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FOREIGN CAR GUIDE

WORLD CAR GUIDE

MARCH 1970 60¢

ROAD TESTS: SUBARU STAR WAGON
'70 VW BUS
FIAT 850 SPORT RACER
1970 CARS: CAPRI FOR THE U.S.
DRIVING THE PORSCHE 911 T and S
CORVETTE FIREBIRD CAMARO
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FIAT SPORT RACER

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WORLD CAR GUIDE

March, 1970 No. 145

March 1970—Number 145 WORLD CAR GUIDE is published monthly by Rajo Publications, Inc., 319 Miller Ave., Mill Valley, Calif. 94941. Second class postage paid at Mill Valley, Calif., and at additional mailing office. Please send all business related correspondence, inquiries, subscriptions and advertising orders to our Executive Offices: 319 Miller Avenue, Mill Valley, Calif. 94941. Phone: 415-383-3620. Single copies 60c—annual (12 issue) subscription $6.00 ($6.60 outside U.S.A.). Remit by Money Order or Draft on a bank in the U.S. payable in U.S. funds. Address all letters to the editors, manuscripts and releases to our Editorial Offices: 4207 Palos Verdes Drive S., Palos Verdes Peninsula, Calif. 90274. (Phone: 213-377-2563). All unsolicited manuscripts MUST BE ACCOMPANIED by return postage. All submissions are handled with care but the magazine assumes no responsibility for their safety. For advertising rates address: Advertising Department, World Car Guide, Rajo Publications, Inc., 319 Miller Ave., Mill Valley, Calif. 94941. Phone: 415-383-3620. West Coast Representative: **March & McCarty, Inc.,** 1708 W. 8th St., Los Angeles, Calif. 90017. (Phone: 213-483-0561) and 115 Montgomery St., San Francisco, Calif. 94105 (Phone: 415-362-4994). New England and Mid-Atlantic Representative: **Mr. Arthur Daks,** President **Bart Associates, Inc.,** 26 East 42nd Street, New York, N.Y. 10017 (Phone: 212-682-6062). Southern Station Representative: **Mr. Laurence A. Weaver, Jr., WEAVER Incorporated,** P.O. Box 80340, Atlanta, Georgia 30341 (Phone: 404-457-4494). Printed in U.S.A.

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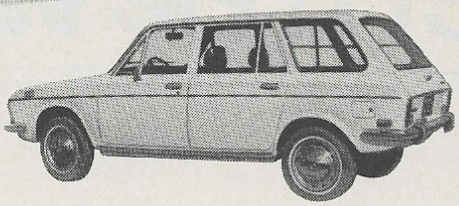
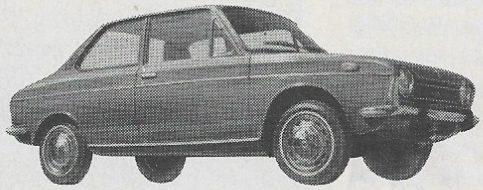


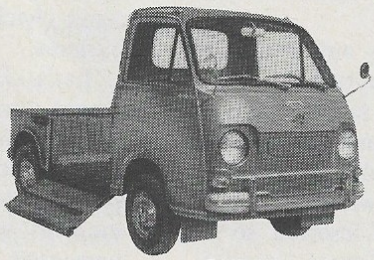
SUBARU STAR WAGON

SUBARU STAR / 4 DOOR



SUBARU STAR / 2 DOOR

SUBARU VAN



SUBARU TRUCK

SUBARU 360

COMMENTARY

by Don MacDonald

Questionable Performance Figures

Around the end of January, the Federal Highway Administration published a booklet which lists performance figures for all cars currently being sold in the United States and in addition, each manufacturer, as of January 1st, was required to have the same information on his own products available to you in showrooms.

Much of this information has already been available for years on the pages of the various automotive magazines published by private enterprise or through the results of the annual Union/Pure Oil Performance Trials. However, it's not our purpose to quarrel with FHWA's intent. They're not spending tax money for the new series of tests, which will be continuously updated, and presumably they'll charge enough for the booklet to defray its cost.

Our quarrel is with stipulated test conditions, particularly those involving brakes. Here the rules state that the wheels cannot be locked on the premise that skidding might cause the vehicle to swerve out of control.

The rules are in accordance with accepted laws of physics. When your brakes are locked, they're not doing any work at all. The only factor then involved is the friction between the tires and the road surface.

Ideally, maximum stopping performance is achieved when the wheels are allowed to rotate at a speed just short of locking up. This way, both the brakes and the tires are putting forth their best effort in a technique that the experts call "feathering."

These same experts, though, are the ones hired to drive the cars during the Union/Pure Oil Trials and skilled as they are and with no pressures other than competition, even they can't count on feathering successfully. Consequently, they invariably skid to a halt in a cloud of rubber smoke as the lesser of two evils, the theory being that the price of four tires is cheaper than human life.

How, then, can we expect the average driver to master feathering? How can we expect him, in a moment of panic, to measure a pedal effort of 150 pounds which is another of the test stipulations thrown in by the FHWA. Brakes differ in design and are called upon to do different jobs, depending upon the weight of the car, road surface and an infinite number of other variables.

To show how meaningless at least the braking figures will be in the forthcoming FHWA booklet, one has only to look at the report from American Motors, the first automaker to complete the test routine. With the 150-pound or less pedal effort and no lock-up, stopping distances from 60 mph for their various models ranged from 199.8 to 269.1 feet. Though it won't be recorded by FHWA, the same cars with wheels locked stopped in distances between 126.4 and 151.3 feet. The difference very probably would include the space occupied by the cause of your panic.

Detroit already has the $250 solution which is an electronic sensing device that feathers for you. It's standard on the Mark III Continental, optional on Lincoln and Thunderbird and will soon be optional on Toronados. Why doesn't the FHWA forget about the publishing business and stick to its regulatory function? If this device were required on all new cars, mass production would cut costs to $50 or less and lives would be saved.

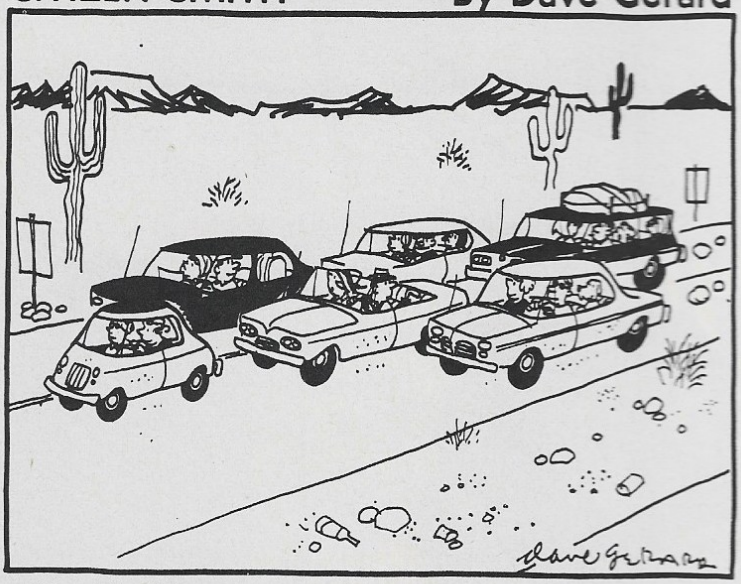
Care and Feeding of Radios

While the insides of any radio will forever remain a mystery to most of us, there are a number of adjustments and fixes you can perform yourself to cure common ailments in car radios. In fact, some of these are necessary to know because a repairman will seldom "road test" a repaired radio.

The simplest and most often needed

(Continued on Page 56)

CITIZEN SMITH By Dave Gerard



"I wish this group would break up. We've been together since that stop light back in New Jersey!"

READER'S FORUM

Kudos for Tony Hill

Sirs: All I can say about Tony Hill's column on carburetion *(Hi-Performance Corner,* WCG, December '69) is it's about time! He really opened my eyes as to what my needs were for properly jetting my 1500 Bug and for future applications. I feel that to the layman, *Hi-Performance Corner* is most helpful to anyone who wants to get the maximum out of a VW engine without spending money on the wrong speed equipment. Let's hear more from Tony Hill!

Lee Rappeport
Cincinnati, Ohio

You will. Tony's about to go racing again in his "World Car Guide Special" VW. Major target is Bonneville for some world's records, something a Canadian has never held. You can be sure we will give you the full lowdown on how he prepares his car. Meanwhile, turn to page 46.

. . . And Brickbats for Tony

Sirs: *Hi-Performance Corner* for August '69 contains a quite common error. The distance between the driving axle shaft and the point where the tire contacts the road will, when divided into the torque at the driving axle, give the forward (or rearward) force propelling the vehicle but not the speed of movement. In one revolution the wheel will move a distance equal to the periphery of the tire and not the circumference of a circle having a radius he describes, sometimes called the "line radius." To be correct the formula given in Tony's column would require a fudge factor for slip.

Ronald Passnon
Valois, Que., Canada

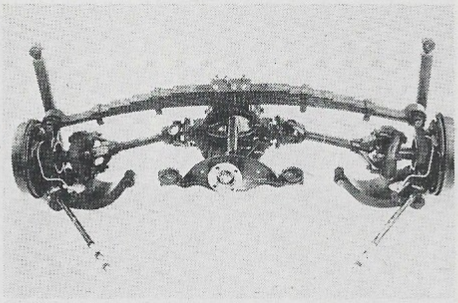
We guess you're right but tire makers don't like to publicize their fudge factor for slip.

How About "Fire Injectors?"

Sirs: Could you do a research article on the "Fire Injector" spark plug as sold by J.C. Whitney & Co and others? Are the advertising claims verifiable without risking blowing up your engine. How would they work in a 356C Porsche?

Robert Lippin
New York, N.Y.

We probably could but we won't do such an article. It would require whatever time it takes to drive until plug failure occurred and even then, the findings would only apply to the particular engine being tested. J.C. Whitney and others have sold this kind of plug for years and naturally wouldn't continue to offer them if they "blew" engines. On the other hand, no major U.S. or overseas maker of so-called brand-name plugs has adopted this type of electrode configuration and there must be reasons for that, too.



6-Plus rear suspension

6 Plus 6 Doesn't Equal 12

Sirs: *Reader's Forum* in January confuses our GT-6+ with the TR-6 and the 6 "Plus" with the plain 6. The GT-6 Plus competed in E Production in 1969 and took the National Championship in the hands of Mike Downs of Group 44. It was a sweep, with two other GT-6 Pluses taking second and third. For 1970 the 6 Plus will be in D Production on the basis of its performance and handling. The 1967-68 "plain" GT-6, with its swing-axle rear suspension, will remain in E Production. The deciding factor is the rear suspension. The 6 Plus has double-jointed half-shafts and a Lotus-like rubber doughnut incorporated on each side (see photo) which removes any doubt about the handling. This year's Triumph Competition Department car has convincingly beaten a number of B Sedan 911s as well as the 1600 Porsches which are its normal competition. So, the C Production TR is the TR-6 . . . okay?

Mike Cook
Public Relations Manager
British Leyland Motors

Okay if you say so, Mike, but you seem to have an awful lot of "sixes" for editors and the SCCA to sort into their proper slots. Why don't you name your cars after girls like the Weather Bureau does hurricanes?

No Hot Car Bug?

Sirs: I'm not much of a hot car bug so I know little about the big engines being offered today but I'm interested in buying a Dodge this year. It's the difference between economy and beauty. What difference in performance, gas mileage, service etc. could I expect between a Coronet 440 with a 383 4V and the Coronet R/T with the 440 Magnum. I'm afraid my ignorance shows but I'd appreciate any and all help you might be able to give me.

S/Sgt. James H. McGee, USMC
FPO, San Francisco

Your question is a good one and by no means "ignorance." The 440 Magnum will outperform the vaunted Hemi at legal speeds, is utterly reliable but it's a gas hog. Chrysler engineers who buy intermediates for their personal use invariably specify the 383, usually with 2V carburetion so they can use regular

(Continued on Page 57)

WORLD NEWS

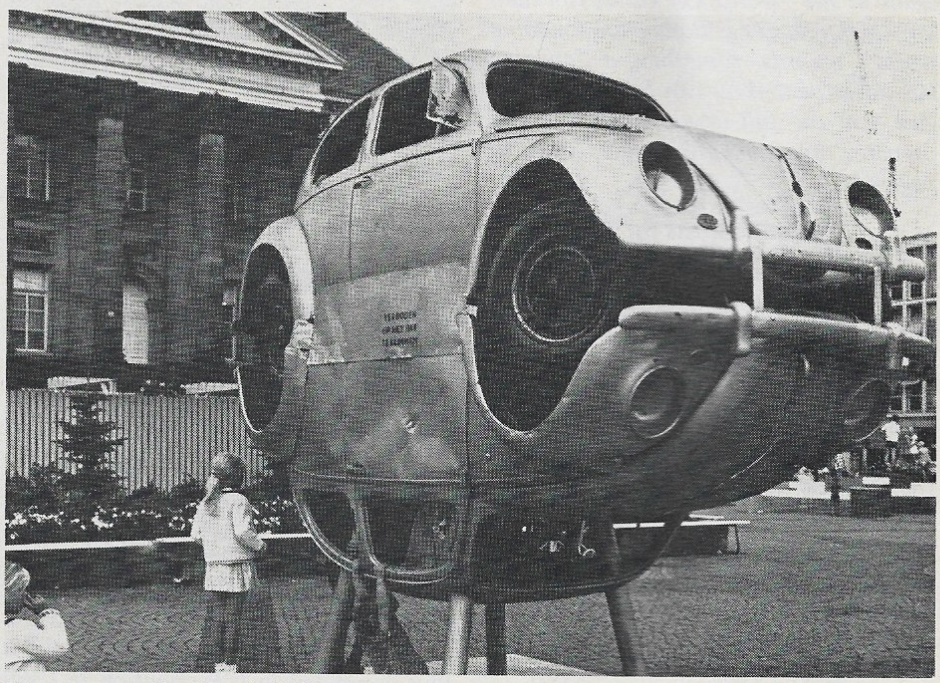
Gasnon electric

No People in Detroit?

Famed Greek planning expert Constantinos A. Doxiadis predicts that in 30 years there will be no people at all residing in the area now encompassed by the city limits of Detroit. His tongue-in-cheek statement was based on the current ratio of people moving to the suburbs versus those moving into the city and it could apply to most any other big U.S. metropolis. Doxiadis's firm currently holds a commission from the Detroit Urban Area Project Group to plan the transformation of all southeastern Michigan into what he calls a "human center" which would aesthetically combine both single and multi-family residential areas and industry where these people could find employment. Cars will be banned from many areas of the center, being replaced by such transportation devices as moving sidewalks and automatically guided capsules of varying passenger capacities. Again using Detroit as his example, he noted that the streets and parking lots needed to handle the city's present car population take up two-thirds of the total area. He calls mass transit only a partial solution, commenting that "once man reaches a certain level of freedom he won't want to give it up, so the personal transportation vehicle is here to stay . . ." He did not explain how he would solve this problem to the joint satisfaction of freedom lovers who have already fled with their cars to the suburbs and must be attracted back to urban life, Detroit's auto industry which is in essence his employer, plus those who feel that a moving sidewalk is not much different or less restricted than a subway or bus.

Yuasa to Build Electrics:

Yuasa Battery Company Ltd., Japan's largest producer and exporter of car batteries understandably figures that electric cars are good for its business. Rather than wait, though, for the auto industry to create the market, it has begun producing its own for sale under the rather dubious brand name of "Gasnon." Initially, existing cars will be converted and the company already has an order for six of them from the city of Takatsuki. The prototype pictured is obviously based on a Daihatsu 1000 and with 10 lead-acid batteries and a 4.6 kw motor replacing the normal mechanism, weight climbs to 2,490 pounds, range is 80 miles and the top speed claimed is 50 mph. Price is pegged at 50% higher than before the conversion. Within three years Yuasa says it will be building its own light alloy or reinforced plastic bodies and chassis and hopefully, current research on lighter and more powerful zinc-air and sodium-sulfate batteries will have born fruit. While hardly a breakthrough in technology, the Gasnon is at least the first modern street electric to be seriously put into production. There are no plans for marketing the car in the U.S.



Mirror image for Dutch kiddies

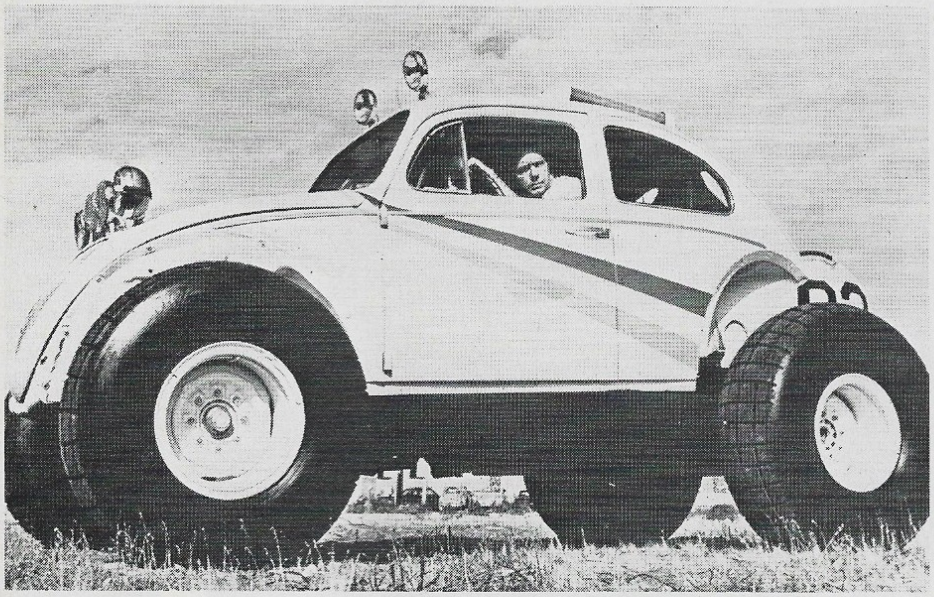
Short Takes from Volkswagen:

* The mile-long VW factory in Wolfsburg continues to rate as one of Germany's leading tourist attractions. More than 100,000 visitors trooped through it in 1969 to see beetles, Fastbacks and Squarebacks being built.

* Sociedade Comercial Guerin, VW importer for Portugal recently provided transportation in the form of 60 white

beetles for as many couples who took part in a mass wedding in Lisbon Cathedral of the Feast of St. Anthony. The free rides got the people to the alter in time but they honeymooned on their own wheels, if any.

* Volkswagen Northeastern Distributors beat Volkswagen Pacific for the first time in the continuing contest among VW distributors to see who can achieve the highest market penetration in their territory. The New England operation chalked up a whopping 9.2% of industry, import and domestic, compared to Los Angeles's 8.5% for the same post-dock-strike period.



Bug for "Mint" 400

* One A.B. Sellards of Mesa, Arizona, peers out the window of the lunar Volks he and a partner named R.E. Packard will pilot in the upcoming Del Webb Desert Rally in Las Vegas. If any of you have worried whether VW wheel bearings will take wide or reversed rims, here's your answer.

* Mexico has begun exporting at least parts of cars. The new VW factory in Puebla is now an important source of U.S. requirements for spare front and rear hoods and fenders, brake drums, wheels, cylinder heads, full pumps and flywheels.

* Though they may have looked like beetles, the first two new Volkswagens imported to the United States just 20 years ago are more akin to rabbits. In that period they've hatched a family of 3,500,000 look-alikes.

* Next venture of airline pilot Mira Slovak, who has twice flown VW-powered Fournier soaring aircraft across the Atlantic, is a plan to hop from London to Australia. This time it will be a two-place Fournier with the electronically injected 65-horsepower engine.

* Next time "Buy American" proponents sound off, remind them that the VW dealer organization now numbers 1,100 and employs 40,000 U.S. citizens. Total dealer investment exceeds $310 million and when you add in that of the 14 regional distributorships, also American-owned, the total climbs to nearly $350 million.

STP

STP Stands for What?

Not all of the 50 million of STP stickers handed out each year end up on bumpers. In 1969 scores of companies unrelated to STP have asked for and received supplies of the decals to spice up sales meetings with their own self-serving meanings for the initials. For example, a reducing chain for women uses "Slim, Trim & Pretty." Some good Samaritan pasted them temporarily on the ancient and low archways of the Mission San Juan Capistrano, the intent being that you had better "Stoop to Pass." They have found some circulation among militant blacks, symbolizing "Strength Through Power" and at least 50 schools invoke their teams to "Stop That Pass" with the decals, some on television much to Andy Granatelli's satisfaction. Seriously, they stand for Scientifically Tested Products Corporation and president Granatelli was recently elected to a directorship in the Boys' Clubs of America, the announcement being made at a dinner hosted by Richard M. Nixon.

Conflict of Interest

Neither the drain of the Vietnam war nor threats to divert highway funds can delay the steady progress of our Interstate System but 65,000 ducks and geese can. All work on a $20 million four-lane bridge to carry I-65 across the Tennessee River near Decatur, Alabama, has been stopped until March 1st to permit the migratory fowl at the nearby Wheeler National Wildlife Refuge to roost in peace. Pile drivers and jackhammers have joined them in hibernation and the lull was planned when bids on the project were taken.

WORLD NEWS IN BRIEF . . .

* Ford Motor Company is contributing $10,000 to the national championship prize fund of the International Motor Sports Association's 1970 professional Formula Ford series, and is matching this amount in contingency awards for Formula Ford drivers competing in events sanctioned by the Sports Car Club of America. Formula Ford cars resemble Grand Prix machines but power is restricted to basically stock 1,600-cc Cortina engines.

* American Motors is adding 1,000 workers to its Kenosha, Wisconsin assembly lines to produce the Gremlin, the sub-compact that will be introduced by the firm at the New York International Auto Show this April.

* If you have any doubts as to the durability of Citroen's two-cylinder Mehari, described elsewhere on these pages, consider that a fleet of them recently transported 200 Belgian students from Liege to Dakar, Africa, a distance of 9,300 miles of which 2,700 was desert.

* Sales of pickup trucks have tripled in the United States in the last decade, and most of this increase can be credited to campers. Sales have risen from 344,000 to 1,120,000 units annually. For Datsun, approximately three out of every five sales is a pickup.

