Beach, Fla. (Sedans).
4	Firecracker 400 — Daytona Beach, Fla. (NASCAR Stcks).
6	NASCAR GTC Race No. 10 — Trenton, N.J. (Sedans).
6-7	SCCA National Championship — Milwaukee, Wisc. (Sedans).
6-7	SCCA National Championship — Galveston, Tex. (Sedans).
7	Trans-Am Race No. 6 — Meadowdale, Ill. (Sedans).
7	Islip 100-Miler — Islip, N.Y. (NASCAR Stcks).
7	French Gran Prix — Rouen (Formula I).
9	Oxford 100-Miler — Oxford, Me. (NASCAR Stcks).
11	Fonda 100-Miler — Fonda, N.Y. (NASCAR Stcks).
13-14	SCCA National Champ. — Cincinnati, O. (Sedans).
14	Northern 300 — Trenton, N.J. (NASCAR Stcks).
14	Milwaukee 250 — Milwaukee, Wisc. (USAC Stcks).
14	Watkins Glen GP — Watkins Glen, N.Y. (Sedans/Spts).
20	Mosport 250 — Mosport, Canada (USAC Stcks).
20	NASCAR GTC Race No. 11 — Bristol, Tenn. (Sedans).
21	Volunteer 500 — Bristol, Tenn. (NASCAR Stcks).
21	Trans-Am Race No. 8 — St. Jovite, Canada (Sedans).
21	USAC 200-Miler — Indianapolis, Indiana (Indy Cars).
21	British Gran Prix — Brans Hatch (Formula I).
25	Maryville 100-Miler — Maryville, Tenn. (NASCAR Stcks).
27	Nashville 200-Miler — Nashville, Tenn. (NASCAR Stcks).
27-28	SCCA National Champ. W. Mich. — Grattan, Mich. (Sedans).

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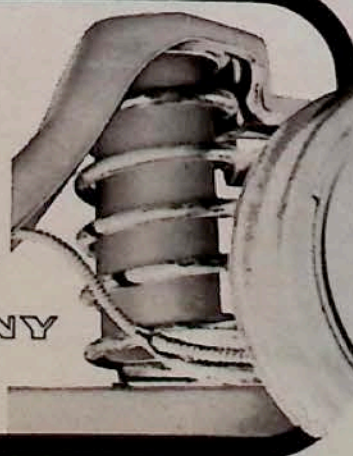
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Q & A

dangling definitions

Q Could you define a few terms for me? If so, I am interested in the following: hemi (referring to the Chrysler engine), dual-point distributors, torque, torque converter (as opposed to a fluid clutch), hydraulic and solid valve lifters, high-lift cams and supercharger.
Steven Sloan
Wilmington, Del.

A Quite an order, but we suppose it's been a long time since we've bothered to pass out the nitty gritty on any of the terms we and others of our ilk use constantly, so here goes.

Hemi refers to the shape of the combustion chamber in the cylinder head of the Chrysler engine. The design permits large valves, and, hence, good breathing and lots of power.

Dual-point distributors have a second set of breaker points connected in parallel with the first set. This roughly doubles the contact area and extends effective point life. They are also claimed to allow better coil saturation and ignition at high rpm.

Torque is a twisting force of the kind you exert when wrenching a bolt. If, say, your wrench is one foot long and you are exerting 100 pounds on it, then you are exerting 100 lbs.-ft. of torque on the bolt. In the case of an automobile engine, the torque figure given is the maximum twisting force the engine can exert and is usually accompanied by the rpm at which this occurs.

Torque converter is the term applied to the type of fluid coupling in which a torque multiplication takes place under certain conditions. Maximum torque multiplication takes place when the most "slip-page" occurs, as when starting from rest in an automobile. The engine (driving) member is then turning fast compared to the gearbox (driven) member. A third member, called a stator and interposed between the driving and driven members, doesn't rotate but serves to direct the fluid pumped by the driving member in the optimum direction of the driven member. Fluid clutches omit the stator, have the driving and driven members in very close proximity (usually), and rely on viscous drag to transmit torque with no multiplication.