* Transcontinental Motors, Inc., former importer of NSU vehicles into this country, has received a favorable decision from the West German Court of Appeals that its contract was breached by NSU (now Audi/NSU) and the

(Continued on Page 55)

Road Test

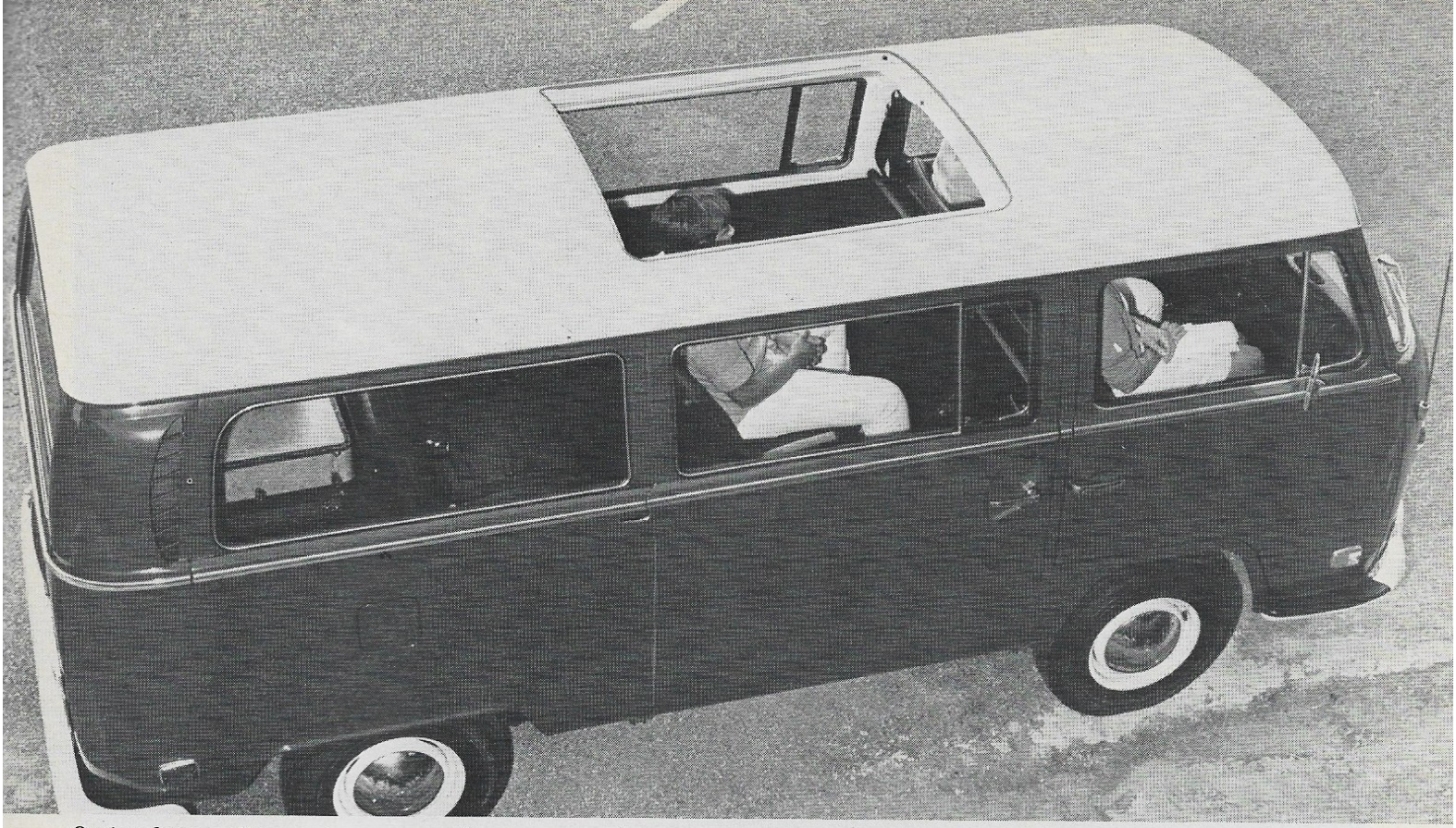
1970 VW BUS... practical for 7

CAR AT A GLANCE: 22-mpg economy . . . 68-mph top and cruising speed . . . Fine attention to detail trim . . . Beefed-up frontal structure . . . Edwardian performance . . . Extremely comfortable ride.

by Don MacDonald

photos by Lester Nehamkin

Purposeful looking front of the VW bus boasts the world's largest "radiator" badge but it does not look out of place. Many owners mount the spare there which helps protect them and the painted bumper.



Optional sunroof is easy to manage and causes no unpleasant drafts. It's also handy when you're carrying cargo such as 7-foot Christmas tree.

If the Greenbrier, a slab-nosed, rear-engined equippage produced by Chevrolet in the early sixties were still around in modernized form, a tester would have at least some basis from which to take the measure of a Volkswagen Station Wagon. The Greenbrier was an imitator and follower but like VW, design emphasis favored passenger rather than commercial versions. The current crop of domestic front-engined boxcars are overly expensive, gussied-up trucks.

The VW bus, thus, stands in a class by itself. It's such a practical shape for carrying people and their recreational accoutrement that unfortunately, the tendency is to cram more into it than its engine will handle. The summer scene at our mountainous national parks anywhere is a long line of cars crawling up the slope, headed by a VW camper conversion, almost like a heavy freight train being pulled by its caboose. Even without the 700 pounds or so of stuff that makes a Campmobile, the bus still weighs 1,000 pounds more than a beetle and the same 57-horsepower engine is used in both.

Bus and Campmobile owners soon acquire downshifting skills, patience, and a talent for ignoring those behind them on the highway. And for some reason the odds are at least even that the head of the bus-owning household will acquire or already has a beard. If you don't believe this, count them the next time you're out for a drive. The purchase of one of these vehicles is a form of escape or rebellion, if you will, from the hurly-burly, as much so as a farm in Vermont or a shanty on the desert, and perhaps that accounts for the beards.

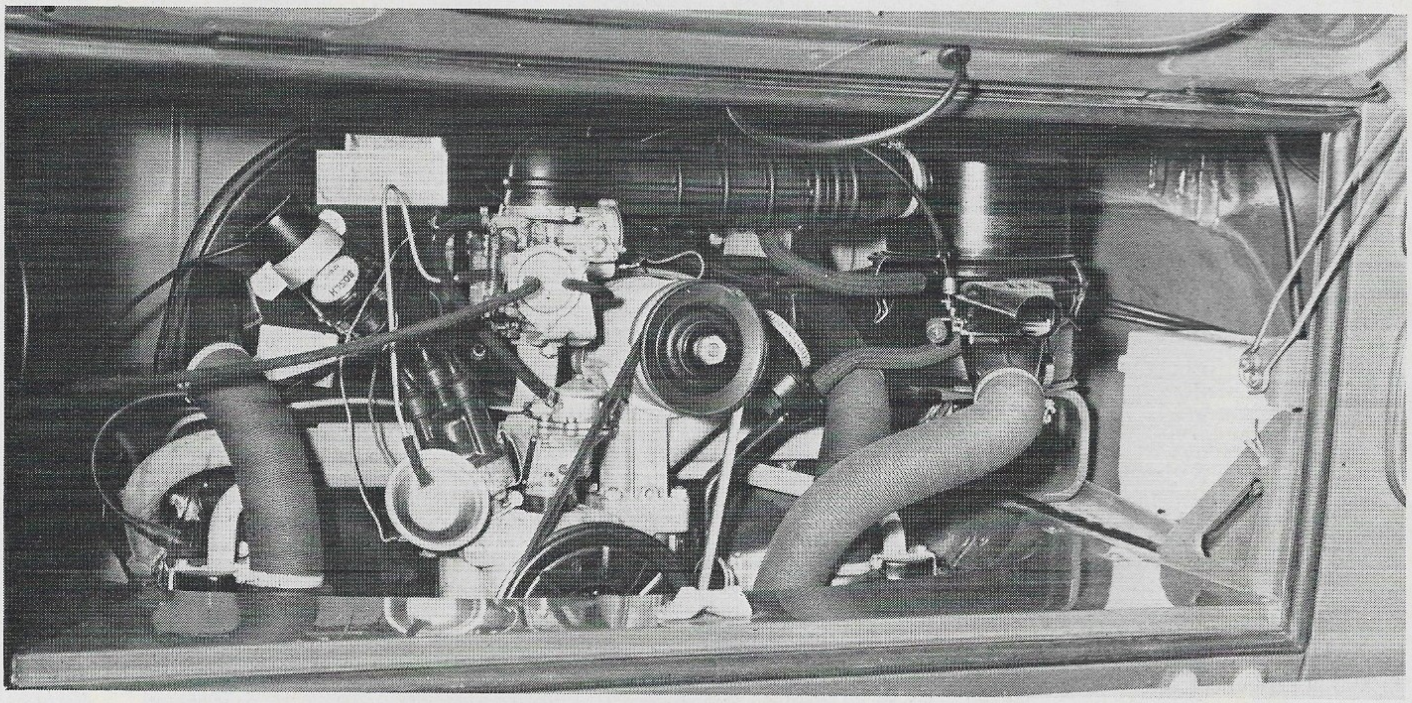
The purchase is also an excellent investment. Well-used VW buses are threatening Detroit's traditional concept of the youth market. Again, escape via a bus is far less expensive and more promising in terms of birds and bees than being encumbered with a bucket-seated, thirsty-engined GTO or Scat-Pack Dodge. Admittedly, however, flower symbols and curtained windows seem to attract the police as readily as racing stripes.

Testing the bus in some meaningful way is a challenge in itself. We found that it will accelerate from zero to 60 mph in 37.11 seconds, a figure matched only by the diminutive Subaru 360 and the belt-driven Dutch Daf but then, who "accelerates" from zero to 60 in any of these cars? For much the same reasons, we didn't investigate whether the bus understeers or oversteers and when it commenced to lean even slightly in a corner, we slowed down. We know, though, that both the cruising and top speed is 68 mph because the gas pedal must be floored most of the time unless you want to stay in the truck lane.

In the two weeks we lived with it, the bus did its job which was to take us wherever we wanted to go. The fact that it required twenty more minutes to make the run from Los Angeles to San Diego seemed quite unimportant when, the next day, we purchased the family Christmas tree and carried all seven feet of it upright, branches unbroken, with the top protruding through the sunroof. You can't do that in a Cadillac despite its 375 horsepower.

Looked at another way, the 375-horsepower Cadillac requires 245.5 inches and several tons of machinery to carry seven passengers. The VW bus does this within 170.0 inches and with only 2,833 pounds of machinery. It will make a U-turn in 40 feet; the Cadillac limousine requires 57.4 feet. Then, to end our analysis of the seven-passenger car market, the Cadillac costs $8,440 more, or the equivalent of three additional VW buses plus $1,200 in pocket money to run the fleet. It's rather surprising that America's undertakers haven't discovered this economic

Sliding passenger door on the right side is perhaps a portent of what will be required on all cars sold in the U.S. in the forseeable future.



A familiar scene greets you here, complete with a battery tucked away so that you have to first remove the air cleaner, then the battery itself, to check electrolyte level.

fact because relatives of the departed could be transported in equal dignity and with more legroom.

Though the bus is easy to drive, anybody who has owned one will admit to climbing a curb or two with the rear wheel the first few times a right turn is attempted. You've got to remember that the front wheels are behind you and not start a sharp turn until you protrude about half the vehicle's length into the intersection. If the corner happens to be adorned with an obstacle, such as the gatepost of a driveway, rather expensive alterations are made in the big sliding door on the right side. The novice driver will also feel that he's going to be scraped along the pavement

This view shows only one of the various places in which to stow luggage.

The middle seat unbolts in minutes and the lugs themselves slide right out to gain a flat loading floor for bulky cargo.

VOLKSWAGEN STATION WAGON

Specifications from the Manufacturer

ENGINE:

Type: Rear-mounted, rear-drive, overhead-valve, flat four, air-cooled
Bore and stroke: 3.36 x 2.72 ins.
Displacement: 96.7 cu. ins. (1,584 cc)
Horsepower: 57 @ 4,400 rpm
Torque: 81.7 lbs. ft. @ 3,000 rpm
Compression ratio: 7.5 to 1

TRANSMISSION:

Type: 4-speed manual, fully synchronized
Gear ratios: 1st-3.80, 2nd-2.06, 3rd-1.26, 4th-0.82, R-3.61
Axle ratio: 5.38

SUSPENSION: Torsion bar, front and rear, front stabilizer

STEERING: Ross-type with hydraulic dampener

WHEELS AND TIRES: Bolt-on steel disc with 7.00 x 14 bias-ply tires

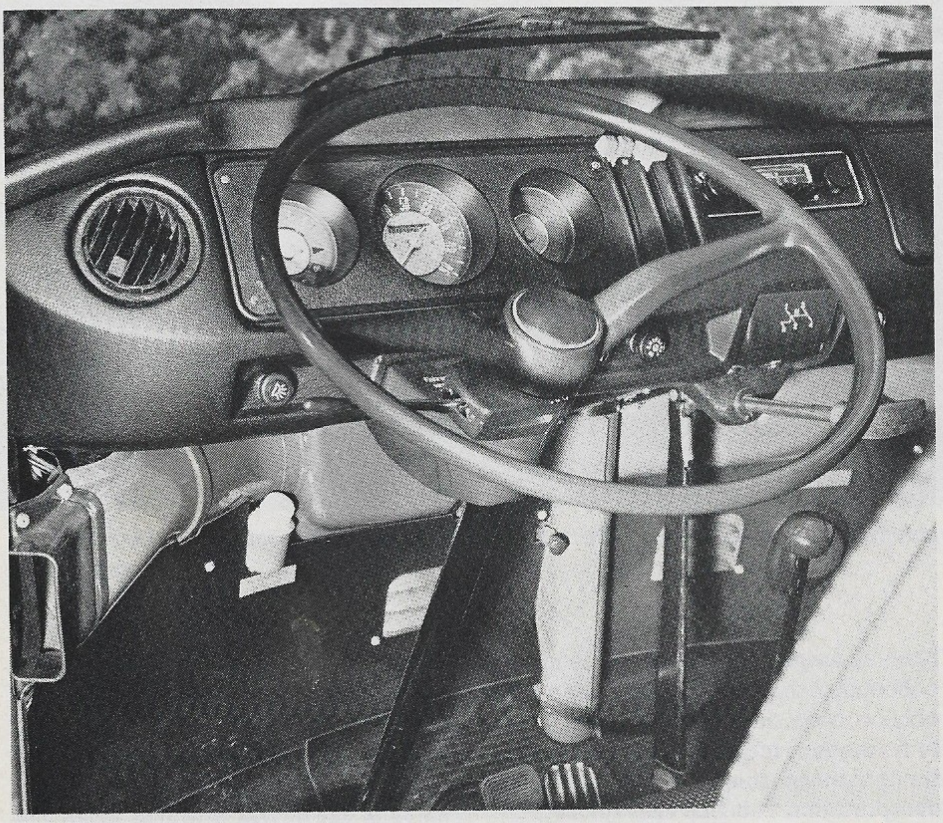
BRAKES: 4-wheel drum

CAPACITIES:

Fuel: 15.9 U.S. gals.
Oil: 5.3 U.S. pts.
Transmission: 7.4 U.S. pts.

BODY AND FRAME: Unitized with reinforced side plates

DIMENSIONS AND WEIGHTS: Wheelbase 94.5 ins., Overall length 174.0 ins., Width 69.5 ins., Height 77.0 ins., Weight 2,833 lbs.



Instrumentation is mostly warning lights but it's obviously right in front of you. Steering position is comfortable, the wheel moves forward in an accident and there's new bracing of the front structure.

the first time he encounters a severe dip and as happened to us, we suggest that you keep your distance from cattle trucks immediately in front of you in traffic.

The gear shift lever on the new model is 1-3/4 inches longer and thus, 1-3/4 inches more vague in its relationship to the gears way back at the rear. Now that Hurst and others have introduced positive-action beetle shifters, we suggest that they devote their attention to the bus as finding reverse is kind of like the old party game of pinning a tail on the donkey. This criticism evaporates once you're in gear, however, as the clutch action in the bus is undoubtedly the sweetest ever to be put in a car. Captain Ahab could operate it with that peg leg of his, cut from the jawbone of a whale.

During the two weeks we had the bus, many persons who had never ridden in one before commented favorably on the comfortable, soft ride. The suspension is a carryover from the big redesign effort of 1968 and there is no need to change it. One guest likened it to a baby carriage but that is

(Continued on Page 49)

Road Test

FIAT SPORT RACER . . . A Style Sensation

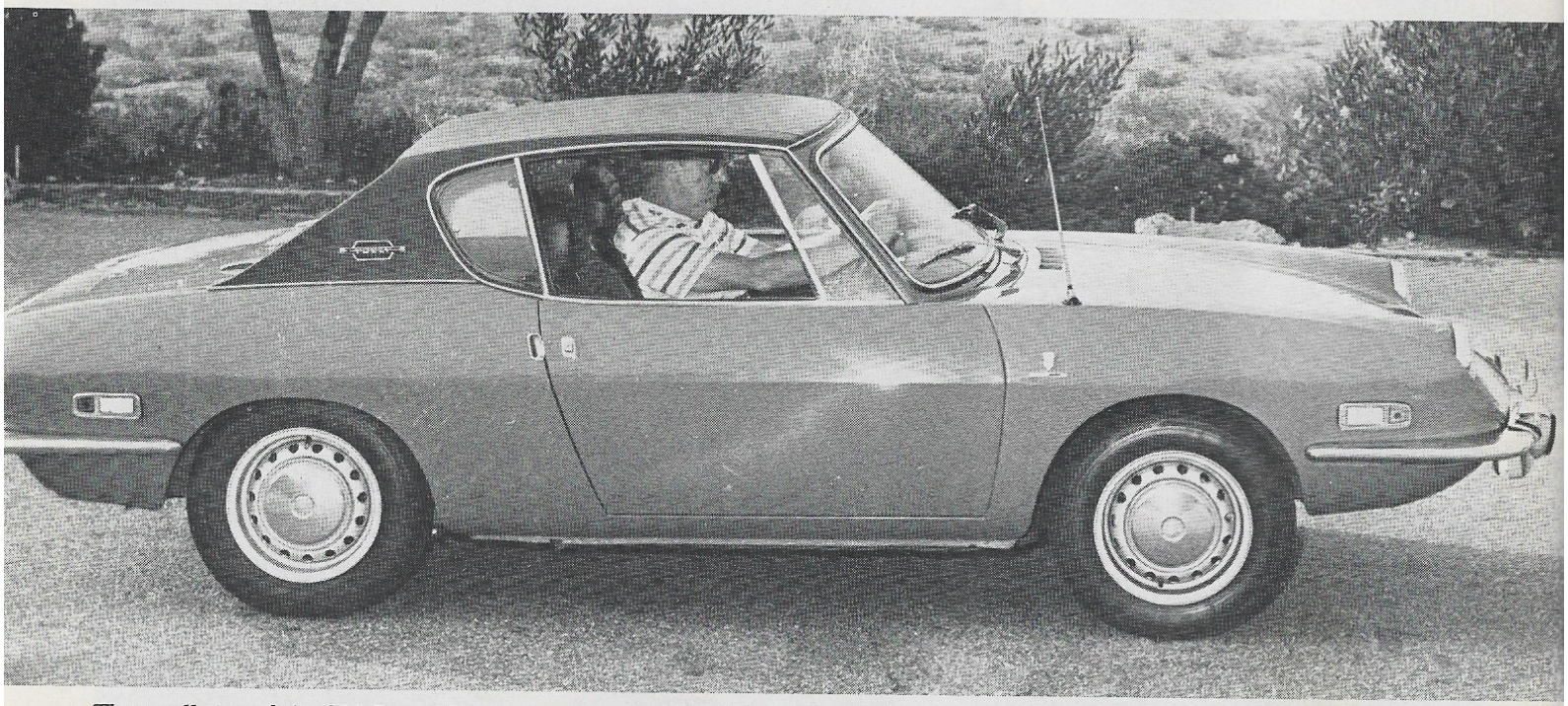
by Don MacDonald

photos by Lester Nehamkin

CAR AT A GLANCE: Tiny, maneuverable two-seater . . . Full instrumentation . . . Excellent handling and stability . . . Standard radial tires and front-disc brakes . . . Not quite as peppy as it looks.

"How does Fiat do it for the money?" That's a question the U.S. distributor keeps asking in their current catalog and my reaction is if they want to sell their cars at a loss it is their privilege. Certainly not much more in the way of a sports car could be crowded into the diminutive shell of the new 850 Sport Racer.

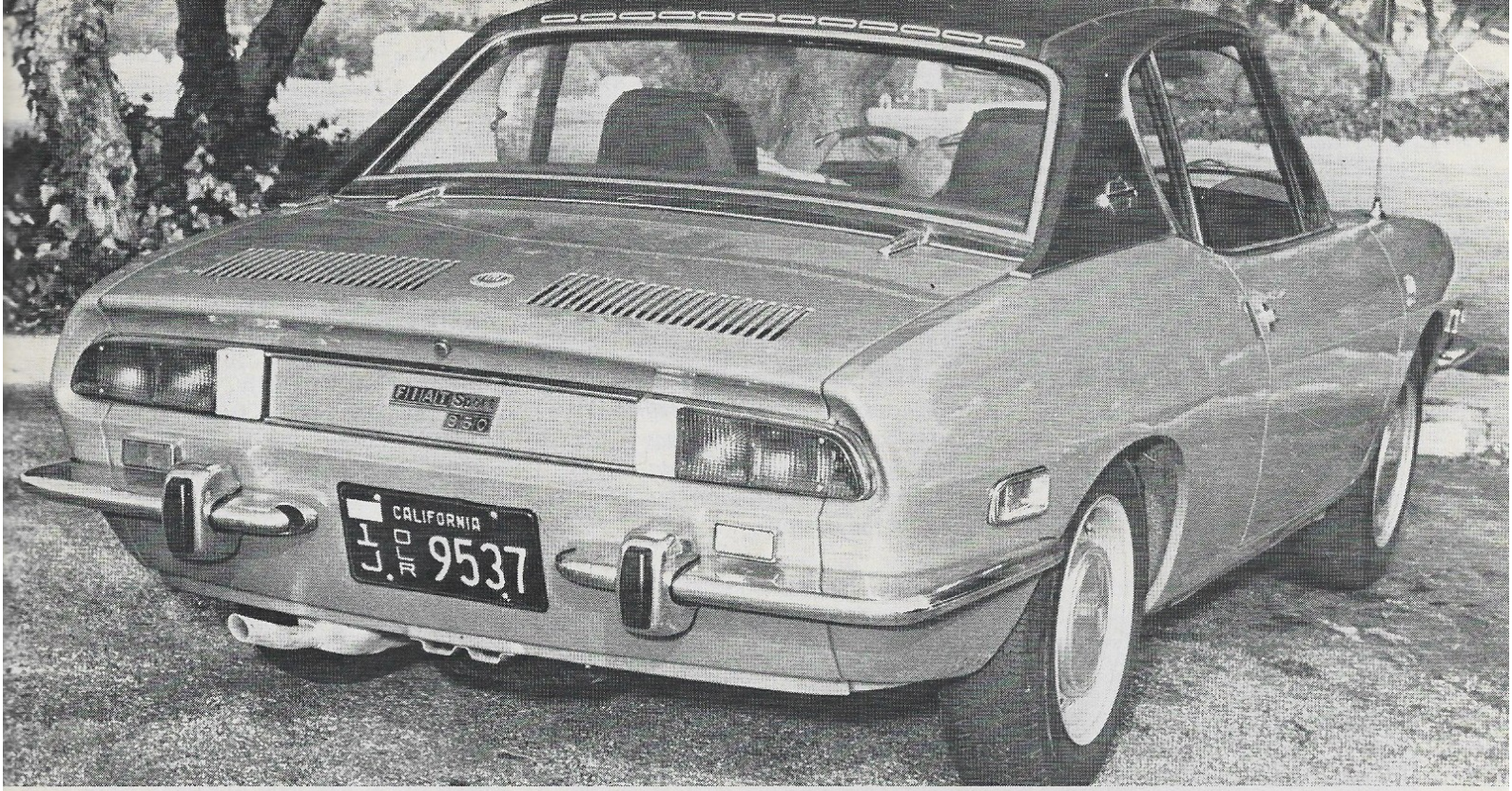
It is very small, with an overall length of 148 inches on a wheelbase of 79, figures 10.7 and 15.5 inches, respectively, less than a beetle. It's also a whopping 11.1 inches lower and weighs 200 pounds less at the curb. At $2,471 off a New York dock the Racer costs about $1.50 per pound which is considerably more than the going rate for a Cadillac. However, delicate filets cut from the eye of the round generally command a higher menu price than T-bones weighing three times as much.



The small size of the 850 Racer becomes apparent only when someone is in it or it's parked near other cars. Yet there is adequate room for two inside.

Perhaps the best perspective with which to view the Racer is to compare it with another member of the Fiat 850 family known simply as the Sedan, a transportation unit that sells for $1,504. Your nearly $1,000 extra is paying for whatever commission per car 'Nuccio Bertone extracts for his styling, 16 more horsepower, a fully instrumented panel that wouldn't look out of place on a Ferrari, front disc brakes, *Gran Turismo* standards of interior trim and a vinyl top applique. Whether the surcharge is worth this or not is up to you but the fact is that sporty 850's outsell the Sedan by a ratio of ten to one.

On first approaching the Racer, an

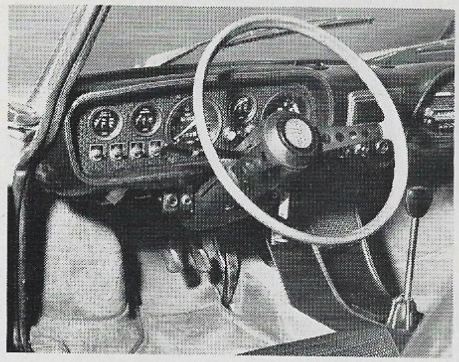


Roof vents are part of the new flow-through ventilation system. Rear quarter windows swing out but front vents are fixed. Barely visible under the car is the low-hanging sump.

Front end, including license plate, sheetmetal and parking lights is rather vulnerable to damage from careless parkers and high curbs.

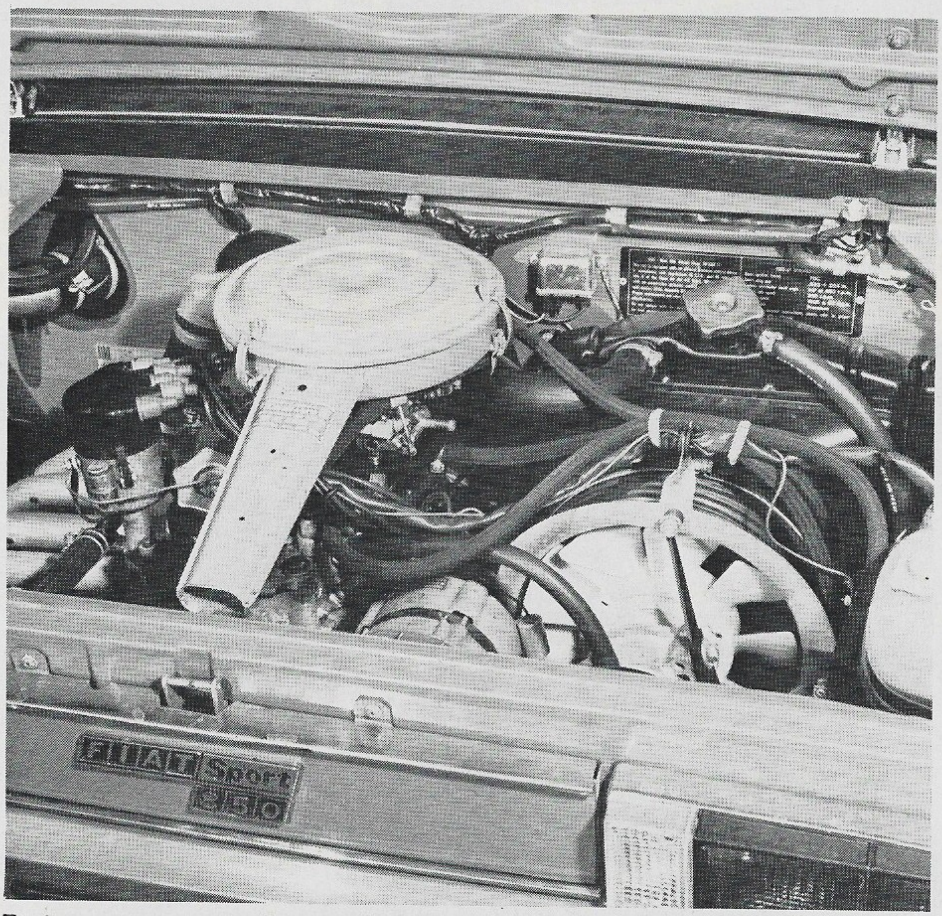
average size adult has a right to wonder how he'll ever get inside. The trick is to lead with your posterior and then follow with arms and legs. Once behind the wheel, you'll find that every dimension is quite ample. In fact, the generous space between the seat back and the wheel lends to driving with arms outstretched in currently approved racing fashion. The pedals, while tiny, are well spaced within the confines of a protruding wheelwell and a center tunnel that serves no purpose ahead of the shift stick on this rear-engine car that we could discover. Persons with overly large feet (or shoes) will have difficulty in sorting the brake from the accelerator.

Tucking the Racer into a testing schedule that has been dominated by Volkswagens these last few months was therapeutic because it proved that there *is* a way to make small, rear-engined cars that not only corner well but which are stable in crosswinds. Without attempting to define the limit at which the rear end of the Racer will break loose (and



Instrumentation, trim and other creature comforts are fully up to Italian Gran Turisimo *standards and so too are the rather cramped foot controls.*

Luggage space in front is minimal but adequate gear for two may be carried inside the car. Note the simple but positive catch to hold the lid open.



Engine compartment offers excellent accessibility which helps whether you pay for maintenance or do it yourself. Filler above the headers is for gas.

that it will with very little warning) let's say that if you can go around a given corner in a stock beetle at 30 mph without discomfort, the Racer will take you around at 50 mph on the same terms. In other respects, though, the beetle is superior in its straight-line riding comfort (on a still day), it won't bottom as easily on dips and it's a shade quieter.

The factory claims "over 90 mph" for the Racer but when the yellow or caution area of the tachometer begins at 6,000 rpm with a gearing that works out to where 5,250 rpms equal 70 mph, I question the adviseability of proving this claim daily with *your* car. In fourth, the Racer requires approximately 600 rpms to achieve each 10 mph increment of speed so 90 mph works out to approximately 6,450 rpm, at which point the engine is falling off in peak power and the tach needle is hovering at the redline.

The gear change is rather good, considering the remote location of the transmission. All four synchros are quiet and the throw is on the short side. There is, though, the usual business of having to push down and then over, this time to the right, to get into reverse. The Fiat people claim that their native *autostradas* would be paved with shattered gears were it not for this protection but hopefully, they'll someday come up with a trigger or push button to make the transition more positive. Otherwise they could stick reverse up alongside first where the worst that can happen is taking off in the wrong direction from a stoplight. There must be half a million American Muncie four-speed boxes on the road now with this pattern and these owners have managed.

Acceleration with two 180-pound men filling the Racer was less sprightly than the attendant commotion from the engine would lead you to expect. Zero to 60 mph can be achieved readily in 19 seconds by staying in third and the same technique should be used for passing. Dropping into third at 40 mph will get you to 60 in 9 seconds, but if you use high, it will cost you 3 seconds. Moving from 50 to 70 mph is a 14 second proposition and here, of course, you do have to shift up a notch. Give or take a second, the Racer and the new 1600 beetle are a close match, performance-wise, but the Racer will produce as much as 35 miles to the gallon (31.9 on the tank that included performance testing) compared to the maximum of 28.6 we achieved with our most recently tested beetle. Offsetting this is the Racer's premium fuel requirement.

Luggage room in the front locker is minimal but when you add in the space behind the seats, two people can take a long trip without packing scientifically. Access to the inside storage area, though, is marred by the thoughtless location of the seat back latches. These are at the bottom center of the seat back and you pretty much have to kneel on the pavement to reach in and manipulate them. Remember, these cars are so low that you can't even stand on the curb and polish the roof without bending over.

That fact brings me to another related point which is the little matter of road clearance. It measures 5.3 inches, presumably from the lowest point on the chassis, and unfortunately that low point is the delicately finned sump casting. Our test racer was only 850 miles old when we collected it and

the sump already looked like someone had attacked it with a hammer. This car is definitely not a candidate for the Encinada-LaPaz road race or any other rural trail that has not been graded since the last rain.

Aside from the excellent disc and drum braking system which you could expect in a car of sporting pretense, three other items of standard equipment deserve note. One is the major step of equipping every car with Pirelli radials, an expense that must exceed the $35 price hike applied to current 850 Fiats. The other is eschewing the infamous ignition buzzer in favor of a white warning light. I didn't realize the substitution was legal but presumably Fiat learned not to try and fool our government when, last year, they had to call back thousands of rear view mirrors because the reflections were miniaturized. The third item is cheating sports-minded buyers out of movable vent panes. The pane is there but it's fixed, achieving nothing but the simplification of lowering the main windows into the doors. While that may benefit Fiat stockholders, it does nothing for either appearance or comfort.

The sales brochure summarizes the 850 Racer rather aptly, calling it "a beginner's car . . . to get the joy of driving without denting the budget." The road is indeed just a few inches below you and the only thing likely to get dented is that oil sump. •

FIAT 850 SPORT RACER

Specifications from the Manufacturer

ENGINE:

Type: Rear-mounted, overhead valve, water-cooled, in-line four
Bore and stroke: 2.56 x 2.68 ins.
Displacement: 55.1 cu. ins. (903 cc)
Horsepower: 58 @ 6,400 rpm
Torque: 47.7 lbs. ft. @ 4,000 rpm
Compression ratio: 9.5 to 1

TRANSMISSION:

Type: 4-speed, fully synchronous manual
Gear ratios: 1st-3.63, 2nd-2.05, 3rd-1.40, 4th-0.96, R-3.61
Axle ratio: 4.87

SUSPENSION:

Front: Independent, transverse leaf spring with stabilizer
Rear: Independent coil with stabilizer

STEERING: Worm and helical gear, curb-to-curb 31.5 ft.

WHEELS AND TIRES: 5J steel disc with 155SR x 13 radial ply tires

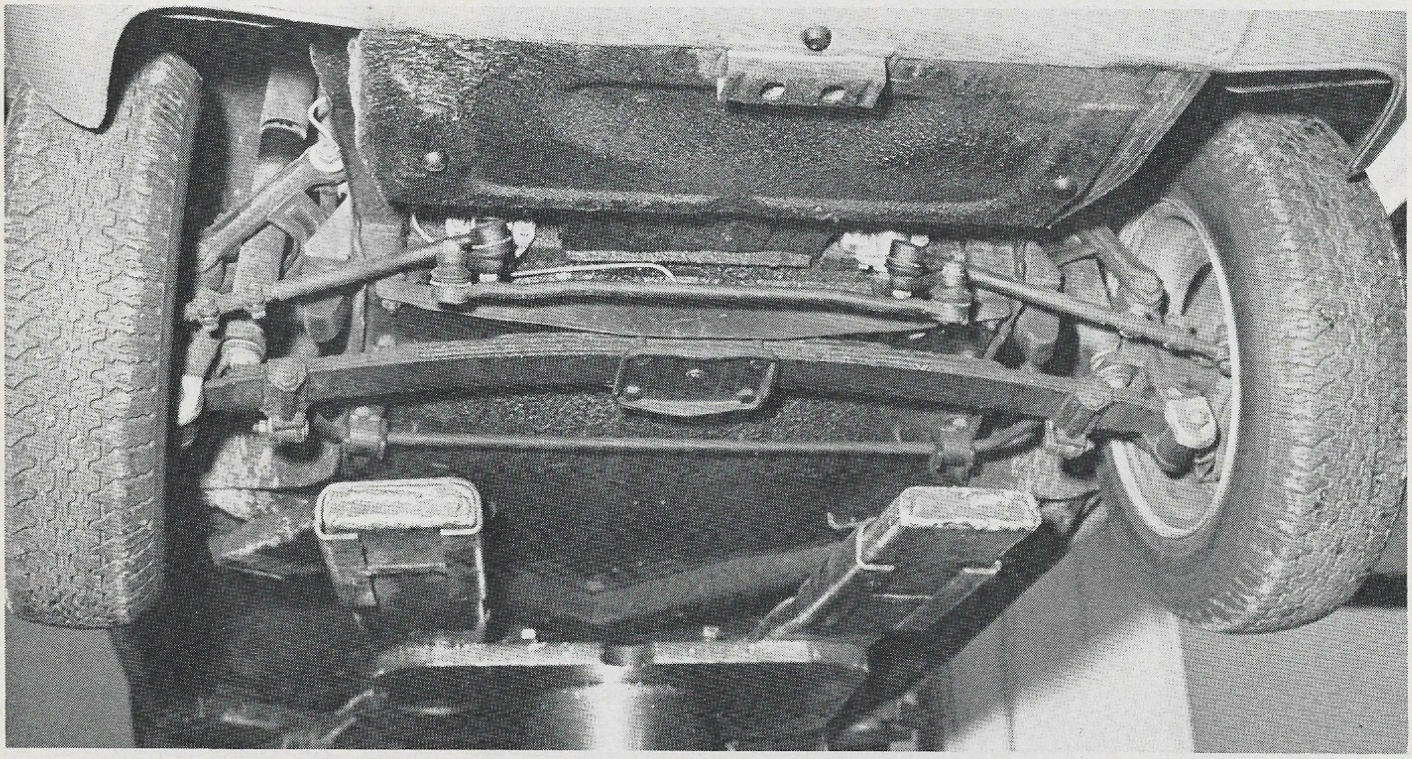
BRAKES: Disc front, drum rear, dual-circuit hydraulic

CAPACITIES:

Fuel: 7.9 U.S. gals
Oil: 4 U.S. qts.
Transmission: 2.2 U.S. qts.
Coolant: 8.0 U.S. qts.

BODY AND FRAME: Unitized

DIMENSIONS AND WEIGHT: Wheelbase 79.0 ins., Overall length 148 ins., Width 59.0 ins., Height 48.0 ins., Weight 1,631 lbs.



This could be a worm's-eye view of a '48 Ford except that the wheels actually are independent. Note the X-bracing of the floor pan giving lift points for most any type of hoist.

Road Test

Subaru wagon is an eminently stable car at normal highway speeds with lighter steering than will be found on most front-drive models.

SUBARU STAR WAGON... Hard to Beat at $1,899

by Don MacDonald

photos by Lester Nehamkin

CAR AT A GLANCE: Four doors and more room than any wagon under $2,000... Adequate performance with unusual quietness... 30-mpg economy... Completely stable in crosswinds.

When WCG tested the two-door version of the front-drive Subaru Star we flatly stated that its combination of adequate performance, excellent handling and 30-plus mpg fuel economy merited rating the car as a best buy and went on to suggest that "it might even be *the* best at $1,697." The four-door wagon under consideration now isn't all that cheap at $1,895 and being 110 pounds heavier, it loses a mite of pep, but its practicality for even a single-car family can't be faulted.

There are, in fact, only two wagons of any kind on the U.S. market for under $2,000. One is this Star and the other, Toyota's Corolla two-door for $1,836 which, except for a shortage of doors, has surprisingly similar dimensions including an identical overall length of 152.8 inches.

Similar figures, however, obscure some fundamental design differences between the two cars that determine which one is the more useful. For example, the Corolla has a wheelbase of 90.0 inches compared to the Star's 95.6 and since modern cars of any make seat people between the wheels, that adds up to 5.6 inches more legroom. In fact, the gain is somewhat more than that in front because the Star's four-cylinder engine is horizontally opposed compared to the conventional inline arrangement used by the Corolla and is therefore more compact. Both have transmission humps in front but the Star's front-drive layout permits a flat floor in the rear.

None of these factors are important if either car is used just as a utility vehicle or for general purposes in a family with two or even three small children. The Star, however, can be *comfortably* used for cross-country travel by four adult-sized people where-

as the Corolla wagon cannot. Thus, in addition to its obvious utility function, the Star may be considered as an alternate to the purchase of a second-hand, full-size domestic wagon by families that need this kind of room but who don't necessarily want to pay for the upkeep of a gas-guzzling U.S. monster, much less chancing the risks inherent in any kind of a used-car purchase.

The front-drive layout of the Star with the engine in front and the transmission to the rear of the axles permits a center pivot steering system that is light and precise, despite the nearly four turns of the wheel that are needed from lock to lock. Steering is further aided by the inboard location of the drum brakes in front which permits a 31.5-foot turning circle, a convenient figure because most residential streets are at least 35-feet wide. Then, while front drive offers no advantage over an engine and drive at the rear on poor road surfaces, it is inherently more stable on windy days. Despite its lightness, the Star is impervious to crosswinds.

Like the Corolla, the 62-horsepower Star engine peaks at 6,000 rpm which means that most passing maneuvers between 40 and 70 mph are best accomplished in third gear. The speedometer is marked in Volkswagen fashion, suggesting that 62 mph is the top limit for third but 70 is feasible in an emergency without protest from the engine. Shifting into high within these ranges during a pass will add enough time for the Lord's Prayer to be recited in full. In third, 40 to 60 mph checked out at 9.4 seconds and an even 16 seconds will see you from 50 to 70 mph. Zero to 60 mph through all gears but high requires 17.5 seconds but it should be noted that the test car had a tacky clutch, making it impossible to get off the starting line without time-consuming front-wheel hop and consequent power stall. The two-door version of the Star with a properly operating clutch, tested by us last summer, showed a zero to 60 time of 14 seconds so allowing for the wagon's extra weight, 16 seconds is probably a realistic estimate of the potential.

The Star's makers claim a top speed of 90 mph for all body styles and it's undoubtedly achievable on a long, clear stretch of road. However, using high of necessity in zero to 75 mph acceleration runs requires 39.6 seconds and at least a third of that time is consumed in high at the top end. Another honest claim is 30 miles to a gallon of regular fuel, giving a

SUBARU STAR WAGON

Specifications from the Manufacturer

ENGINE:

Type: Front-mounted, front-drive, overhead valve, flat four, water cooled
Bore and stroke: 2.99 x 2.36 ins.
Displacement: 66.4 cu. ins. (1,088 cc)
Horsepower: 62 @ 6,000 rpm
Torque: 63 lbs. ft. @ 3,200 rpm
Compression ratio: 9.0 to 1

TRANSMISSION:

Type: 4-speed manual, fully synchromesh
Gear ratios: 1st-4.00, 2nd-2.44, 3rd-1.54, 4th-1.03, R-4.10
Axle ratio: 4.13

SUSPENSION:

Front: Wishbone independent, torsion bar
Rear: Trailing arm, torsion bar with central coil spring

STEERING: Center pivot, rack and pinion

WHEELS AND TIRES: Bolt-on steel disc with 6.15 x 13 6pr bias-ply tires

BRAKES: 4-wheel drum, inboard at front

CAPACITIES:
Fuel: 9.5 U.S. gals.
Oil: 5.7 U.S. pts.
Transmission: 5.3 U.S. pts.
Coolant: 12 U.S. pts.

BODY AND FRAME: Monocoque

DIMENSIONS AND WEIGHT: Wheelbase 95.2 ins., Overall length 152.8 ins., Width 58.3 ins., Height 55.7 ins., Weight 1,640 lbs.

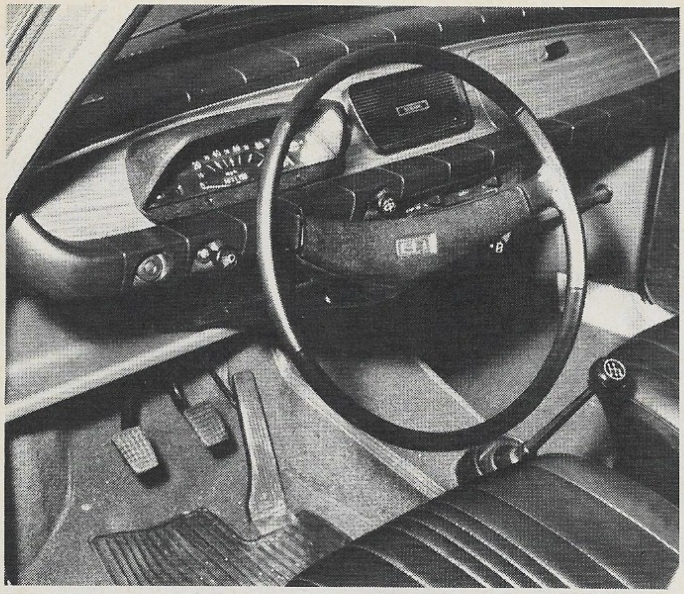
Tailgate is formed from two sections, resulting in a few rattles. Ingenious divided bumper, fuel tank under the rear seat and spare in the engine compartment permits unusually low gargo floor.

Styling is free of frills and the wagon version manages to avoid the boxy look of other imports its size. Note the securely fastened antenna.

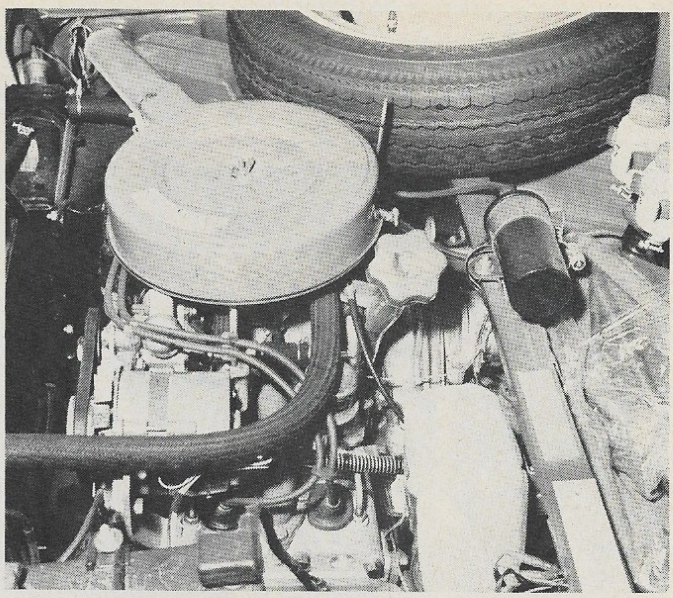
The front seats here are in their rearmost position and there is still a reasonable amount of legroom for passengers. Purpose of bars on rear windows was never discovered.

270-mile cruising range and 15 extra miles to hunt for a station on the 9.5-gallon tank. We achieved 30.5 and 30.3 mpg on the two fills that we checked, the latter including acceleration tests, and no attempt was made to drive with economy in mind.

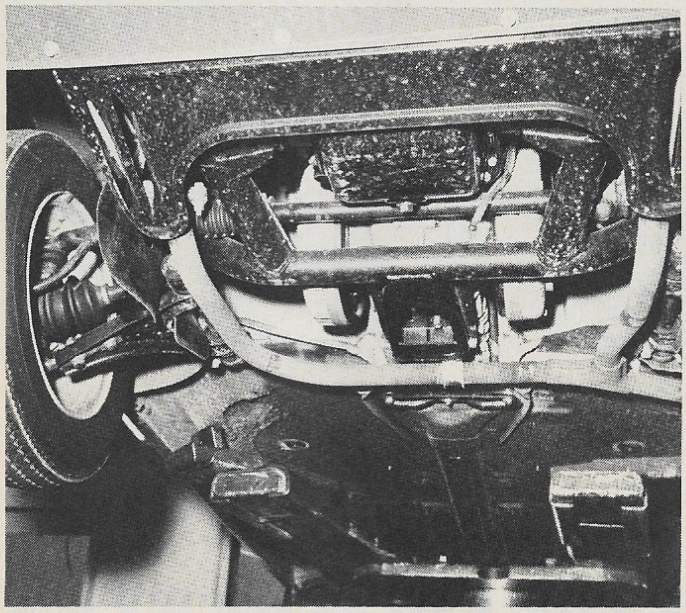
Subara shares a distinction with the much more expensive Lancia Flavia in offering one the two liquid-cooled flat fours on the market today. There are, of course, a number of air-cooled versions of this configuration, most notably the various VW plants. All share the advantage of a shorter, stiffer crank which adds to the inherently better balance and smoothness of this design but there is no way that air cooling can match the silence of jacketed cylinders and heads and the absence of a constantly running, oversized cooling fan. Then Subaru goes a step further by employing two radiators, the larger of the two acting as an auxiliary to avoid fan usage at highway cruising speeds in normal climates. The motor powered fan cooling the smaller radiator only switches on at a coolant temperature of



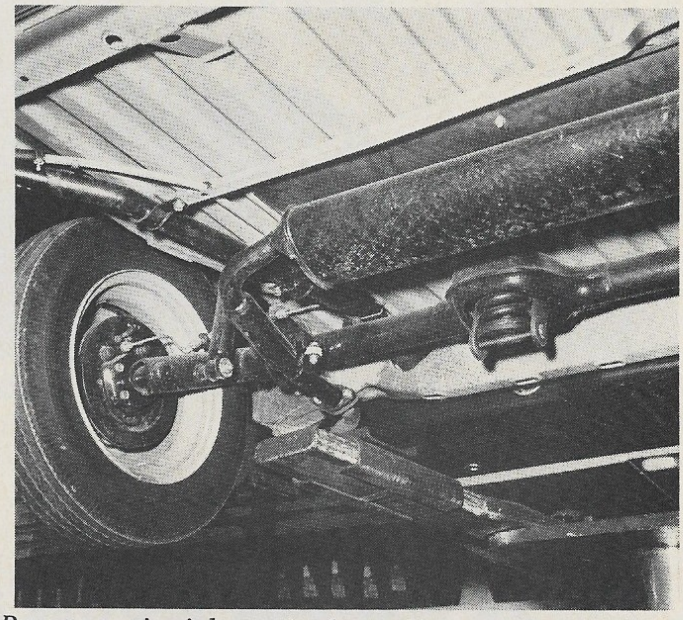
Instrument panel is neatly trimmed in veneer and provides provides both a glove compartment and a full-length package shelf. Pedals are well spaced.



Compact powerplant with its two radiators is dwarfed by the spare wheel and tire.



Front end layout is unusual with its torsion bar suspension and drum, finned brakes mounted inboard adjacent to the differential.