Hydraulic lifters, like solid lifters, operate between camshaft lobes and pushrods in most engines. But instead of being one solid hunk of iron, are built in a piston and cylinder arrangement so that they can change their lengths. This length change takes place under the influence of engine oil pressure which is fed to the piston (plunger) through a tiny hole in the lifter. Plunger size is selected so that force is exerted to take up all clearances but not enough to lift the valve off the seat. A ball check valve within the lifter prevents the oil from squirting back out the hole and collapsing the lifter when a valve is lifted. As might be imagined, lubrication is critical, and clean oil with proper additive level maintained is a must. With solid lifters some clearance must be adjusted into the valve setup and redone at intervals to compensate for wear.

High-lift cams are ground so that they lift the valves higher off the seats than normal to improve performance.

A supercharger is a device that pumps more air/fuel mixture into an engine than could be obtained under normal atmospheric pressure. Power for running the supercharger may come from belts or gears connected to the crankshaft or from a turbine driven by the exhaust. The power superchargers consume is considerable, but it's easy to make them efficient enough so that the power gain at the flywheel far outstrips it.

capacitive discharge, family style

Q Does the installation of a photoelectric capacitive discharge ignition system serve any useful purpose in a family style car? Does it eliminate the need for tuneups other than carburetor adjustments?
A. L. Herrington
FPO Seattle, Wash.

A Capacitive discharge ignition systems are noted for their ability to fire spark plugs that would be considered fouled for ordinary systems. Ignition system maintenance would very likely be less frequent, but we are certain it wouldn't be eliminated altogether. Since ignition systems of the ordinary kind are no great problem on family cars, we doubt if the use of a capacitive discharge system would prove economically sound.

groovies vs. slicks

Q My driver education instructor claims that street tires give you more traction than slicks on the road, while I believe just the opposite. He also claims that the only reason drag racers spin their wheels on hole shots is just to spin their wheels. I think this is ridiculous and told him so. The result has been the wager of \$1 that I am right. Can you help me prove it?
Tim Puchalski
No Address

A Well, maybe. It has been our experience that, on dry pavement, a good slick has far superior traction over a good street tire insofar as acceleration and braking are concerned. However, on wet pavement, dirt, or dirty pavement, slicks are unpredictable, and here we prefer a street tire.

forgetful

Q I am the mother of a 22-year-old son through whose persuasion we bought a 1967 GTO with automatic in a console. The choice was very good except for one drawback. It seems that I habitually forget to put the shift into PARK. Now, after an accident where the car rolled backwards and several instances of finding myself leaving the car in DRIVE, my question is what is the solution to this problem? Would a buzzer like the 68s feature on the key be a remedy for absent-minded drivers like myself? I am otherwise considered a good driver.
Name and address withheld

A Because of what your insurance company might want to do to you, we are protecting your identity. Maybe a buzzer for the selector would help in your case. But suppose you had one, and for some reason it failed to work. Would you want to



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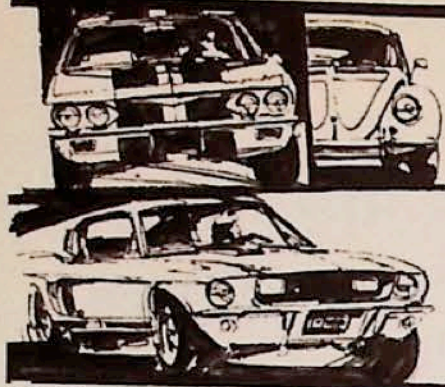
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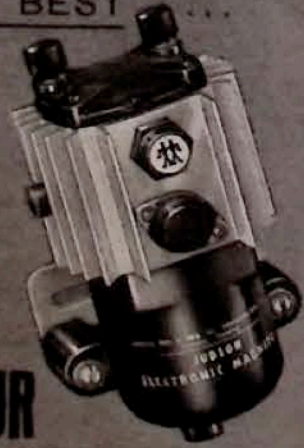
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Q&A continued

blame the manufacturer for that and any damage that might result from the runaway car? You bet you would! You and hundreds of others. But the accident wouldn't be the last of that kind regardless of upon whom the courts fix the blame. It is utter folly to expect more from buzzers, courts, governments, or large corporations when our senses and instincts of self-preservation so often let us down. Incidentally, you never mentioned the parking brake. Get your son to show you what it is.

hi-riser
 Q I am interested in a quad hi-riser intake manifold for my '68 Charger R/T 440. The factory carburetor has a rated air flow of approximately 575 cubic feet per minute (cfm), which seems a bit low compared to other high-performance engines. Can you suggest a suitable carburetor for this combination? I would like to retain the smog control system. My car has the automatic transmission and 3.23 final gearing and will be used on the street.
 Larry C. Martin Rockville, Md.