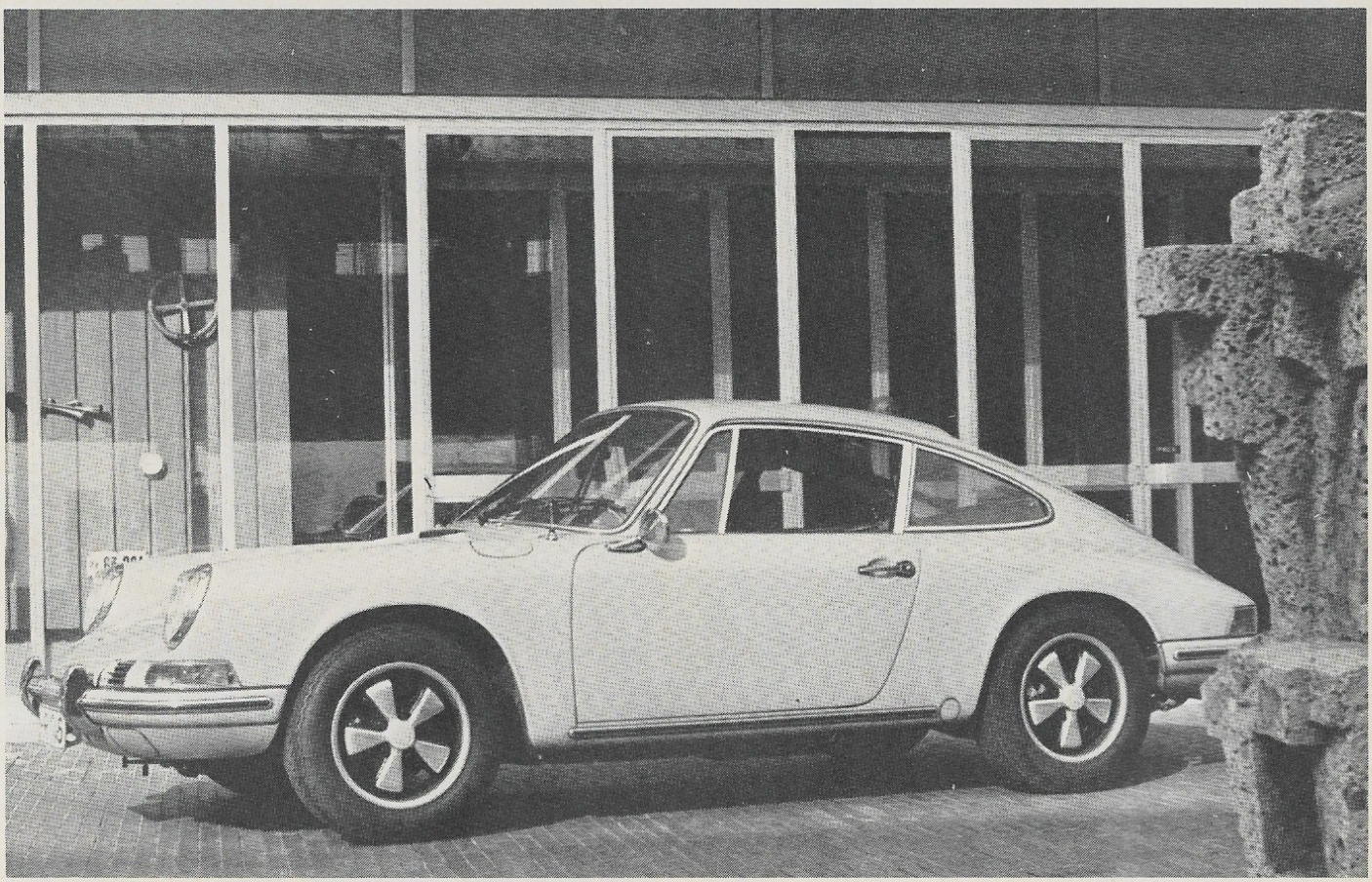
Rear suspension is by torsion bars with an assist from a centrally mounted coil spring. Care must be exercised in lifting the monocoque body on this type of hoist.

about 200 degrees F which ordinarily would be encountered only at high noon on the desert or in heavy summer traffic. The Star, thus, is probably the quietest of all the economy cars without the penalty of heavy and expensive insulation.

The wagon body is not as versatile as those offered by Renault and Simca in that the seat backs cannot be reclined for "camping," but the rear cushions can be folded flush against the front seat backs for added carrying capacity. There is also a two-piece tailgate, not found on most imported wagons, which adds a measure of security when children are occupying the load area. Granted, they shouldn't be out of their safety harnesses but what parent is successful in enforcing this rule on a long trip?

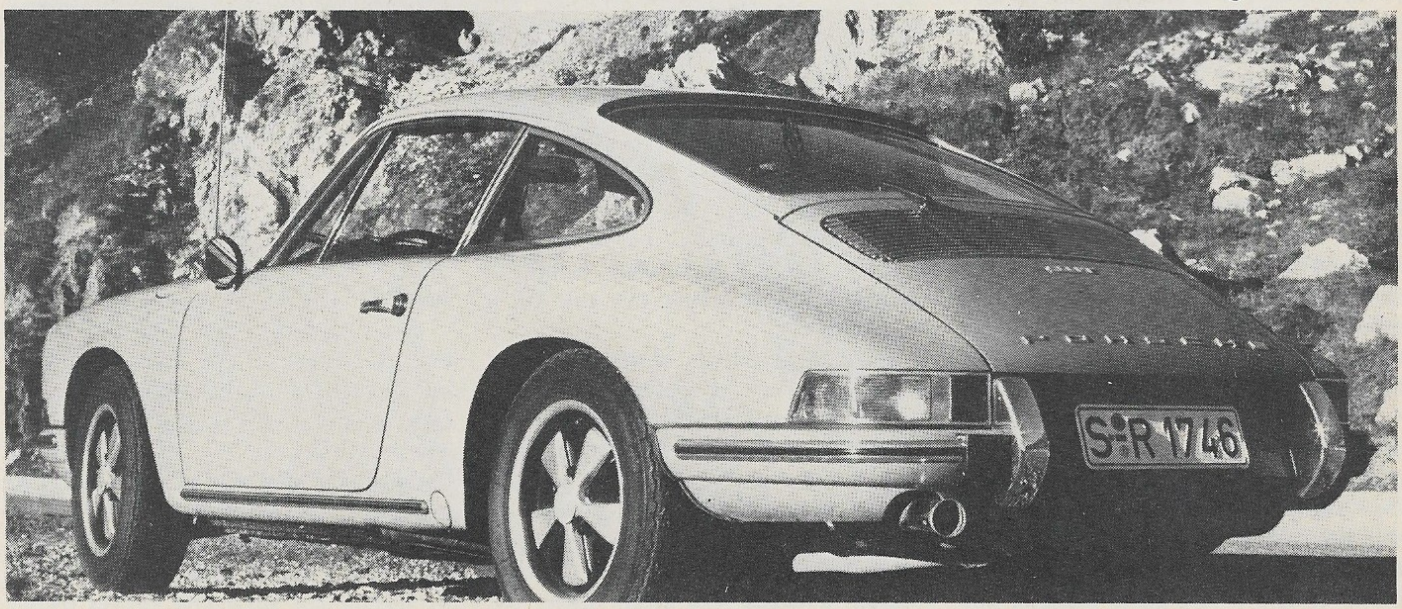
Mechanical details worthy of note include a very accessible fuse box located adjacent to the battery in the engine compartment plus spare fuses taped to the battery cable; a positive locking mechanism to support the hood when it is open; a convenient though rather tinny pull-up parking brake located between the front seats; the industry's most strident key alarm which fortunately has a quick disconnect; a map light built into the inside rear view mirror; and a vandal-proof radio antenna that is attached at two points to the windshield post.

In summary, the Star wagon is excellent value for very little money. It has a slight performance edge on the Corolla and offers considerably more room without sacrifice of economy. A disadvantage that will be cured in time is spotty distribution with the result that knowledgable service outlets might be hard to find in some areas. However, its mechanical simplicity invites owner maintenance once the six month, 6,000-mile warranty period is up. •

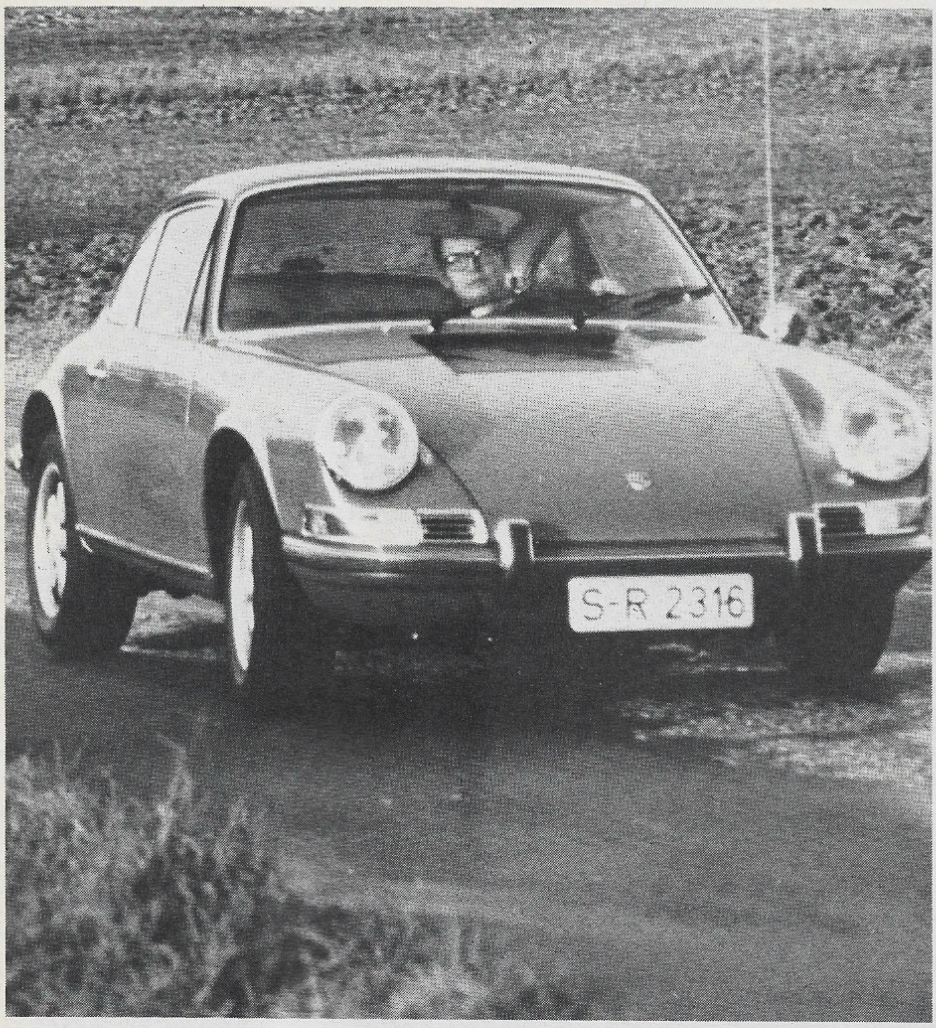


The new 911T adds considerably more authority to the familiar Porsche shape with 142 SAE horsepower and a top of over 125 mph.

A Closer Look at the Porsche 911's



All Porsches now have both wiped and heated rear windows and heat will be added to the front screen soon along with, hopefully, an imbedded antenna.



The full-house 911S with 200 SAE horsepower rides more softly but still corners well at speed. At a slower pace it's a little heavy into the bends.

Text and photos by Sloniger

Porsche has a pattern going. You progress from a roadable competition package to the epitome of a grand tourer within one basic body and engine set. Then you change the name of the game.

Your 356 made the cycle from alloy screamer to sybaritic C model in slightly more than a dozen years, to be replaced by that first 911 – a bigger, better car and a rally winner originally.

Only six years later we have already reached the 911C plateau with a car matured into a highway cruiser of elasticity, elegance and high-gloss excellence. (Their 914/6 arrived meanwhile to carry those checkered banners.)

Look what a capacity boost to 2.2 liters can do, particularly when the goal is not merely more ponies but tamer ones. Power in a 911T (carburetors) went up to 125 DIN (142 SAE) from 110 with the peak remaining at 5,800. And, the top-dog 911S gained 10 to 180 DIN (200 SAE), developed lower at 6,500 rpm.

More important they have nice flat new torque curves. There are 130.2 lbs.-ft. in the T at 4,200 and 156.4 at 5,200 in an S (and that at lower revs too). The S boasts injection as well as a 9.8:1 compression against a modest 8.6 in the T. Small wonder I was eager to see what Porsches might do when they carried an engine silhouette sticker in the back window with 2.2 writ thereon in red.

After 1,400 miles, merely saying that more bore (84mm with stroke remaining at 66) meant more urge is too easy. New maturity in both builders and buyers means you can hear the radio at 100 mph now. In fact this C-series 911 is the first Porsche which might sound good wrapped around a stereo tape deck.

Another nice thing about Porsche is that they never merely apply the old bore bar and smile. Alongside greater power they re-engineer a total product. But, since a 911T now goes as quickly as their previous B-series car with injection, it should have ventilated disc brakes from that car too.

Other '70 model changes include an interval wipe stage for the wipers and two-level sizzle for the rear window which also has its own wiper. Relocated heater vents toast the right foot and the turn indicators have two levels. For passing you can flick a blink without the wand locking "on" while harder pressure puts it into the familiar hold position until cancelled by steering wheel return.

A heated windshield is coming for 1970 in a month or so, and the seats don't match any more. Passengers remain coddled and held while the driver gets a near-sporting model which is thinner but better braced in back with more thigh and shoulder support. This semi-bucket feels lumpy the first five miles. Thereafter, you can't imagine driving a Porsche without one.

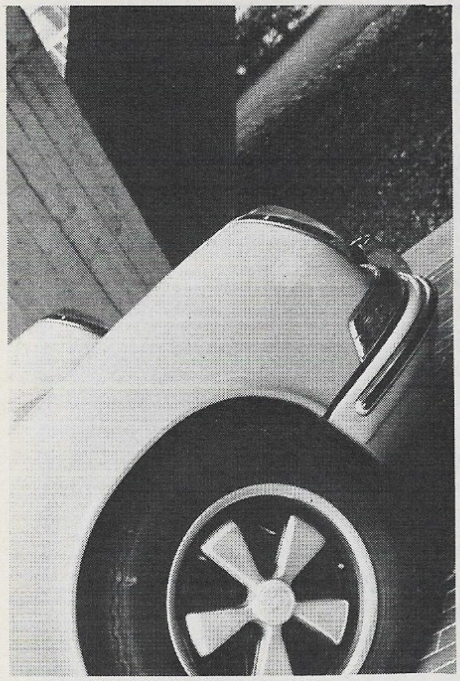
Despite the price (roughly $5,000 at home for a T, half again as much for an S) Porsche still hasn't figured out a symmetrical key which will always slide into its door lock. Nor have they done the driver any favors by leaving no inside handle to pull the relatively heavy door shut. The pocket is too far forward for this and too thin for much but maps, come to that.

To back up punchier engines Porsche fits a larger, softer, rubber-damped clutch which still requires a modicum of talent for smooth departures. The five-speed box (a T option but fitted to our test car) is still tricky into first in a hurry. Thereafter, each cog clicks like an Apollo linkup provided you aren't grabbing drag-strip shifts.

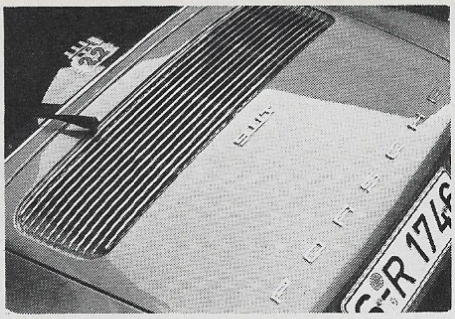
There has been considerable carping around Germany to the effect that 2.2 Porsches lack handling in the border realms. For one thing, those limits come higher now and 55% of the weight still rides in back. So they do not, in fact, handle like mid-engined track burners.

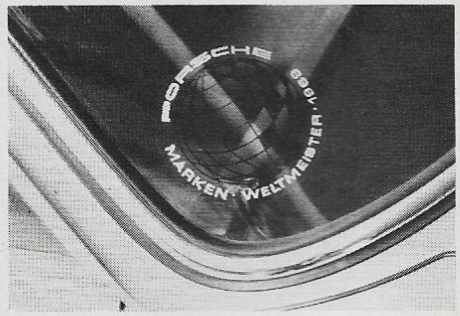
C-type 911's are also softer than competition cars, which is precisely the point for open-highway comfort. The T and S use front torsion bars and shock absorber legs, not the E's hydropneumatic leveller. The ride is firmer of course, and that car carries 6-inch rims while 5-1/2-inch are standard for the T.

I would also be willing to bet that

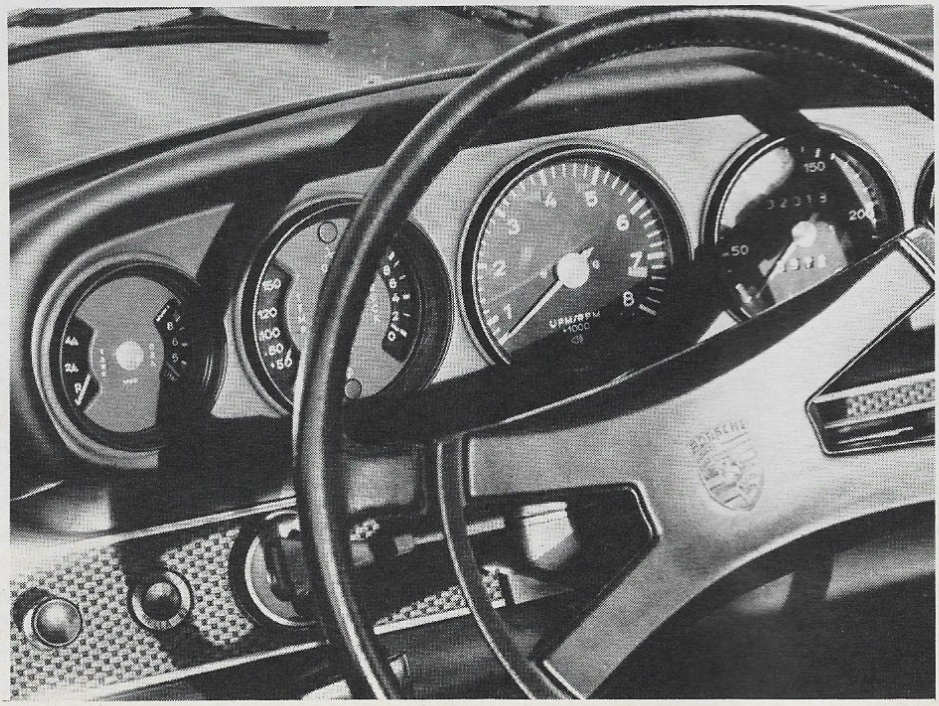


Semperit radials are standard equipment on all C-series Porsches as is this partly chromed one-piece wheel with beauty ring.





Porsche holds the 1969 Manufacturers Championship and wants everybody to know it. At the rear a "2.2" decal tells of the new displacement.



This year the 911T instrument panels have the same number of holes as senior Porsches and presumably you can order a complete set of gauges.

95% of 911 buyers (T or S) will never drive their machines near the limits. Even the remaining 5% won't do so except on a skid pad. They would be crazy if they did. This is not a racer, but a supremely comfortable way to move rapidly with safety.

Don't forget we're speaking of better than 125 mph even in the cheapest (if you can call five grand the poverty border) T form, not to mention better than 140 mph in an S. This Porsche will go faster in fourth than a T flat out.

A 1970 Porsche sweeps through the bends, and consequently it won't dart around your gymkhana course. The steering, which feels so solid over 100 on a straight, is heavy in Alpine hairpins where the car feels next to massive. It comes on close to neutral initially but there is plenty of power, even in a T, to hange your tail on the throttle setting any place prudence and skill allow.

My chief criticism of general Porsche driving is a continued sensitivity to side winds when you are going high, wide and handsome. It's nothing like old-time Porsches, but still evident on a gusty day.

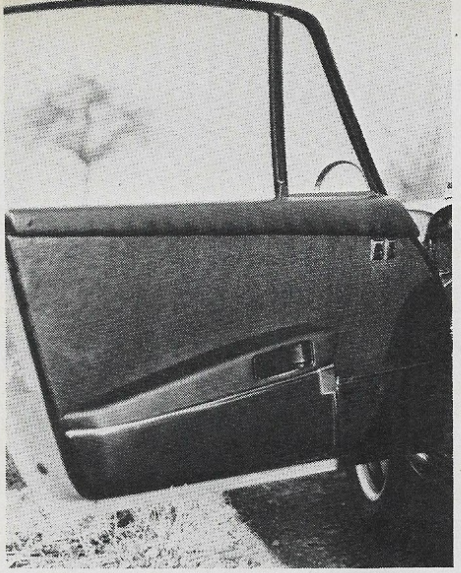
Snob appeal aside, the S with injection is no longer such an advance over their T with a pair of Zenith triples unless you dote on ultimate speed. And if you know where to use that, let me know.

I couldn't find a single gulp on pickup taking a 911T over the top of St. Bernard Pass. Fuel feed was just as smooth as it had been near sea level. This T pulls cleanly from 2,000 in fifth and still sounds happy as you hit the 6,200 red line, though they have geared so it is nearly impossible to find a road long enough to see more than 5,500 in the overdrive top.

First is only used to move off – and for just two out of the hundreds of St. Bernard bends – while II is your spurt ahead gear and III-IV serve most rolling needs. Top is a cruiser. In figures, the gear speeds are 35-60-90-120 and 128 mph, enough to manage a 0-60 run in 9.7 seconds. That's better than Porsche claims.

Speaking of revs, Porsche (naturally) fits a great whacking tach and a speedo but the other round holes in your matt-black dash are mostly show. Okay, a T must be that much more spartan than the S, but any Porsche buyer will want more information. You get plenty in the S, right down to oil level in the dry sump system without ever leaving the seat. By the way, it holds 10.6 quarts compared to 9.5 in the T or E.

The S tach reads to 7,200 before things go red, and shows a power peak



Doors lack any form of grabber for closing and they aren't light. Electric windows rate as a desirable option as the hand winders are tediously geared.

The 911S has a dial for everything and a tach redlined at 7,200 rpm. The leather covered wheel is one of the goodies you get for your $2,500 extra.

higher than maximum allowed revs in the T. This S *will* work below 2,500, but not happily. Instead, it shows plenty of punch over 6,000 and screams off into the distance with that tone wealthy Porsche drivers love so much.

Yet our test car would idle all day – okay, clear up to late lunch – at 800 and crawl through the rush hour crush with docility, once you sorted out first. An S does 35 in low and 70 in II which could get you tagged on many open U.S. roads with three gears to go. It reaches 60 from zero in 7.5 seconds.

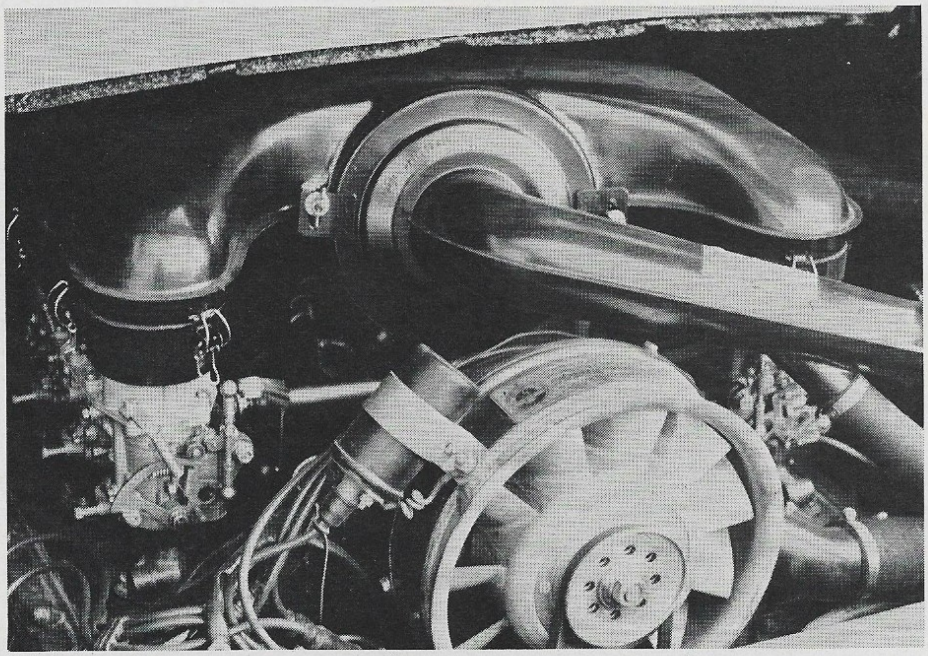
Anybody laying out the green for a 911S, or T for that matter, would do well to take electric windows as well. This sounds soft but their manual winders are a pain in the neck and anyway, electric panes suit the newly-staid image.

It begins to sound like I can't see a 911S for the T and in many ways this is true. Admitting I didn't drive the S as far nor over any alps, it achieved pretty close to even economy but gave more work. Consumption proved to be 14.8 mpg for the T, and 14.2 for the S which would go under 14 with identical treatment. The claimed "norm" of 25 and 23, respectively, would suit U.S. limits.

For plain Porsche pleasure, detail quality, fast ease and what was considered race handling in '63 when the first 911 appeared, a T is all you need.

But also, when the really hot flat-six in your S winds up towards 7,000, peasants move respectfully to one side (good shock color schemes this season) and any live driver will start figuring how to convince his wife that only the S offers real economy motoring. ●

A Closer Look at the Porsche 911's



A pair of Zenith triples help to fill the engine compartment of the 911T, giving about the same fuel consumption as the 911S with injection.

Posed from left to right are the Trans Am, Formula 400, Esprit and Firebird. Trans Am spoiler and the hoods for it and the 400 are plastic.

A QUARTET OF FIREBIRDS

Ram-air intake for the Trans Am emerges through a hole in the hood. Brittle ABS plastic spoiler in front is aerodynamically efficient but vulnerable to curb damage.

For reasons that are not quite apparent now that we've finally seen them, Pontiac (and Chevrolet) chose to hold back the introduction of their latest sporty cars until mid-February. In the interim carryover '69s were built and sold very well, particularly convertibles when word got around that there would be none in the new line.

The explanation fed auto writers was that "the '71s were so hot, we decided to move them up a year." The new Firebird "1970 Plus," as it's officially called, is indeed a nice-looking car but there is nothing all that radical about it to account for the delay. Odds are someone either over-bought components for the '69 models or unforeseen delays occurred in the tooling cycle which is an 18-month procedure under normal circumstances.

In any case, Firebirds are now offered as a single coupe body style in four series. They're technically coupes rather than hardtops because longer doors eliminate the need for rear-quarter windows and, of course, this feature greatly enhances ease of access to the rear seats. Models include the base Firebird which is the only one available with the Chevrolet-supplied, 155-horsepower six-cylinder engine; the luxury Esprit (pronounced *Ess-pree*)

1970+ FIREBIRD

Specifications from the Manufacturer

ENGINES: 250-CID six (155 hp), 350-CID V-8 (255 hp), 400-CID V-8 (265, 330 and 365 hp).

TRANSMISSIONS: 3-spd std, 2-spd auto opt six and 350 only, 3-spd auto opt all, 4-spd opt 350 and 400.

STEERING: Manual std, variable ratio power opt.

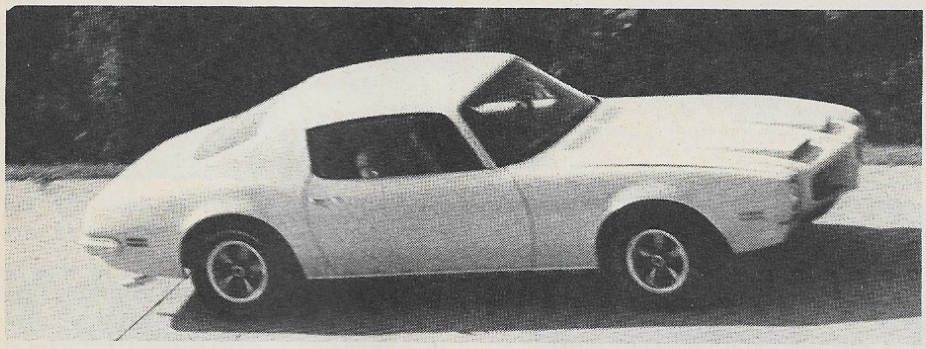
TIRES: 78 series std, 70 series opt, 14 x 6 or 7 in. rims.

BRAKES: Front disc std, power opt.

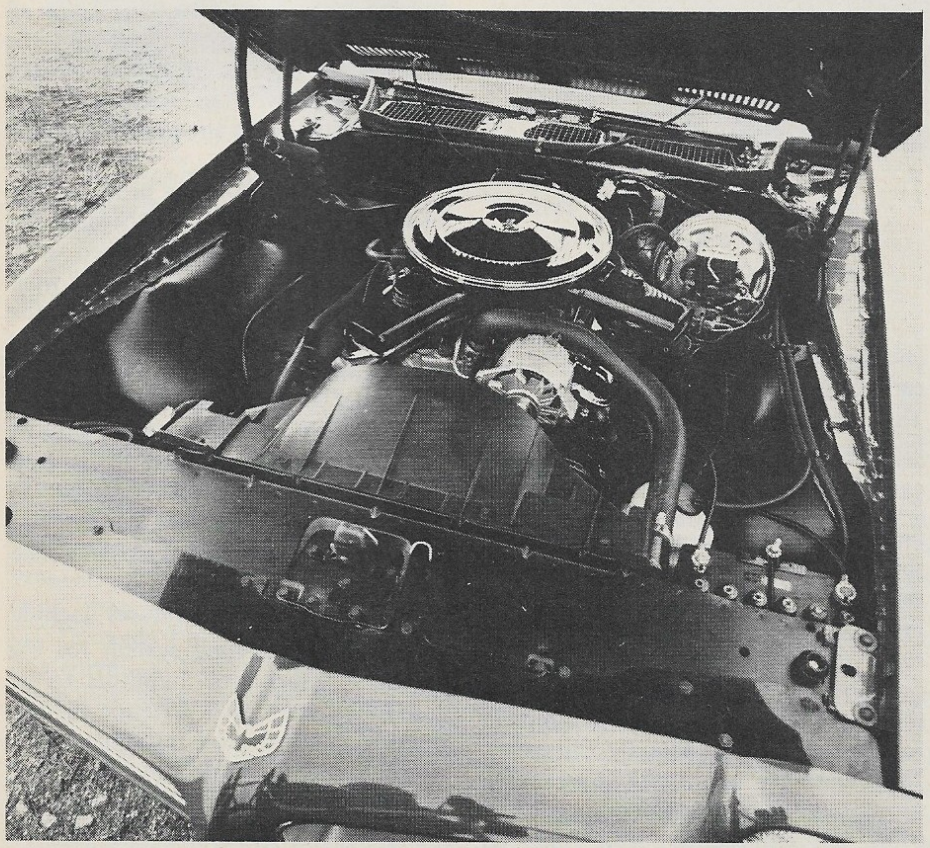
FUEL CAPACITY: 19.5 gals., (17.0 Calif.).

DIMENSIONS: Wheelbase 108.0 ins.; track 61.3 ins. front, 60.0 ins. rear; width 73.4 ins.; length 191.6 ins.; height 50.4 ins.

BODY STYLE: 2-dr coupe.



Formula 400 scoops are functional when ram-air is specified. Forward location is claimed to avoid the vacuum formed by air passing over the hood.



Twin-snorkle air cleaner is standard on all V-8 models, adding approximately 5 horsepower. Compartment is unusually roomy for a car of this type.

with a standard 250-horsepower V-8; the Formula 400 with the familiar 400-CID, 330-horsepower GTO engine standard, or with optional ram air boosting horsepower to 345; and, finally, the Trans Am, a misnomer because its 400-CID V-8 with standard ram air is far too large to be eligible for competition in that type of racing.

Powerplants are for the most part carryover except for the hole-in-the-hood type of ram-air intake used on the Trans Am and the largest of them would have to be extensively "blue-printed" after purchase to match the outputs available in stock form from MoPar or FoMoCo. This problem is not of Pontiac's making; it stems from the unfortunate parental dictum that no GM pony car can have an engine larger than 400 cubic inches, and to extract horsepower equivalent to, say, the 425 of MoPar's Hemi from fewer cubic inches is rather expensive, even at the factory level.

Wheelbase and exterior dimensions remain essentially unchanged from previous Firebirds but the body is an all-new one structurally, inside and out. The styling speaks for itself, being clean and lithe but with no regard whatever given to such little matters as keeping the lower body sides clean and protecting the point of maximum width from parking lot damage. Ventless sideglass, imbedded antenna and hidden wipers are not new but deserve noting because having been designed in rather than added on, the blending is better.

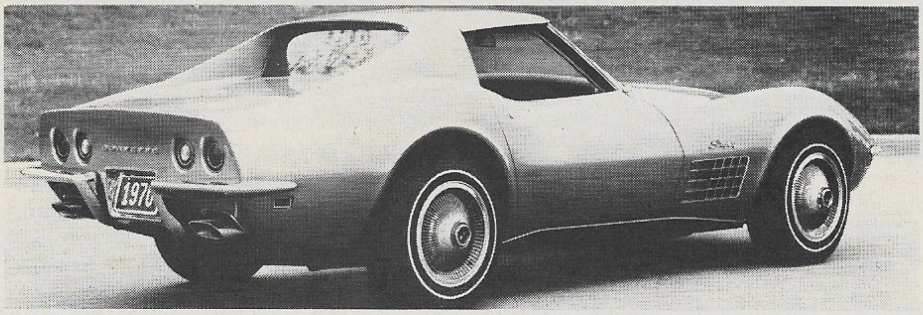
Major attention has obviously been devoted to interiors. Most notably, the pretense of offering accommodations for three in the rear seat has been abandoned in favor of two honest and comfortable bucket seats separated by a high tunnel that functions as an armrest. This high tunnel also cures a chronic bottoming problem experienced by previous Firebirds and Camaros, the two cars, of course, then as now, sharing the same basic body structure and underpinnings.

Another important interior improvement is designing the panel so that the optional full set of engine instruments can be built in rather than added on in the space above the console. Unlike most domestic cars in its class, you can get both a clock and a full-size tachometer, the tach being tilted on its side so that the redline appears at the 12 o'clock position approved in drag racing circles. The most interesting new Firebird instrument, however, is substitution of a voltmeter for the usual

(Continued on Page 49)

"1970 PLUS" CORVETTE and CAMARO

Cast grille and fender scoops are the only Corvette styling changes. Extra-cost removable hardtop is available for the convertible.



Sting Ray coupe has built-in roll bar protection. Roof panels over occupants and rear window may be removed and stored in the car.

CORVETTE

Specifications from the Manufacturer

ENGINES: 350-CID V-8 (300 hp), 350-CID V-8 (350 hp), 350-CID V-8 (370 hp), 454-CID V-8 (390 hp), 454-CID V-8 (460 hp).

TRANSMISSIONS: 4-spd std, 3-spd auto opt.

STEERING: Manual std, power opt.

TIRES: 70 series std, 15 x 8 in. rims.

BRAKES: Disc std, power opt.

FUEL CAPACITY: 17 gals.

DIMENSIONS: Wheelbase 98.0 ins; track 58.7 ins. front, 59.4 ins rear; width 69.0 ins, length 182.5 ins; height 47.4 ins; luggage 6.1 cu ft.

BODY STYLES: 2-pass cpe, 2-pass conv.

CORVETTE

America's only production sports car seems to go through cycles where at the end of the usual three-year run with a basic body, stylists invariably clutter an otherwise clean design with non-functional fender scoops and the like. The scoops were there before, to be sure, but they weren't heavily outlined in chrome. These, plus a new cast grille are the only appearance changes for "1970 Plus."

The introduction delay and most of the engineering effort were occasioned by the decision to use Chevrolet's new 454-CID V-8 in the Corvette, replacing the powerful but obsolescent 427 as the top powerplant. To put this progress in retrospect, the punchiest 1969 Corvette catalogued was a 427 with three 2V carburetors rated at 435 horsepower. This year's top 454 is rated at 460 horsepower.

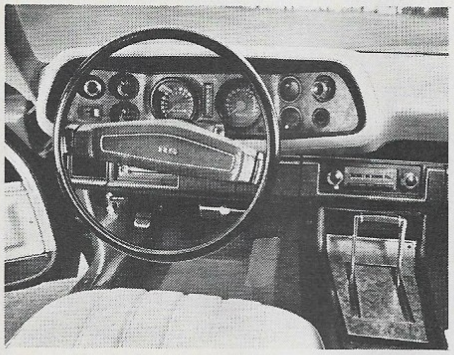
The base engine is a premium fuel 350-CID V-8 of 300 horsepower and the most desirable option is undoubtedly the 370 – repeat, 370 – horsepower version of this. While engines that produce more than one horsepower per cubic inch of displacement are quite common in Europe and even Japan, there are just four manufactured in America, three of them by Chevrolet. They make far more sense in a genuine sports car, which the Corvette is, than going the cubic inch route with its attendant imbalance of weight. The 454 Corvette and the 427 before it are not very forgiving of errors made by the average driver or even self-styled experts, for that matter.

A three-speed manual transmission and the two-speed Powerglide are thankfully absent from the 1970 specifications. The four-speed manual is standard and the three-speed Turbo-HydraMatic is optional on the base 350 and the 454's only. Also standard on all is a locked differential along with the carryover disc brakes at all four wheels. These latter, with or without power assist, are as fine as any system to come from Europe.

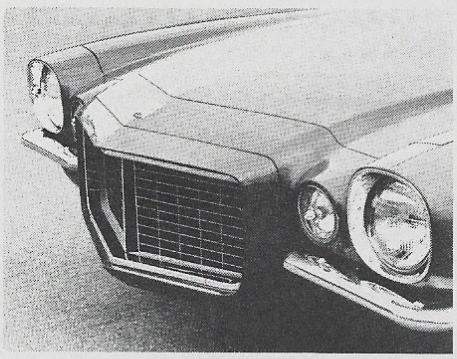
The Corvette body is probably the safest of any American car because the fiberglass structure is reinforced with steel. In coupe form, this includes what amounts to a built-in roll bar. When the roof sections over each occupant and the rear window are removed, this style becomes for all practical purposes a convertible. A true convertible, with or without a removable hardtop, is continued in the line-up contrary to predictions that it would be dropped along with flip headlights in deference to anticipated safety legislation.

Standard Corvette features include an automatic washing system for the headlights, fiber-optic monitors to let you know that each exterior light is working, integral head restraints, eight-inch rims and a unique motorized panel that pops open to let the windshield wipers work. The only dimensional change is a one-inch increase in headroom for both body styles.

Standard Camaro has full width front bumper with parking lights under it. No Endura (painted rubber on steel) is used in the grille area.



Rally Sport option includes full instrumentation, now wholly integrated into the dash. Note indicator for the transmission quadrant in the panel.



"Rally Sport" styling option features Endura housing for grille, parking lights adjacent to the main lights and bumper outriders.

CAMARO

Specifications from the Manufacturer

ENGINES: 250-CID (155 hp), 307-CID V-8 (200 hp), 350-CID V-8 (250 hp), 350-CID V-8 (300 hp), 350-CID V-8 (360 hp), 396-CID V-8 (350 hp).

TRANSMISSIONS: 3-spd std (six and 307 only), 4-spd std (all others), 2-spd auto opt (six and 307 only), 3-spd auto opt (all others).

STEERING: Manual std, variable ratio power opt.

TIRES: 78 series std, 14 x 6 in. rims; 70 series std SS and Z28, 15 x 7 in. rims.

BRAKES: Front disc std, power opt.

FUEL CAPACITY: 19 gals (18 gals Calif.).

DIMENSIONS: Wheelbase 108.0 ins; track 61.3 ins front, 60.0 ins rear; width 60.0 ins; length 188.0 ins; height 50.5 ins; luggage 7.3 cu ft.

BODY STYLE: 2-dr coupe.

CAMARO

The "1970 Plus" Camaro borrows its frontal appearance very successfully, particularly in Rally Sport form, from the Monte Carlo. Then, even though Enduro rubber is used to outline the RS grille, there is enough chrome so that you can tell from a distance that it's the front end you're looking at. Pontiac GTO's and Firebirds actually cause confusion on two-lane highways with their look alike appearance, coming or going.

Another plus derived from the new body is extending the doors to the rear quarter or "C" posts. This gives 5½-inches greater access to the rear seat and eliminates the sometimes noisy quarter windows. Overall length has been increased two inches but actually, the whole passenger compartment has been moved back nearly three inches to permit a more sharply angled windshield. Oddly enough, however, dimensions already critically marginal in existing Camaros were sacrificed still further in the redesign. These include rear-seat headroom, down 0.6 inches, and trunk space, short a whole cubic foot.

Engine availability ranges from the durable "stovebolt" six of 155 horsepower to a 396-CID V-8 producing 350 horsepower. The most desirable from a performance standpoint option, a 350-CID V-8 of 360 horsepower, if unfortunately limited to the Z28 model which means you have to advertise its presence with "racing" stripes and plastic spoilers. Someday Detroit (or its customers) will come of age and forego such gimmicks which serve only to attract the attention of the highway patrol.

The three-speed manual gearbox with column shift is limited to the six and the smallest (307-CID) V-8. From there on in, a floor-shifted four-speed transmission is standard and a three-speed automatic optional. Customers who want an automatic six must put up with the two-speed Powerglide. When the three-speed automatic is ordered with a console, the position indicator is located on the instrument panel. That is an eminently logical idea but it will be a little disconcerting to parking lot attendants the first time around.

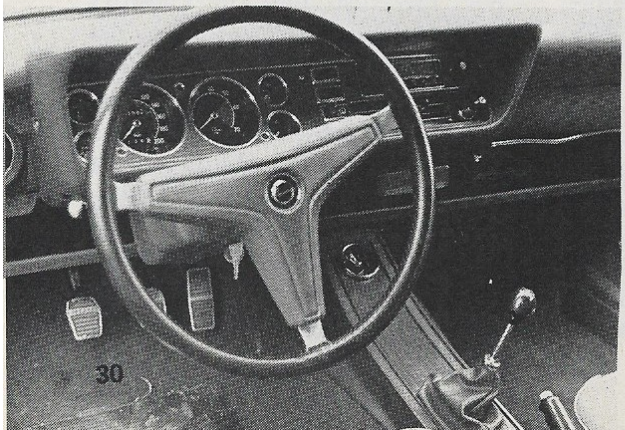
For the first time in Camaro's three-year life span instrumentation has been well planned with everything including optional engine gauges located in front of the driver. Rear seating is a modified version on Firebird's bucket arrangement, with bucket-shaped cushions and a conventional full-width back rest. The "upholstering" on the quarter

(Continued on Page 50)

CAPRI FOR THE U. S.

Unlike the Maverick, handling packages have been developed for the Capri which gives it a cornering ability on a par with any U.S. sporty car.

Modern full-flow ventilation, as evidenced by the vents in the deck, is built into every Capri. It will carry four in reasonable comfort.



Full instrumentation is a plus that you have to pay extra for on a Mustang and it's not available at all on Mavericks. Thick-rimmed wheel, though, is a Capri accessory.

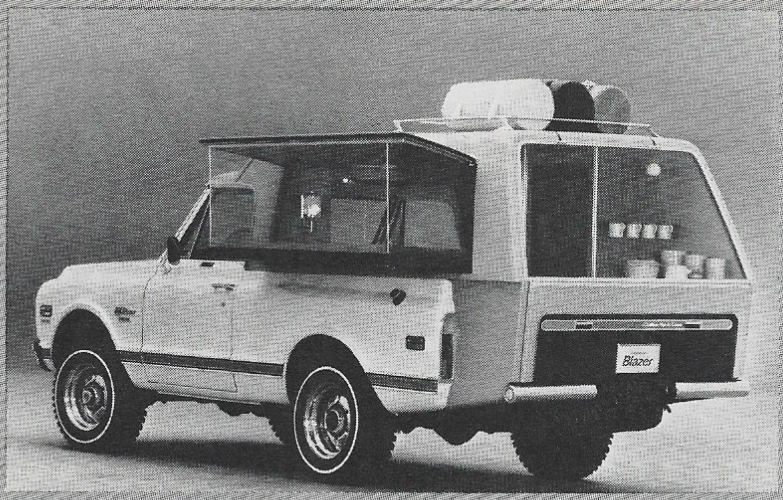
Except for the square iodide lighting, the car pictured here will soon be available in Lincoln-Mercury showrooms across the nation. It is the German version of Ford's Capri, powered by a V-6 rated at 145 SAE horsepower without emission control. Price with a normal complement of accessories should be under $3,000.

The car fits L-M's carefully nurtured image in that it's a Maverick-sized luxury car. Power provided is enough to propel the 101-inch wheelbase, 2,200-pound car from zero to 60 mph in about 10 seconds. Standard transmission is four on the floor and a three-speed automatic is optional. Full engine instrumentation is also standard.

If the first version to be imported sells well, it ultimately could be offered in as many as eight models with V-4 and V-6 powerplants of varying outputs. Odds are, though, that imports to the U.S. will be restricted to the V-6 to avoid parts supply and service training problems. As with the Maverick, of course, there will be only one body style available initially.

As Sloniger has already reported on these pages, the V-6 has vast untapped potential in stock form. Ford of Germany's rally team has already developed a modification involving triple 2V carburetors and Westlake heads that's rated at close to 200 horsepower and there's also a turbocharger available for the car on the German aftermarket.

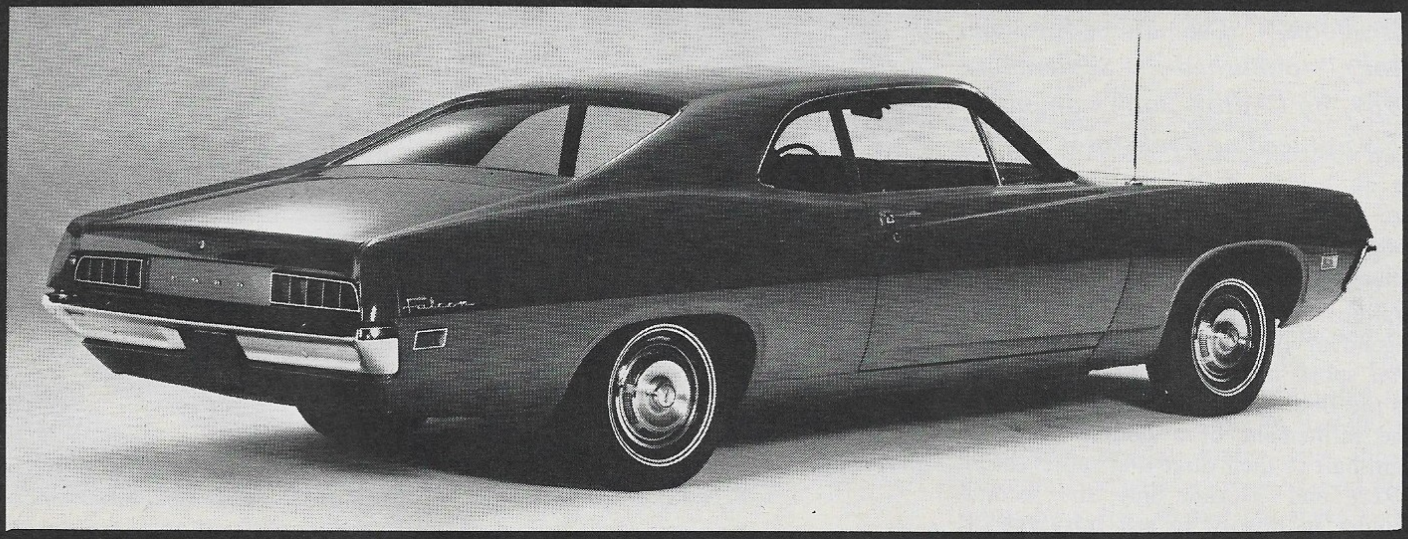
Patience is sometimes rewarded. L-M fought hard for the right to market a Maverick powered by FoMoCo's 302-CID V-8 and was refused. Such a car, however, could hardly appeal to the economy minded who are in the majority. The V-6 will, plus having the added mystique of being an import. •



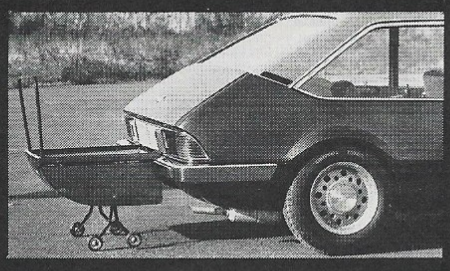
NEW CARS FOR 1970

A POTPOURRI OF NEWCOMERS

If you attend one of the major recreational vehicle shows you'll probably see this "dream camper" by Chevrolet stylists which is mounted on a stock Blazer chassis. The idea is a camper for two that contains everything needed for travel over rough terrain without really roughing it. Odds are good that the basic design will be quickly grabbed up by some imaginative camper builder and put on sale.