A Any gain you might realize from a larger carburetor would come at the very top end, if at all. And more often than not, too large a carb will ruin low-end performance. Your engine is by nature a low-ender and we doubt if it would respond to more carburetor. Holley Carburetor Co. is the only one in the field that we know of (besides Weber, of course) who is actively seeking a performance image. You may write them to see what they have to say about the problem.

too-powerful gasoline
 Q I just bought a 1968 Ford Torino Fastback with 390 2-bbl. 265 hp. I use Amoco Super Premium gas in it but was told that this gas is too powerful and would ruin my motor. I just traded in a 1966 Galaxie with 390 4-bbl. which was running perfectly on original points and plugs, and which had used the same gas. Is there any truth to what I've been told?
 Robert C. Beaman Portsmouth, Va

A This story cropped up early in the history of the automobile, and has been going strong ever since without a germ of truth to sustain it. If your Torino is rated for regular fuel, then you should use it because it will save you money. Using the next grade of octane higher than your car needs will harm only your pocketbook—not the car.

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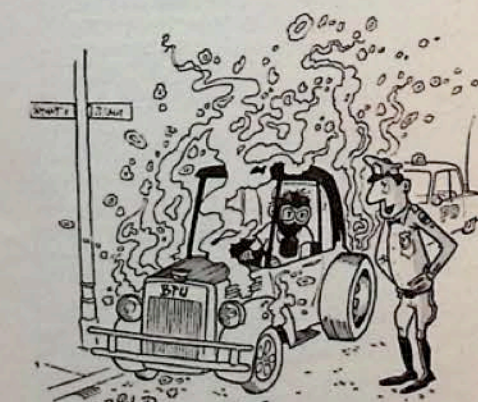
continued from page 76

for each turn of the wheel. Typically these are toothed rotors between wire-wound coils on a magnetic core. The computer converts these pulses into whatever signal it requires for processing and comparison.

Kelsey-Hayes uses such a pulsing sensor for its latest system for rear-wheel anti-skid. Bendix has developed a very special one for its latest systems. Small in diameter, it's geared up from the wheel to produce 360 pulses per wheel revolution. For maximum sensitivity Bendix uses one at each front wheel and a single one at the drive shaft for the rear wheels. Inputs from these are carried to the quite complex central computer which Bendix uses to produce control signals for either its full-hydraulic or its vacuum-modulated braking circuits.

Clearly there's ample technology at work on the job of controlling wheel locking. The better systems have shown an ability to reduce braking distances on wet roads by 30 to 40%, and the best ones have also been able to show shorter stops on dry pavement, up to 10% shorter. All of them provide startling and dramatic improvement — life-saving improvement — in stopping stability, when used with brake systems which are basically sound.

Only two factors remain unresolved. One is obvious: high cost. The other is less so: a heightened danger of failure with more complex systems linked into the brake circuits. The customers for these systems, the car manufacturers, are keenly aware of both problems, as are the anti-lock developers. In at least one case these hurdles seem to have been jumped, for plans are now firm to offer an anti-skid system on at least one 1969 model car from Detroit. And where the Motor City goes, these days, Washington will not be far behind. The trip will be a safer one with anti-skid braking aboard. /MT



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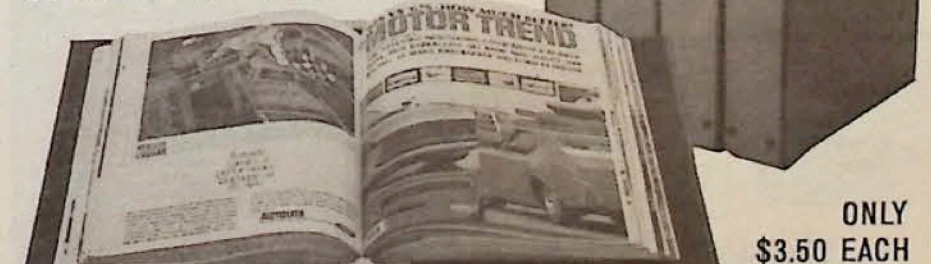
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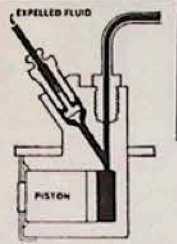
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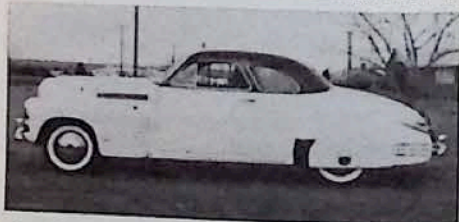
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MOST COSTLY REFINING