Ford's 1970½ Falcon is essentially a cut price Fairlane 500, being mechanically and dimensionally identical and with no styling change other than substitution of Falcon emblems. It is, though, $127 cheaper in four-door form at $2,500 than the equivalent Fairlane and $156 cheaper for the four-door wagon. The two-door pillar sedan, pictured, at $2,460 is not offered in Fairlane form. Base engine is a 155-horsepower six but V-8's are available along with a more complete line of accessories than formerly. Falcon was once the most successful compact of all with 2.7 million being sold in the 10 years of its existence.



We previewed Bertone's adaptation of a Fiat 128 coupe in page 36 of our February 1970 issue but these pictures will give you a better idea of the latest in shapes for shopping. The grocery cart literally plugs into the rear of the car. All basic chassis and mechanical components are retained and according to Bertone's release, series production is a possibility.

THE "THREE HUNDRED" MERCEDES

. . . A Modern Day Classic

by Louis Wm. Steinwedel

This article is adapted by the author from Chapters 8 and 9 of his book, "The Mercedes-Benz Story," published in September, 1969, by Chilton Book Company, $5.95 at leading bookstores.

The Mercedes 300 was Mexico's official Car of State in 1962 and still is today. The late presidents John. F. Kennedy and Adolfo Lopez are shown riding in one here.

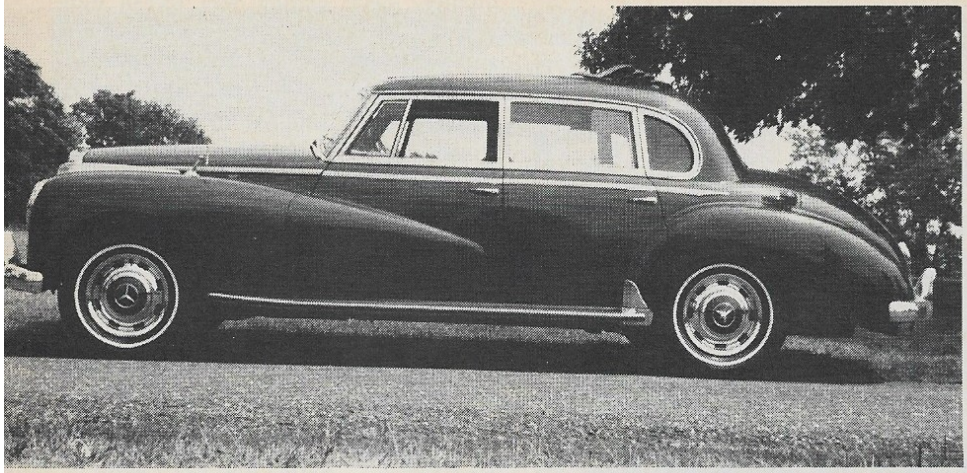
photos courtesy Daimler-Benz and the author

Rather much has been done with three-liter automobiles over the years. Walter Owen Bentley built a living legend at LeMans with his first three-liter sports machine, still seen by many as *the* Bentley. British Sunbeams added the refinement of a double overhead camshaft to their three-liter sports car in 1925, and became only the second builder in history to sell this type of engine. Ettore Bugatti made a quite grand, if scarce, contribution to the advance of three-liter lore with his Type 47 Grand Sport, which a 1929 issue of *Autocar* described as a car of "sixteen cylinders, forty-eight valves, two crankshafts, two cam shafts, 250 horsepower, and a weight of five hundred pounds or two pounds per horsepower."

But despite W.O.'s charisma and *Le Petron's* monumental machinery from Molsheim, it was not until the 1950's that the three-liter engine was "fully extended" by the engineers at Daimler-Benz. From a basic three-liter, six cylinder, single overhead camshaft powerplant they created three separate, superb machines. Each had a distinctive personality and each stood at the top of its class. There were a comfortable high-speed touring sedan and formal convertible, a fast and majestic Grand Touring car and a spectacular sports machine which methodically devastated every competitor in sight to become world champion. Today, the triumverate of the 1950's can be viewed in perspective. Daimler-Benz is currently working in somewhat other directions and the three "Three Hundreds" no longer have exact counterparts. The 250 SL and 280 SL are not quite the same breed of animal as the 300 SL, the "Grand 600" certainly outspends the 300 series luxury tourers and the 300 S, the last great classic, was the end of an era.

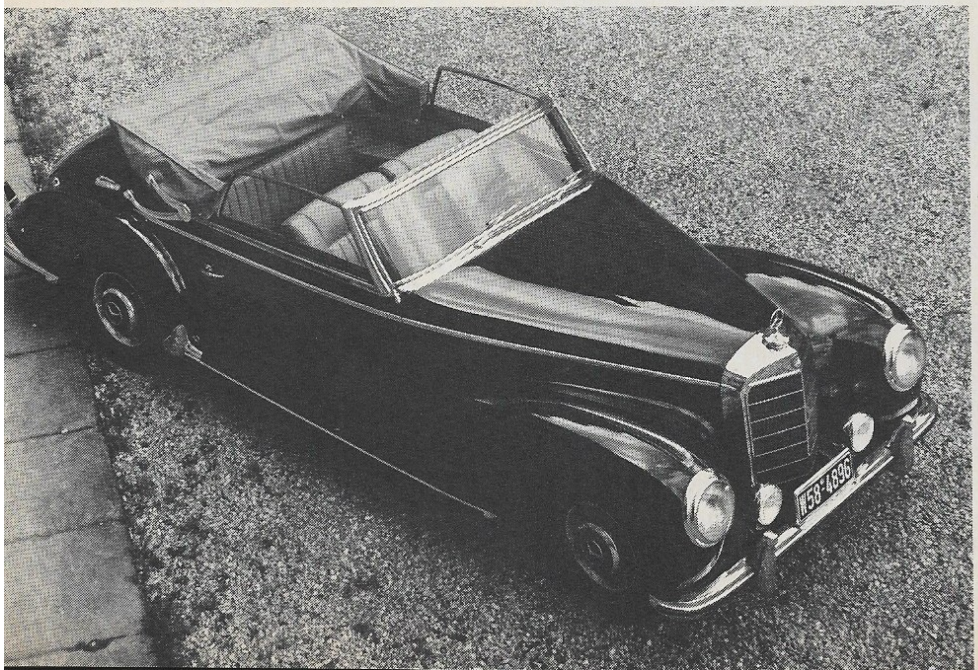
1945 was also the end of an era. In that year the Daimler-Benz board of directors declared that the company "had ceased to exist." But a skeleton, mostly on paper and in men's minds, did survive among the rubble of bombed-out factories, and it struggled along at repair work and later built pre-war designed 170 S gasoline and 170 D diesel utility sedans. As soon as the skeleton fleshed out a little the design department could afford to think of other things. And the thing it thought about most was something that was seldom absent from the Mercedes line, a fine quality prestige touring car of advanced engineering. The product of that thinking was shown for the first time in the spring of 1951 at the Frankfurt Motor Show, and the first "Three Hundred" resolved any doubts that Mercedes was back in the game for keeps.

The new Three Hundred sedan was easily the most advanced touring car on the road in 1951. While other luxury marques generally relied on pre-war technology (and maximum production), Daimler-Benz extracted extreme effici-



Author Stienwedel owns this 1955 vintage 300 C, calls it "an eminent touring machine." Car has automatic transmission, power brakes, electric load leveler and central lubrication system.

This special 300 D ceremonial car was built for Pope John XXIII. Rear-facing jump seat and styling of the glass area shows it to be the inspiration for the current 600 limousine.

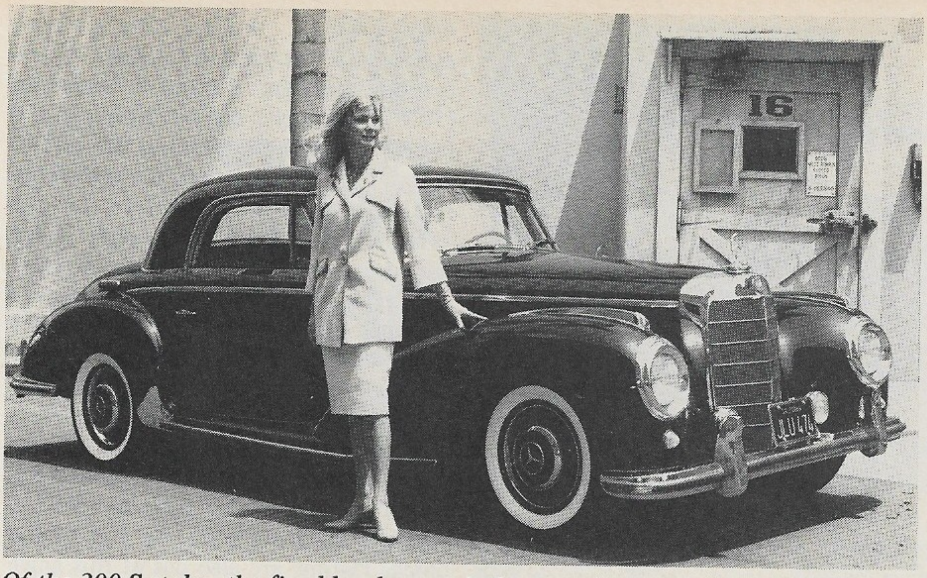


ency from a modest displacement, economically operated engine of unorthodox design. Bolting a three-liter (183 cubic inch) engine into a 4,210 pound automobile promised the sort of soggy performance that the otherwise sparkling three-liter Bentleys of the twenties gave when laden with heavy saloon coachwork. But a special valve arrangement and an unusual combustion chamber shape gave the M 186 engine grand potential. Staggered valve placement rather than a conventional in-line arrangement was used. The head is constructed without openings (spark plugs are fitted through the block) and is cut on a 30-degree slant to match a corresponding angle at the top of the block. Pistons are also cut at this angle and then into a notch which, with part of the cylinder wall, forms the unusual combustion chamber.

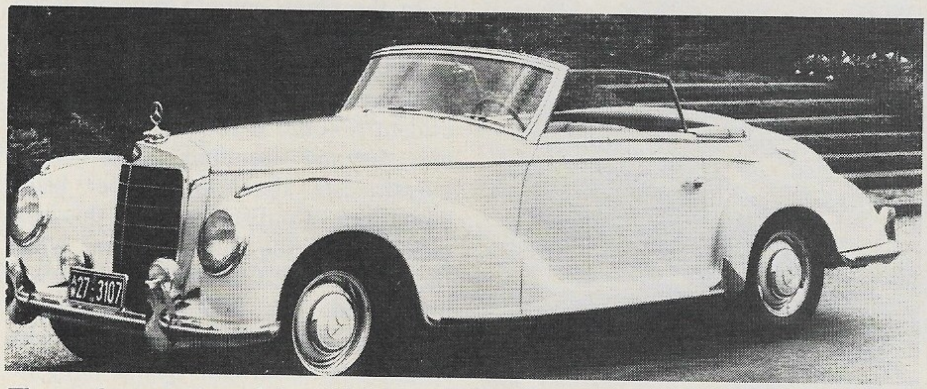
In the silent, smooth running sedan the casually tuned engine was a pussycat at 125 horsepower. But under the velvet glove was a mailed fist, for it was quite evident that the M 186 was intended for uses beyond trundling Ruhr Valley industrialists about in somber black limousines. Confirmation of this suspicion came the following year when the 300 S Grand Touring machine was introduced. The 300 S picked up a tradition begun back in 1932 by *chefkonstrukteur* Hans Nibel who fathered a heroic series of electrifyingly elegant high-speed touring cars of swing axle construction which culminated in the exotic 540 K of 1936. The compression ratio went up from 6.4 to 1 in the sedan to 7.5 to 1 in the 300 S and more precise tuning plus three downdraft carburetors easily raised the horsepower to 150 and the speed to a conservative 110 mph. The next logical step was an all-out sports car based on the versatile three-liter engine which would employ Daimler-Benz's wartime experience with fuel injected aircraft engines. But the M 186 engine gave Mercedes the most attractive assortment of touring and Grand Touring cars in the world and it wisely chose to concentrate on selling these for the moment.

The 300 sedan was one of a handful of cars which successfully combined the classic and the contemporary. It's pure

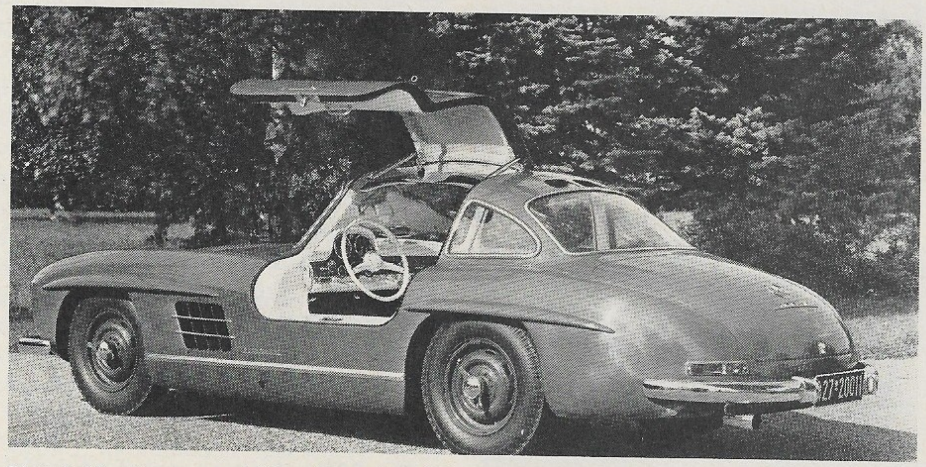
The 300 S cabriolet landau, built to order between 1952 and 1957, commands around $6,000 in today's collector's market. A total of 760 in three body styles were built.



Of the 300 S styles, the fixed-head coupe is the most "common" and some think, the most attractive. Movie star Yvette Mimieux is the owner of this one.



The roadster version of the 300 S Mercedes accounted for 194 cars in the production run, 53 of them being equipped with the 180-hp injected engine and thus designated 300 Sc.



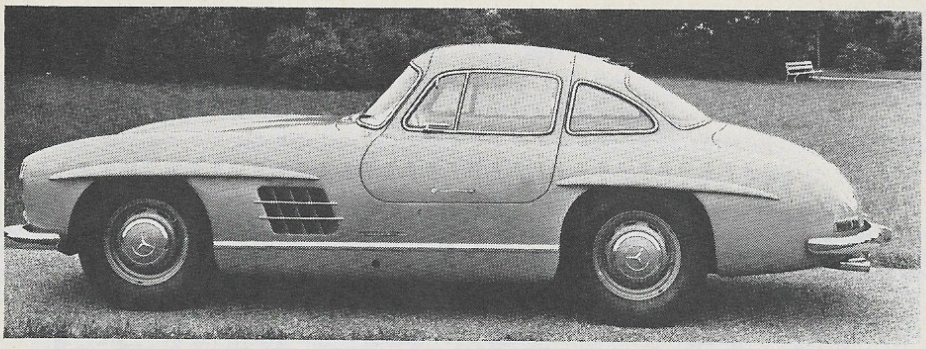
Skitch Henderson and King Hussein of Jordan were among the owners of 300 SL gull wings. This model was perhaps the most innovative sports car design of all time.

Mercedes ancestry was obvious at a glance. Yet it was a totally new car, physically and mechanically, and not a re-worked version of an earlier design as was, for instance, the Silver Wraith Rolls-Royce of the same period which was directly traceable to the 1939 Wraith. The Three Hundred was a staunch machine of stereotyped Teutonic robustness and uncompromising quality. Each engine was run-in individually on a test stand, disassembled and inspected for needed replacement parts, Magnafluxed, and then re-assembled and installed in a designated chassis. In the coachbuilding division the solid brass brightwork was filed and fitted to a specific car, marked with its serial number, and then chrome plated and installed on the same body when it returned from lacquering. Its sedate bearing and quiet elegance took the 300 into prestige and diplomatic circles and it was soon carrying kings, Popes (a special 300 was built for the Vatican), U.S. Presidents, and at least one bona fide emperor (Haile Selassie of Ethiopia).

If you are willing to forego neck snapping acceleration and do not go into trauma if you're not the first away from stop lights, then the 300 offers some very rewarding driving experience. Designed as a high speed touring car, the 300 fulfills this function to near perfection with an extraordinarily stable and comfortable ride, cruising all day in the 80-90 range with all the solidity of a battleship. Driving one is an eerily tranquilizing experience; the cares of life have been known to melt away under its spell. The road surface is "civilized" by the superb swing-axle coil spring suspension and stray vibrations to the driver's hands are absorbed by a separate shock absorber in the steering system. Fitting softened Konis to the author's car re-emphasized the 300's uncanny affinity for the road. Lubrication of most of the chassis can be accomplished on the open road by pushing a plunger over the high beam switch to operate the central lubrication system. A switch on the dash controls the auxiliary electric rear suspension that compensates for more or less weight in the back.

The 300 sedan also appeared as a four door cabriolet with a classic landau top luxuriously padded with four inches of horsehair (with a dome light right in the middle of the convertible top!). Folded back, the big, baroque top recalled the elegance of carriage days and its sheer bulk made the 300 convertible as safe as a hardtop. The author once owned a 1954 model of this style that didn't quite make a curve at eighty. That fortress of a top grudgingly yielded four or five inches to one side and benignly rewarded the driver with a black eye and a crushed ego instead of a crushed head.

The 300 S Grand Touring Mercedes-Benz was, and still is, one of the most eminently civilized automobiles ever



The gull wing here is buttoned up for the road. The car stands 50 inches high with low pivot point, swing axle suspension and a tubular lattice structure substituting for a conventional frame.

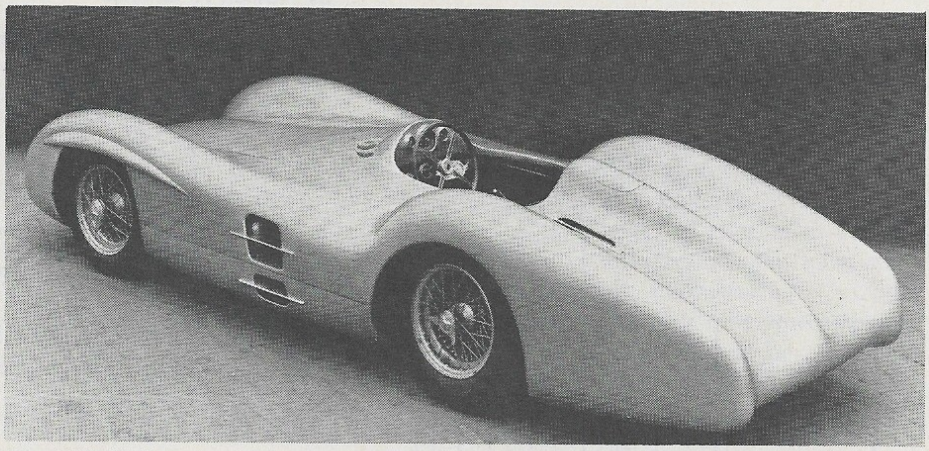
The team of Stirling Moss (driving) and Denis Jenkinson in No. 722 won the 1955 Mille Miglia.

created. Basically a shortened and lightened version of the 300 chassis fitted with classic semi-sports bodies, the 300 S was available on order only. It was immediately accepted as *the* glamour car of the era and sold to such folks as the Aga Kahn and Gary Cooper. It even got into show business itself with appearances in "Three Coins in the Fountain" to "The Man from U.N.C.L.E." Three styles were available; a roadster with disappearing top, a hardtop coupe, and the elegant cabriolet landau. Interiors offered a cozy little world of the best rolled and pleated leather accented by sumptuous slashes of hand polished walnut wainscoting. In a sense the car was the best of both worlds; lively performance and impeccable road manners for sporting moods and svelte style and luxury for hedonistic moments. A total of 760 of the 300 S cars were built between 1952 and 1957, with 200 of them being equipped with the 300 Sc fuel injected 180-hp engine.

As World War I combat planes flew higher and higher, the air grew thinner and in 1915, Daimler engineers looked for ways to increase the efficiency of oxygen starved engines. Supercharging proved a practical answer and the experience carried over well into peacetime. Daimler had a marketable supercharged sports car by 1921, the first of a heroic series of screaming machines of the Twenties. In the World War II era history repeated itself when Daimler-Benz engineers perfected fuel injection for high altitude planes and again were able to re-direct their wartime experience into building an advanced postwar sports machine.

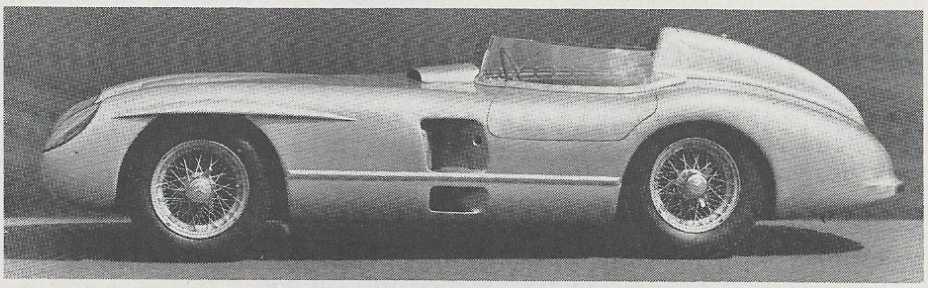
When the 300 SL appeared in 1952 it stood as an amazing anomaly among sports cars. For the sake of lightness a conventional frame was discarded in favor of a stiff "lattice pattern" structure of steel tubing designed to

(Continued on Page 51)



The 300 SLR sports-racing car stemmed from this all-out 2.5-liter Grand Prix Mercedes of 1954. Its eight-cylinder engine produced 260-280 horsepower at 8,5000 rpm.

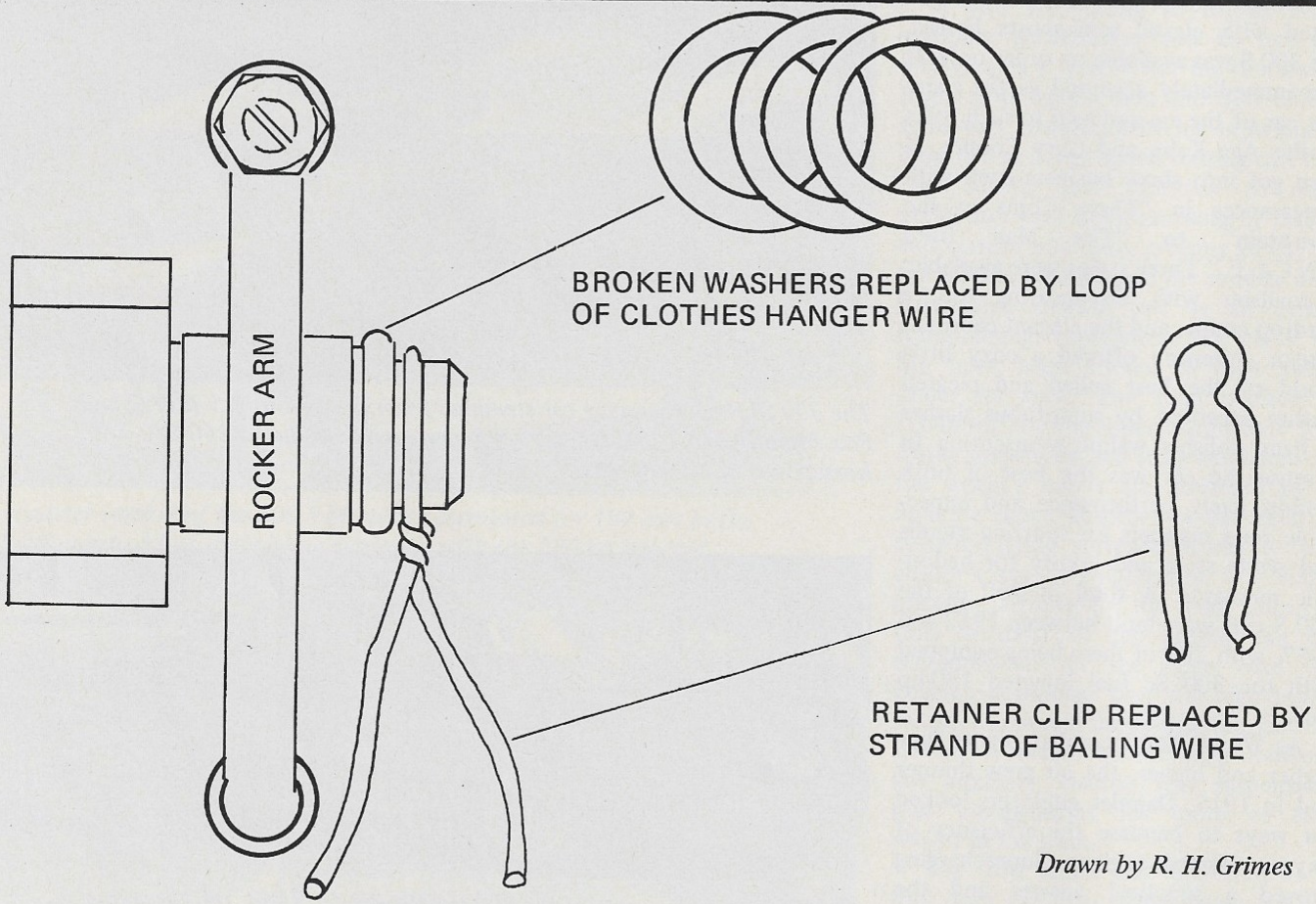
After the discontinuance of the 300 D limousine in 1963, the three-liter, injected, 180-hp engine was adapted to an upgraded 220 Series chassis and the body called the 300 SE.