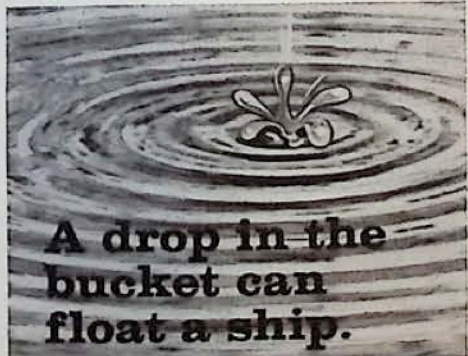
Only AMALIE refines this crude by an exclusive low-heat process preserving these two characteristics. It is an expensive process, but no oil available today will reduce friction and wear; absorb engine heat like AMALIE. Special additives are included to handle sludge, varnish, rust, acid, ash, and foaming. Every quart is complete... requires absolutely no additional "oil improvers."



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"There's a bargain, the upholstery caught fire so you get all that smoked glass free."



"If you won't sign this intention to buy form, would you sign this 'promise not to make a silly offer' slip?"

Exclusive!

How GM's Knudsen Will Change FORD!



The Story Behind the story of the **INDY 500!**



next month in **MOTOR TREND** on sale Thursday, July 18th.

ANOTHER ISSUE, ANOTHER UPROAR. "What are Steve Kelly's qualifications that made MT give him the chance to write 'Runnin the Little Ones' in your April issue? It certainly is an excellent piece of inconclusive mumbo jumbo. What was his assignment—to fill up 10 pages? That's all he did, as far as I'm concerned."

Two amazing conclusions of his tests were:

p. 46: 'This car (Rogue) seems much more like a suitable family car than the others.'

p. 47: 'More of a family car (Falcon) than the other three tested....'

Contradictory conclusions are something I can do without—and I'll start by no longer buying MT."

John T. Steinberg, Santa Clara, Calif.

"In the article, 'Runnin the Little Ones' you stated: The Falcon is the first Ford Motor Co. product we've had this year that didn't exhibit rubber-band steering linkage. Isn't it true in your Jan. '68 issue you stated that the Mustang steers like a car should and that there's no lag between steering wheel and front wheel movement? And about the Cougar (Jan.) you said: 'Steering action is positive. Front wheel reaction to steering wheel movement is instantaneous.' About the Torino, Dec. '67 issue you said steering was very tight, instantaneous action. About the Continental Mark III you said: (March) 'Steering is everything it should be.' Ford Motor Co. does make these cars, doesn't it? Or is it my mistake?"

"I was glad to see you gave the Falcon and the Dart such good ratings but it makes me wonder why you made the Chevy II top compact of '68."

"In your report (April) of the Triumph 250 you gave its 1/4-mile time as 10.8 secs. Man, just think what this car could do if it could get its fuel-injection system into this country! By the way, this is something I missed (the quarter-mile times) in your report of the Hot Compacts."

John Eaken, Chambersberg, Pa.

"I have just finished reading the April issue of Motor Trend and was particularly interested in the article, 'Runnin the Little Ones,' as I am a compact car fan."

"From your article I noticed you actually had two Falcons available, apparently a Sports Coupe with the 302 V-8 with 4-bbl. carburetor and Cruise-O-Matic, and a Futura Ford or Sedan with the 289 V-8 and Cruise-O-Matic. All of the photos showed the 4-door in your different tests, so I assume that your performance figures were for the 289. However, under the specifications section of the chart (copy of the chart enclosed and outlined in red) you showed the 302 V-8. Also the fact that the performance figures were much slower than the others tested would lead me to believe these were figures for the 289, especially considering the Rambler 290 outperformed the Falcon as well."

"Just to satisfy my curiosity would you be kind enough to set me straight on this matter? Did you run performance figures on both the 289 and 302? Which figures

do the ones printed represent? If you have figures on both could you furnish them for me? If the figures printed are for the 302 why are they so much slower than the others? Of course, the Dart 340 V-8 speaks for itself with much more brute power, but the others are not that much smaller."