Zenith of the 300 Series, the SLR sports car, won every race it entered except for the "black LeMans" of 1955 when one of the team cars crashed into the crowd killing scores and causing Mercedes to withdraw from both the race and racing altogether.

It Could Happen to *YOUR* Volks! ... A Roadside Repair Detailed

by Russell H. Grimes



Drawn by R. H. Grimes

Volkswagen dealers and service organizations dot the world like spots on a Dalmatian. If your VW needs spare parts, you can get them almost anywhere. But, one place you cannot buy VW parts is twelve miles north of Le Mars, Iowa, on Highway 75. I lay on my back in the hot August Iowa sun looking up at a critically sick VW engine, and wishing that there was a Volkswagen dealer and a well equipped parts department right across the road. But, there wasn't, and I was in trouble!

My wife and I, and our three sons, were returning from a camping vacation in the Superior National Forest of Minnesota to our home in southern Nebraska in our heavily laden 1965 VW bus, pulling our even more heavily laden 14-foot boat and trailer. In northern Iowa, the bus's ordinarily trustworthy engine began to make a noise like a hundred blacksmiths were busily modifying its interior. The power dropped alarmingly, the hammering increased, and I had to pull off the highway onto the shoulder. We were stranded in the flat, corn covered Iowa countryside.

My car-oriented teen-aged sons quickly located the area of the pounding. It originated from the left valve rocker arm cover. We pulled the cover off, and our spirits fell even lower. The spring on the rocker shaft had broken, apparently many miles ago, causing the valve rocker washers to wear away and break, letting the valve rocker slide against the retaining clip. When the retaining clip broke, the valve rocker slipped off the valve stem, and that's when the banging and crashing started. The pushrod from the cam forced the valve rocker to beat against the rocker cover with the loud, nerve jangling sound.

The first thing I did after seeing this one-in-a-million failure was to verbally kick myself for not having our bus checked by my VW dealer. But, in the press of time and excitement of going on vacation, the check was deleted from our schedule. The time I saved then was going to be dearly spent on that rocky, hot and uncomfortable Iowa highway shoulder.

My wife checked the booklet we always carry listing the addresses of all the VW dealers in North America. The nearest dealer was in Sioux City, over thirty miles away.

We had one chance. If I could fabricate a replacement of some kind or other, we could limp on into Sioux City and get the parts we needed. The fact that I am a machine and tool designer by profession and have a pretty good knowledge of machine practices and processes was the one good thing we had going for us.

I told my wife and boys to make themselves at home in the shade of the bus, and I set to work. First, I needed a spacer. I found that a clothes hanger was close to the total thickness of the missing spring and washers. From the tools I carry for our outboard motor, I utilized a couple of pair of pliers to form a ring out of the clothes hanger wire about the same diameter of the rocker shaft.

It fit beautifully, except for one thing! It was just a little too thick. But this was no great problem. When we camp, I always carry a file to sharpen the camp axe. With the clothes hanger wire ring held firmly to the boat trailer tongue, just a couple of strokes of the file thinned the wire ring to the right thickness. By cycling the motor over by hand, the jammed valve rocker was freed so it could be pushed back into the correct position, and the ring slipped onto the rocker shaft.

So far so good but, finding something that would work for a retaining clip was going to be a real problem. I made several out of the clothes hanger wire, but failed each time because the wire was too stiff. Something else had to be used, and in checking the supplies at hand, that something else couldn't be found.

Our salvation for the difficulty was in our geographical location. Because we were in Iowa, the heart of America's farmland, the one thing we needed was in bountiful supply. Baling wire!

I sent the two oldest boys down the highway a quarter mile to the nearest farmhouse. Within fifteen minutes, they were back with a roll of wire. In fact, we were all lucky there. I got my baling wire, and the boys said they had met a pretty teen-aged farmer's daughter.

While the boys were discussing their latest experience, I got back to work at my latest experience. The soft baling wire fit the slot in the rocker shaft where the retaining clip should have been. I twisted a three-inch piece of the wire around the shaft and locked it in place in the retainer slot. The rocker cover was quickly clamped into place, and I hoped we were ready to go.

I slipped into the driver's seat, and with a cheer and a tear ready for whatever happened, turned the starter. The rugged little engine fired right up and ran as quietly as a Volkswagen can. Cheers were in order.

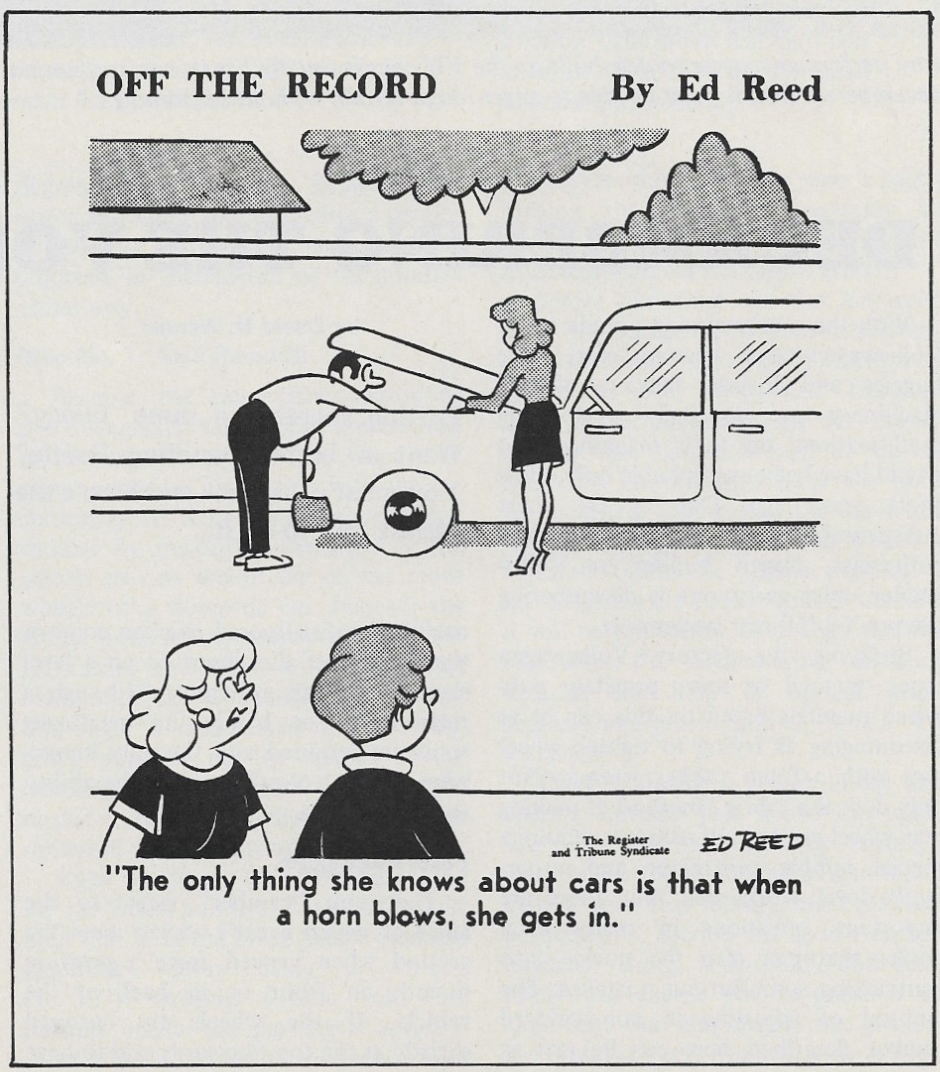
When the engine zipped to life, my wife looked up from the book she was reading and said, "So soon?" The whole incident had taken a little less than an hour. Everyone piled into the bus and off we drove, carefully, ever so carefully, to Sioux City.

We quickly located the Volkswagen dealer in Sioux City with the help of the VW dealer directory. I walked into the parts department with a churning stomach. My billfold was nearly empty as the trip and gift shops had taken most of my cash. I held my checkbook and credit card tightly in my hand. I was ready for the worst.

The young man behind the parts counter quickly found the parts I needed. The bill came to exactly eleven cents. Even after a vacation, I could afford that!

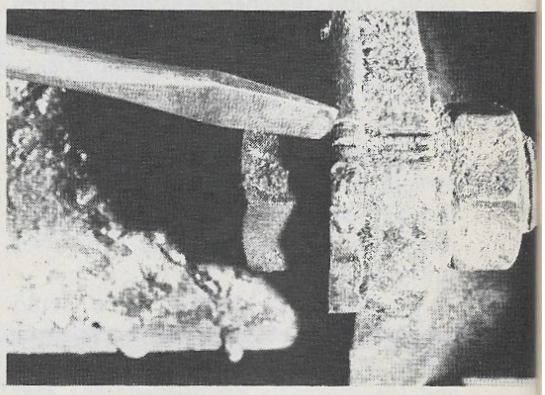
We left the VW shop, the little engine and its jerry-rigged repair still humming away like the day it came out of the factory. We stopped at some friends in South Sioux City for supper, and as a delicious roast was being prepared in the oven, I crawled under the bus to replace the repair with the new parts. Everything slipped together like magic. It took me fifteen minutes.

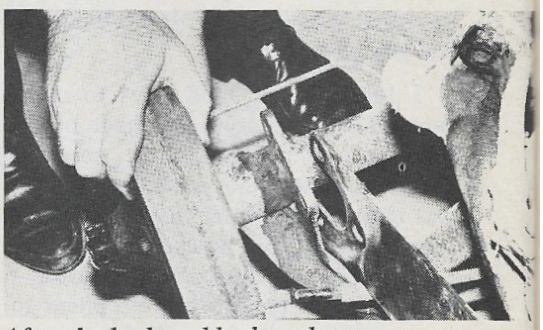
After dinner, we continued on home with no more trouble. We have many memories of our vacation, but the memory of the VW, the clothes hanger and the baling wire will be one of the best. •



Any performance-type vehicle built on the VW chassis usually has its rear suspension decambered. But, it must be able to cover rough terrain without bottoming.

Marks at tip of screwdriver were cut into the radius arm with a cold chisel. Their position matches grooves placed in the axle bearing housing at the factory.





After the brake cables have been loosened, the shock absorber dismounted and the axle's position marked, it can be taken off the radius arm as shown.

DECAMBERING THE VOLKSWAGEN

by David N. Wenner

Putting together a dune buggy? Want a better handling Beetle? You must decamber and here's the easiest way to do it.

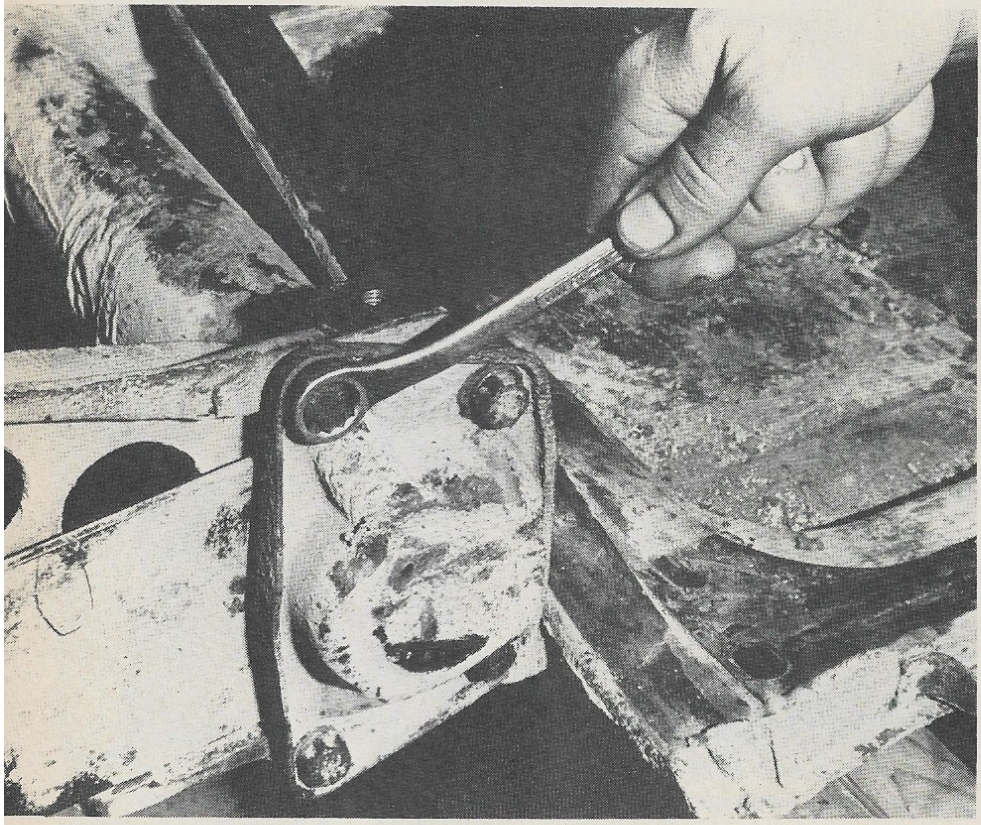
With the mushrooming popularity of Volkswagen-based custom cars, dune buggies and V-rods, fanciers of VW machinery are routinely performing modifications on their machines that would have been unthinkable only a few short years ago. One of the most indispensable alterations that the VW enthusiast, buggy builder or Volks-rodder must carry out is decambering the pre-'68/'69 rear suspension.

Studying the factory Volkswagen repair manual or some privately published manuals based on this can be as discouraging as trying to tighten wheel lugs with a foam rubber wrench. Not only does the "shop" method of making rear wheel camber adjustments require a special bubble protractor and a perfectly level work area, but there are important omissions in many such books that can trap the novice into committing some serious mistakes. The method of adjusting to non-standard camber described here can be just as useful in a dirt-floored chicken coop or the middle of the desert as on a level slab of smooth concrete. Although a ruler might be handy, no measuring tools are required and the only knowledge of math you'll need is the ability to count to ten.

Facts and Figures

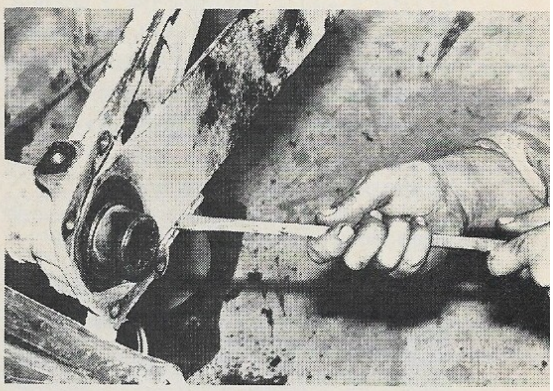
The term "camber" refers to the angle at which a car's wheels meet the ground when viewed from a position directly in front or in back of the vehicle. If the wheels tip outward slightly at the top, the car is said to have *positive* camber. If the wheels lean inward at the top, giving the vehicle a somewhat wider track, it is said to have *negative* camber. Wheels that are perpendicular to the ground, as they are on a car having a solid rear axle, have *zero* camber.

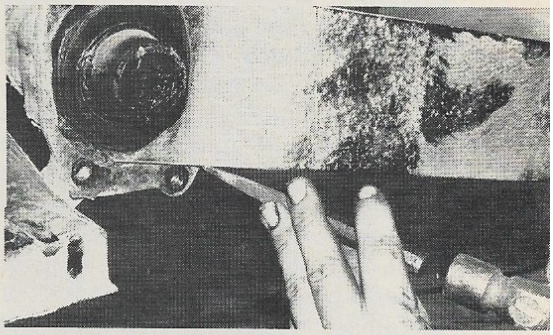
Earlier Volkswagens came from the factory with a slight degree of positive camber. The greater load capacity and suspension travel which this allows can be an important consideration when you've got to make time over a potholed roadway with the rear seat crammed with neighborhood rug apes. However, if your idea is merely a bit of sporty driving with only yourself and perhaps one passenger aboard, you can obtain considerably better handling from your Beetle by changing the rear suspension settings so that it has a modest amount of negative camber. In addition, when the VW body is removed and scrapped in favor of a lightweight fiberglass replacement, it is *always*



The radius arm hub cover is removed with the help of a 15-mm (5/8") wrench. Inside are rubber bushings that form the torsion bar's pivot point.

With the hub cover off and the rubber bushing removed, pry the radius arm outward until it slides off its lower stop.





After radius arm is off stop and the torsion bar unloaded, mark its position. This notch will help you to locate the torsion bar's original position if forgotten.

necessary to decamber the rear end to get it back down where it belongs. Remember, though, that these adjustments apply only to earlier swing-axle VW's, and not to the late "double-jointed" models.

The Volks rear end is sprung by means of two solid steel torsion bars that run crosswise of the chassis inside a large tube located just ahead of the rear wheels. The inner ends of each bar fit into splined sockets welded into the tube's center. The splines on the outer ends of the torsion bars accept the grooved hubs of the radius arms (sometimes called "spring plates"). Camber adjustments are made by changing the position of the torsion bars' inner splines in their mountings inside the chassis.

The inner splines on the torsion bars have forty grooves and the outer splines contain forty-four. Changing the radius arm's position on the outer spline one notch changes the angle of the radius arm by 8 degrees, 10 minutes, a minute being 1/60th of a degree. Withdrawing the torsion bar and moving it one notch in its mount inside the chassis changes the radius arm's angle by an even nine degrees. This variation between the outer and inner splines creates a vernier adjustment that allows the bars to be adjusted in increments of 50 minutes either way.

Step No. 1: Axle Removal

Because the sidescuffing action of the swing-axle suspension creates too much friction to let the suspension move easily up and down with the car stationary, it is not practical to adjust camber by measuring the angle of the wheels as one would do on the front wheels of a domestic car. Instead, the radius arms are disconnected from the rear axles and their downward angle measured. As we pointed out earlier, this angle is determined by the radius arm's position on the splines at the outer end of the torsion bar and by the position of the torsion bar's inner splines in their mounting.

Raise up the car (or chassis) and take off the wheel and tire. Remove the four nuts that hold the brake cables onto the handbrake lever using a 10-mm (13/32") wrench. (These nuts are located inside the passenger compartment and are hidden by the rubber boot that covers the handbrake lever's base.) Freeing the cables is necessary to provide enough slack for pulling the axles rearward off the radius arms.

Before unbolting the rear half-axles from the radius arms it is extremely important that their original position on the radius arms be marked. The bolt holes in the radius arms are oval-shaped so that the half-axles can be moved backward and forward once the bolts are loosened. This is how the toe-in and toe-out alignment of the rear wheels is adjusted. Unless the original position of the axles on the radius arms is marked, it will be impossible to re-align the rear end after the decambering operation without the help of optical wheel aligning equipment and a trained VW specialist.

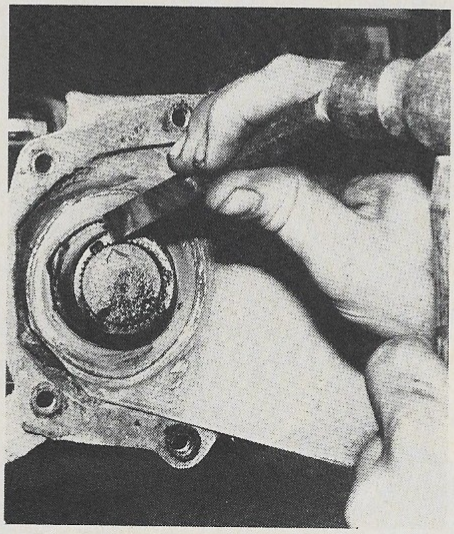
There is already a groove in the axle bearing housing just above the upper rear axle mounting bolt. By cutting a mark in the top of the radius arm that is in line with this factory mark you can permanently record the axle's correct location. Doing it carefully and accurately will enable you to preserve the alignment that the chassis was given at the factory. *(Continued on Next Page)*

After marking the axle's location you can take out the three bolts holding it onto the radius arm and dismount the shock absorber from its lower fastening. For these two jobs you'll need a 17-mm (11/16") and a 19-mm (3/4") wrench. The axle may then be pulled rearward and out of the way. If you've loosened the brake cables as described above, the cable housings should pull away from the metal brake cable tube where it projects from the chassis horn.

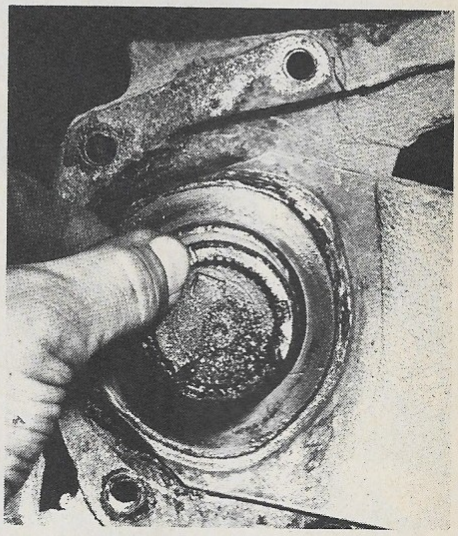
Move The Outer Spline	Move The Inner Spline	Arm Angle Change
Up 1 Notch	Down 1 Notch	0° 50′
Up 2 Notches	Down 2 Notches	1° 40′
Up 3 Notches	Down 3 Notches	2° 30′
Up 4 Notches	Down 4 Notches	3° 20′
Up 5 Notches	Down 5 Notches	4° 10′
Up 6 Notches	Down 6 Notches	5° 0′
Up 7 Notches	Down 7 Notches	5° 50′
Up 8 Notches	Down 8 Notches	6° 40′
Up 9 Notches	Down 9 Notches	7° 30′

Step No. 2: Freeing The Radius Arm

The radius arm hub retainer plate is held in place by four bolts. These can be taken out with a 15-mm (5/8") wrench with no fear of sudden spring unloading. Not only is the radius arm solidly supported by the lower suspension stop, but the torsion bar is practically unloaded anyway when fully depressed. Inside the hub retainer plate there's a large rubber bushing that surrounds and supports the radius arm hub. There is a similar bushing behind the radius arm as well. However, the arm should not be taken off the torsion bar until its location has been properly marked. If the rubber bushings are worn or cracked it is highly important that they be replaced with new ones.



Mark the radius arm's original position on the torsion bar by striking a notch on the hub's edge. Torsion bar is too hard to cut, so use letter for reference.