Donald A. Laliberte, Camden, Me.

The performance figures are from the 289. The Editors.

"How about a fair comparison among the Little Ones? Surely you could have gotten a 307 Chevy and 273 Dodge a little more equal. The chart on page 48 concerning performance is useless if you wanted to compare them on the same basis. Why not try a Schwinn-Honda comparison?"

Kim B. Murphy, South Sioux City, Neb.

AND THEN I SAT DOWN AND WROTE "In your April edition of Motor Trend, we wish to thank Mr. Schmidt for his very amusing and descriptive account of his 'Wild Ride with Dan Gurney.' It was a thoroughly enjoyable article. Thank you very much."

Mr. and Mrs. Don Gardiner, Jeffersontown, Ky.

Yeah, we liked it so well ourselves we sent Julian packing for Death Valley. Look for the account in the Aug. issue. The Editors.

EXCEDRIN HEADACHE #71—THE UNFAIR COMPARISON. "I am writing in regards to your March, 1968 issue. First, I would like to say that your magazine has brought me many enjoyable hours of reading. Keep up the good work!"

"However, in the March issue there were certain facts I found surprising and disappointing. Referring to the article 'The Most Grueling Test of All' by Julian Schmidt, where you had tested four popular hardtops, the performance times of the Ambassador DPL were far inferior to the other three autos tested."

"Why was the Impala SS equipped with its largest powerplant (a whopping 385 hp) and the DPL just the middle of the line engine 280-hp?"

"To allow the Impala SS to run its 'big brute' but limit the Plymouth and Ambassador to their second line engine is hardly a fair comparison. Your statement about the Plymouth, 'lacks the impact' of the Ford or Chevy, is certainly out of place. Surely you realize that the Plymouth was giving away 55-hp and 44-D.I. to the Impala SS. On top of this the Plymouth gave away 200 lbs. in curb weight to the same Impala."

"What bothers me is the average layman who reads these road tests. He is apt to get a slanted picture of what really exists. He may tend to glance at the acceleration data, etc. and overlook the obvious differences in engine size. If you were not able to obtain automobiles of comparable engine size to test, why test them at all? No test is better than a slanted test."

"How about at least a mention of differ-

ent size engines in your road test comparisons of the future?"

Bruce Mackey, Libertyville, Illinois

"Your article in the March issue—The Most Grueling Test of All, by Julian Schmidt—interests me. Not so much for what it said, but for what it didn't say and what, if anything, it was trying to prove. Any enthusiast should have some missionary motive, either to influence the evolution of the car or at least to enlighten his readers. His I never saw."

"He made the point that the standard car is no family-trip vehicle, then leaves us dangling. How does the reader travel? By airplane? He appears uninterested in the route I'd think he'd have taken since in his 'We don't like' column he lists the ride from the Rambler's heavy duty suspension."

"You all must know the elementary basics for travel—a stable vehicle and a little precaution for motion sickness. You also know that suspension is always a compromise between the mush/lush ride and the tightening down that allows the "stocks" to stay on the tracks at 170 or so mph. You also understand what apparently happens to any manufacturer who tries to make his standard car with a firm suspension. Your article, however, evades any constructive comment, any advice. Maybe it includes an implied condemnation of the manufacturer, in an area where I'm afraid they could use some help from an enlightened public."

J. M. Moore, FPO, N.Y.

"I enjoyed reading the article in the March issue of Motor Trend comparing those four American dreadnoughts in 'The Most Grueling Test of All.'"

"I would like to bring to your attention an apparently missed fact of life. With such a dandy group of wives as co-drivers, companions, whatever—that weekend couldn't have been as bad as that, could it fellas?"

Roy J. Hart, Baldwinsville, N.Y.

Well, now that you mention it, yes. The Editors.

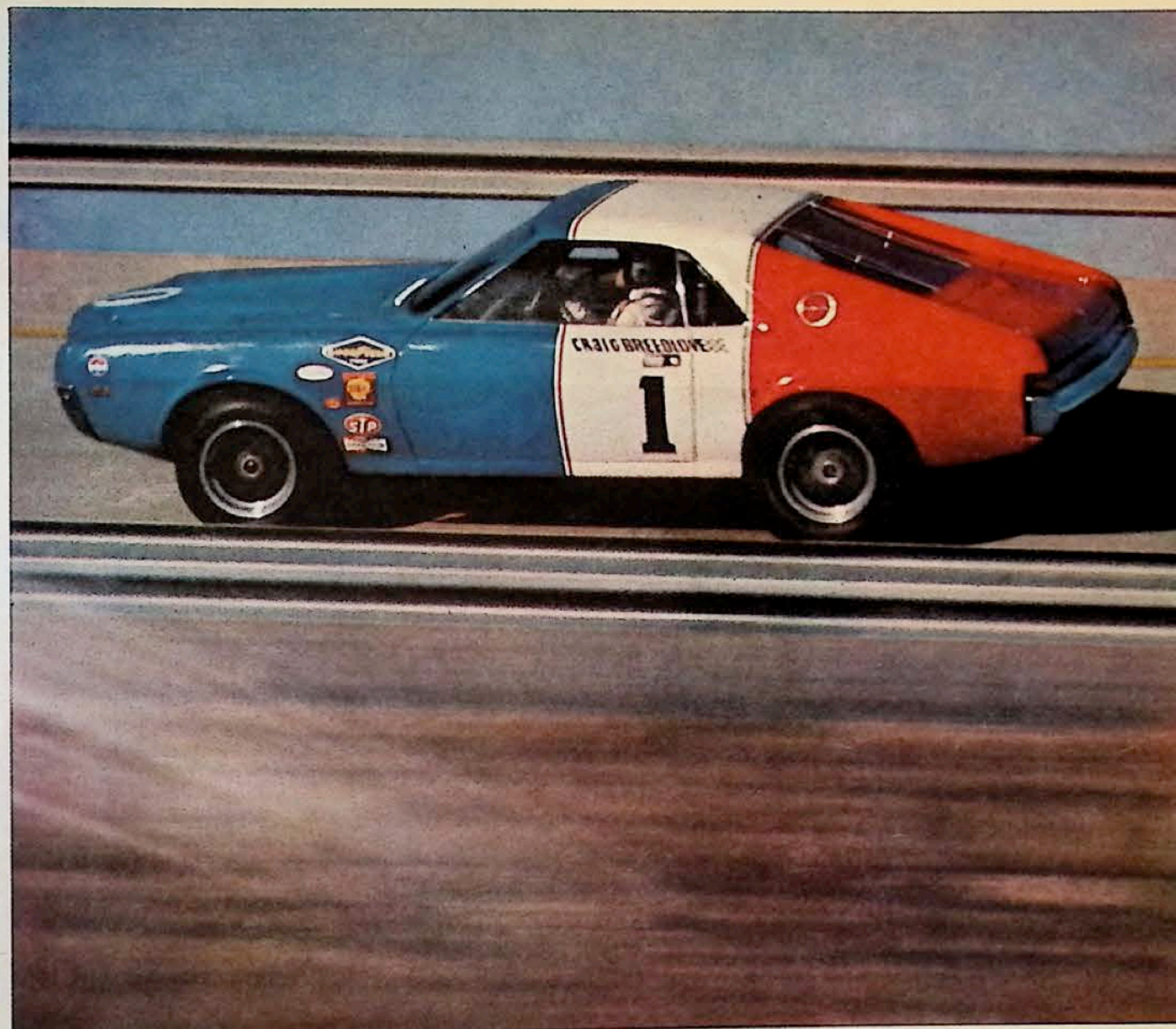
BY THE DAWNS EARLY LIGHT-FADING.

"Motor Trend and most of the other automobile magazines in the U.S. are of low quality. When I was in Japan, I read a monthly automobile magazine and I recall that I was usually satisfied every month. Recently, I have decided to take one from Japan every month while I also get Motor Trend. The Japanese magazine I started taking costs about 70c a copy. Why does a 20-cent difference in price give such a big difference in quality?"

Mitsuhiro Horikiri, Houston, Texas.

Mr. Horikiri enclosed a copy of the Japanese publication to illustrate his question and we must admit he has a point. Perhaps it is the same reason the Germans designed a good deal of our latest M-50 tank, or the best hydro-electric generators come from Sweden or Japanese motorcycles buzz around the world. But we built a helluva spaceship and we still have Playboy. The Editors.

/MT



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