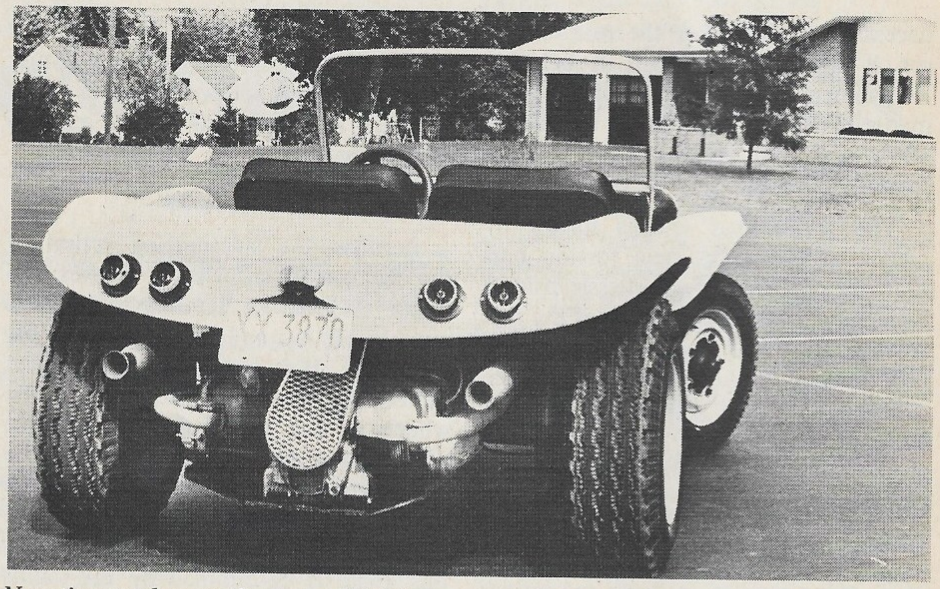
Torsion bars are marked "L" and "R" for left and right. Don't mix them. Mark on hub can be in line with bend in letter "L" or one leg of the letter "R". (Note comment

Step No. 3: Marking

Since your goal is to adjust the camber to a position *relative* to the original settings, you've got to make sure that the original settings are not forgotten. Using a very large screwdriver or other suitable tool, pry outward on the radius arm until it slides off its lower stop. The torsion bar is now unloaded. A reference mark should be struck into the shock absorber support casting with a cold chisel to mark the lower edge of the radius arm. This mark will be just above the bottom-most hub cover bolt hole.

The original position of the radius arm on the torsion bar's outer spline is marked by cutting a groove into the radius arm's hub. This mark should be exactly in line with some easy-to-remember part of the letters "R" and "L" that appear on the torsion bar ends.

If you become confused about the original camber settings while making your adjustments it is only necessary to place the hub's mark in line with the correct part of the letter "L" or "R" on the torsion bar and adjust the torsion bar's inner spline until the lower edge of the radius arm is back on the mark that you made in the shock absorber mount casting. In this way you'll never lose sight of the original suspension settings during your experiments with various wheel cambers – even though changes may be made over a space of several months.



Negative camber on the rear of this buggy was obtained by moving radius arms up one notch on the outer spline. Setting is for good handling with light loads.

Step No. 4: Adjusting

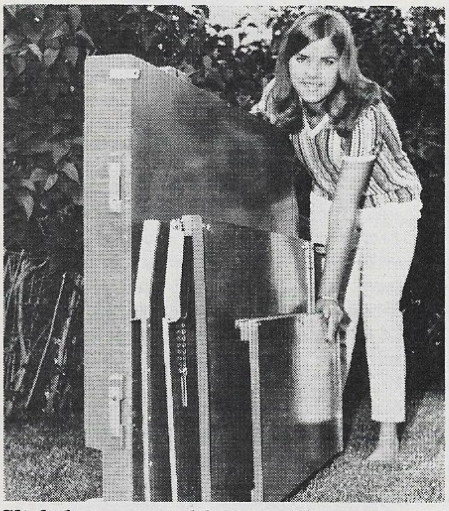
If you are adjusting the rear suspension on a chassis that will be used for a lightweight dune buggy, and that will seldom be asked to carry more than one or two people, you can decamber the suspension with a simple change to the outside spline only. Just pry the radius

(Continued on Page 5 3)

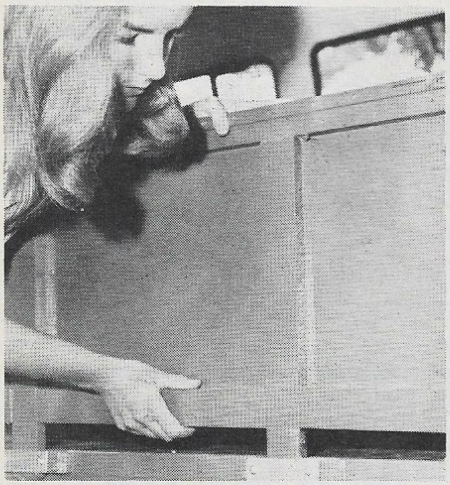
Put a Truck *IN* Your Bus

Notes and Photos by Bill McClure

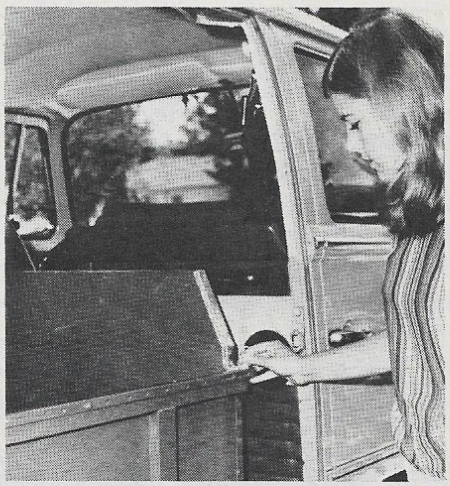
Heave-ho! Toss anything you like into the cargo box without fear of scratch or splatter.



Slightly separated here to illustrate details, the folded box can be stored in a space less than a foot wide.



Sides and tailgate are held in place by stakes attached to panels and slipped into sockets.



Tailgate is keyed into place as on a pickup truck and built lower than the sides to facilitate shoveling.

Do you itch to use all that cargo space in your VW bus for all the dirty hauling jobs that go with home ownership but hesitate to subject the interior of your wagon to such treatment?

Well, you can start shoveling. Sand, gravel, trash – even mud or ashes – can be heaved into her with never a qualm about scratches or smudges on her upholstery or dirt and mud on her floor.

How? Simply put a truck in your bus!

There's plenty of room for a lightweight, take-down cargo box that rivals a small pickup in capacity, and that barn-size sliding door on your bus is made-to-order for shoveling. Your truck-in-a-bus can be assembled in place in about five minutes after the center seat is removed and best of all, when you're through with the dirty work you can store the take-apart truck body along the wall of the garage by standing the floor, three side panels and tailgate in a space less than a foot wide.

You can build the whole thing with about $25 worth of plywood, light angle iron, some 1x4-inch and 1x2-inch strips and a little hardware. For another $10 you can line the truck floor with sheetmetal to make a smooth and long-lasting shoveling surface.

The base of the truck box is a piece of half-inch plywood for the floor elevated on 1x4-inch strips to clear the safety-belt lugs and to accommodate the stakes that slip into sockets to hold the side panels and tailgate in place. A 1x4-inch joist or two can be added to handle extra-heavy loads.

Side panels are of 3/8-inch plywood reinforced along the top with 1x2-inch strips and fitted with light angle irons at the corners to make a dribble-free box. And that's about all there is to it. Exact dimensions and design are up to you. A few hours' work with simple tools can put you in the dirty hauling business and also keep your bus passenger-clean.●

TECH CLINIC

Questions of widest reader interest will be answered in this column monthly. These answers are prepared by our technical staff with the help of consultants who have many years of experience servicing the car involved. WCG, of course, can accept no responsibility for accuracy or applicability to a given situation although every effort is made to constructively help readers who have mechanical problems with their cars. Due to the heavy volume of queries, none can be answered personally so therefore do not include postage with your submissions. To be considered for inclusion in this column, send your question to: Tech Clinic, World Car Guide, 4207 Palos Verdes Drive South, Palos Verdes Peninsula, Ca. 90274. Please limit queries to a single problem and be as specific as possible.

Volkswagen

QUESTION: I own a '64 bus and am interested in decambering the rear suspension so that the tire treads will contact the road more evenly. Is it possible to adjust the torsion bars to decamber the suspension or is there another way? My bus is used mainly for transportation and seldom carries a load.

K.M. Hunter
San Bruno, Calif.

ANSWER: Your question comes at a fortunate time because on page 38 of this issue our maintenance editor, Dave Wenner, describes the whole procedure. He uses a beetle for his example and his settings are oriented to dune buggy usage but your suspension, except for the heavier torsion bars, is identical and you can pick the setting that suits your needs.

QUESTION: I have to replace the clutch on my beetle and wonder what kind of lubricant is best to use when installing a new throw-out bearing?

George Reynolds
Boca Raton, Fla.

ANSWER: Original and replacement throw-out bearings are prelubricated internally for life at the time of their manufacture. Many dealers, though, have found that spraying or coating the teflon surface of the bearing assembly with a molybdenum disulfide compound aids in obtaining quieter, smoother clutch action. One such product, "Moli-Spray," is sold in handy spray can form by the Bemol Corporation. If you can't find it at your parts store, you could write them at 25 Central Ave., Needham Heights, Mass. 02194. Tell them WCG sent you.

QUESTION: I own a '68 beetle which is a great little car but it has one annoying fault. The doors are chronically loose and rattle when I drive on bumpy rural roads which is most of the time. Also, the weatherstripping squeaks. I have tried to adjust the doors and I keep the adjusting screws tight, but it has done no good. What can I do? And on another but related subject, would Koni shocks reduce rear wheel-hop under acceleration on washboard roads and in deep snow?

Heinz Schober
Verner, Ont., Canada

ANSWER: You don't tell us what part of the door you're trying to adjust. Normally, adjustment is made by moving the striker plates in, a little at a time, until you get a tight fit that doesn't interfere with the proper seating of the locking mechanism. You can probably cure the squeaky weatherstripping by coating it with household talcum occasionally. Koni shocks will very definitely reduce rear wheel-hop under any conditions. Get the adjustable variety if possible.

QUESTION: Thanks much for your prompt answer to my carburetion problems in January WCG. Now I have another one which perhaps you can answer. How do you adjust the solenoid operated idle jet? When I had the carburetor off to clean it, it looked to me like the little screw in the solenoid was about to fall out so I tightened it. My VW mechanic, though, says that they are adjusted at the factory so he wouldn't know how to do it himself. I'm also puzzled about the top speed of my bug. Most stock '68 bugs will do 80 mph and I can only do 70 with 1600 cc barrels and a 3/4 Isky cam. If you have any suggestions on these problems, I'd appreciate them.

Gale Reed
Knoxville, Tenn.

ANSWER: The little screw in the solenoid operated idle jet controls the contact. Screwed in, as you have it, is the normal position. Should the solenoid fail in the future, screwing it out will sometimes restore operation. We suspect your performance problem may be due either to a broken vacuum advance or poor timing, or a combination of both. First check the advance mechanism. Now, since you have a '68 which is not subject to Federal emission control regulations, set your timing to 33 degrees total advance at 3,000 rpm. The easiest way to do this is to obtain a degree wheel, attach it to the pulley aligning the zero mark on the wheel to

the existing mark on the pulley (also zero) and then scribe the pulley again at the 33 degree point over to the right. After that you are set to time with a strobe light for the new setting. We don't feel, as you may have gathered, that the usual static method of timing VW's works too well.

QUESTION: I should apologize for writing you about such a low performance car, but I feel you can help me. I have a '69 Campmobile with a 1600 engine and would like to get better performance on the road and up hills. For the last two months I've investigated dual and 2V carburetor kits, but after reading Tony Hill's article on carburetion in your December issue I thought I should see what I could do with the existing 30 PICT-2 Solex that's standard on the vehicle. This has a 0.116 fuel jet and a 0.125 air jet which I suspect are on the small side due to emission control requirements. Can you recommend a better jet set-up or will I have to go to special carburetor kits? If so, which type of these is the best? I have an EMPI exhaust extractor on the car now.

Larry Vorheis
Bethany, Okla.

ANSWER: First, there's no need to apologize for writing us about "low performance" vehicles. If you turn to page 10 of this issue, you'll note that we think they have a purpose. But to answer your question, since you live in Oklahoma it is technically legal to modify your engine after purchase until such time as that state passes its own emission control legislation, despite the fact that your present jet sizes were dictated by Federal requirements. We suggest that you substitute a 0.116 fuel (properly called "main") jet and a 0.120 air jet. We also suggest that you follow the timing procedures recommended in answer to Mr. Reed's query above. If these changes don't satisfy you – and they're not going to make a drastic difference in the performance of your heavy Campmobile – you might be well advised to purchase either a dual or 2V carburetor kit from any of our advertisers. Your query as to which one is best gives us a chance to hopefully dissipate a storm we raised in January's Tech Clinic where we implied that a 2V set-up with ram manifold was best for street use. Our source for this statement was Darryl Vittone of EMPI but Michael Garber of PolyPad strongly disagreed when he read it. The two companies sell competitive products and both commonly check the products of their competition on their own dynamometer installations. However, test conditions are not governed by any industry code as in the case of Detroit horsepower figures and also, it must be noted that no two dynamometer installations will provide exactly the same results. With that in mind, we relay Mr. Garber's feeling that the Vanguard twin carburetor kit his company manufactures has proved superior to any conventional 2V kit with ram manifold they have tested. Mr. Vittone still holds to his original statement and neither specifically told us that they had tested the other's product. Both agree that the twin 1V installation is somewhat harder to maintain due to more complicated linkage and synchronizing problems. Mr. Vittone agrees with Mr. Garber that a 2V kit on a ram induction manifold with plenum chamber is superior to the same mounted on a ram manifold without a plenum or "mixing" chamber. Mr. Vittone thinks that a 2V Weber carburetor on a plenum chamber type of manifold is the overall best when price is not a factor; Mr. Garber will allow only that it might compare favorably with his twin 1V set-up for street use only. Poly Pad makes the twin 1V and handles the 2V Weber with plenum chamber manifold under the Vanguard trademark; EMPI offers only 2V set-ups with and without both plenum chambers and Weber carburetors. The twin 1V is cheapest, the 2V with conventional carburetor comes next and the Weber set-ups are relatively expensive. We suggest that you contact both companies (their addresses will be found in their advertisements in this issue) for literature and decide for yourself which installation best suits your needs and your pocketbook.

QUESTION: I notice that you cite SAE horsepower in some articles and DIN horsepower in others. This confuses me. How does DIN relate to SAE?

Roland Connery
Brandon, Man., Canada

ANSWER: A simple and reasonably accurate method of translating DIN horsepower to SAE is to divide the DIN figure by 6 and then multiply by 7 to obtain SAE. SAE is obviously higher because it is a less rigorous rating method. However, you've made your point and from here on in, WCG will make the computation and print nothing but SAE ratings as of this issue.

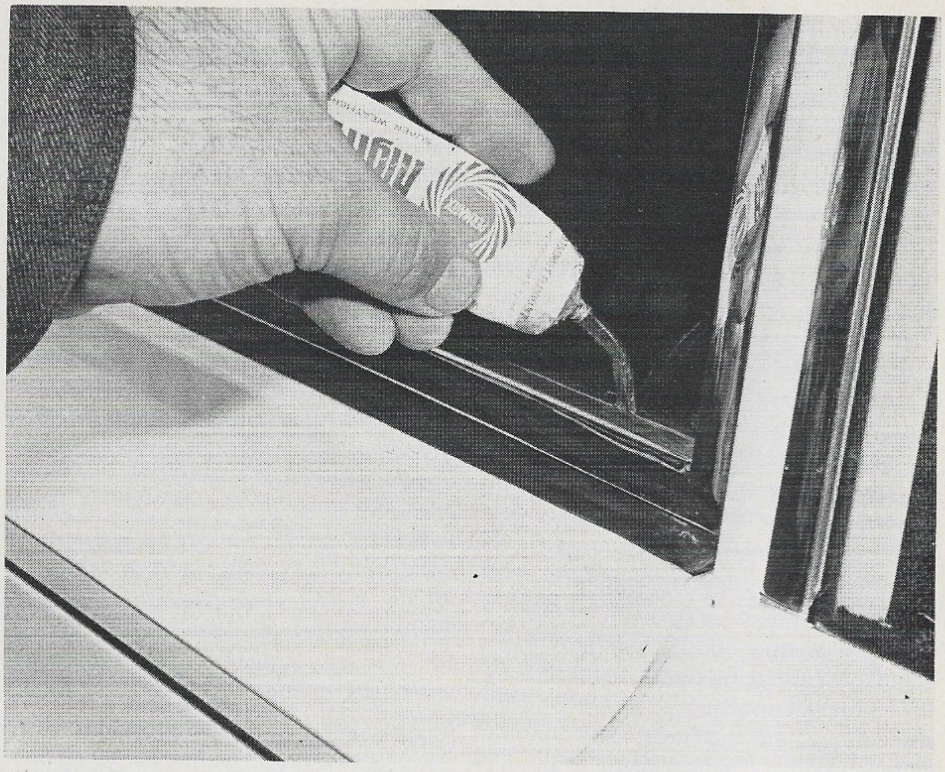
COMMENT: In January Tech Clinic, C.N. McGaughey asked where he could purchase neoprene valve cover gaskets for a VW and you stated you did not know of any except for decorative valve covers. I purchased a set that fits stock covers from Diana Import Co. who advertise in your magazine. Keep up the good work. Your magazine is most informative and has helped me over a few rough spots in my VW ownership.

Ronald Totten
Denver, Colo.

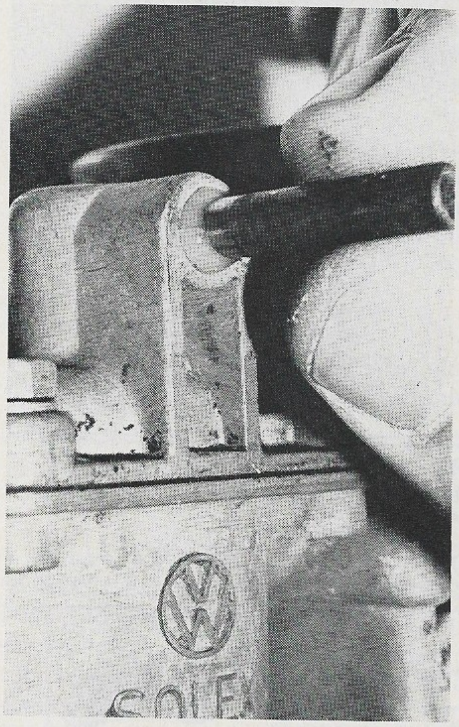
Ed. Note: Thanks, Mr. Totten, for the information and your kind comment. ●

Not for Sale... See "Scrapbook," Page 54

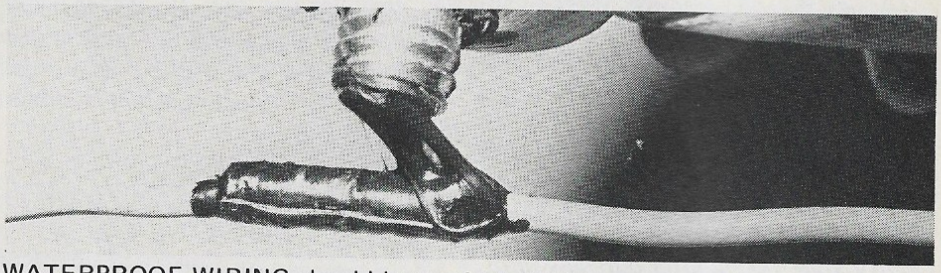
LET DAVE DO IT
LET DAVE DO IT
LET DAVE DO IT



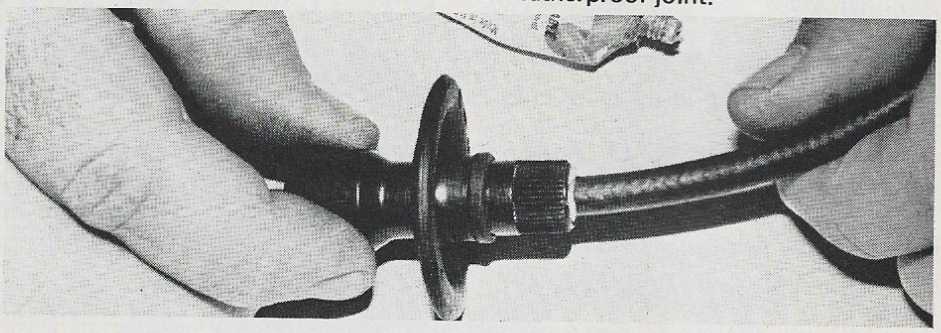
STICKY PROBLEMS will be our subject this month! Drivers who take care of their own cars usually spend more time fussing with tubes of goo than the bottle washer's assistant in a germ warfare lab. When you have to seal a leak between a window and its rubber gasket, it's hard and messy work trying to get the cement into the space between them. To make it easier, flatten the end of a piece of copper tubing, bend it slightly, and slip it over the end of the cement tube. The flattened end will slide easily into the crack and get the goo where you want it.



FUEL TUBES on carburetors and fuel pumps are pressed in at the factory. Unfortunately, they will sometimes pull out when you disconnect the fuel line, particularly when the engine is hot on a summer day and the light metal castings expand. If you have a chronic problem with this you can stop it permanently with — you guessed it — *glue!* Remove the tube, clean the parts thoroughly and roughen them slightly with sandpaper or a file. Give them a coating of epoxy resin cement, leaving a bead around the tube as shown. After a 12-hour wait for the glue to set, the repair is permanent.



WATERPROOF WIRING should be a prime aim in any automotive electrical repair. After you have spliced two wires or a broken wire together, you cover it with electrical tape, right? Trouble is, heat, oil and fuel vapors, dirt and old-age tend to destroy the tape's adhesive. When it falls off, you're all set up for a dandy short in the electrical system. Next time you tape a splice, cover the tape with a coating of liquid rubber. The result is an indestructible weatherproof joint.



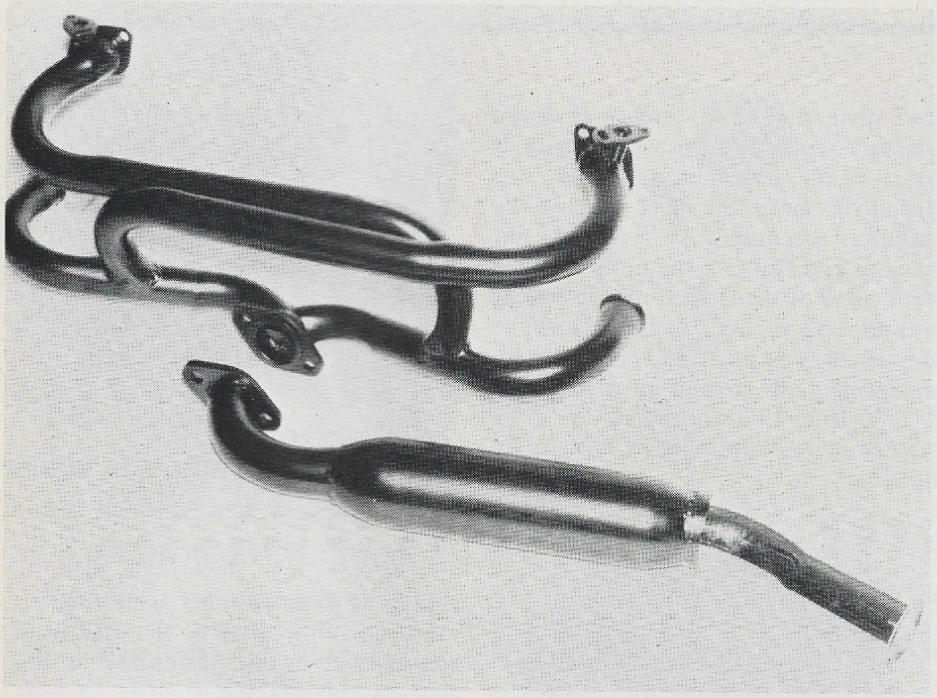
ENGINE MISSING caused by plug cables that have accidently been pulled out of VW plug connectors can be a problem, especially when resistance-type cables are installed. When will those ham-handed gas pump jockies ever learn not to yank on the wires to disconnect them for a plug change? Here's a permanent way to foil them and also make your wiring more waterproof. *Glue* the cables to the connectors with trim cement. When you have to change cables you can still save the original connectors by dissolving the adhesive with paint remover. I wouldn't be without it on my bug!

— Dave Wenner

HI-PERFORMANCE CORNER

by Tony Hill

EXHAUST TUNING...PART I



The subject of exhaust tuning, particularly on Volkswagens, is a controversial one and to this day experts disagree on some of the techniques involved in applying the theory of air waves to extract more horsepower from an engine. All agree, though, that what they're trying to accomplish with a tuned exhaust is to remove *all* of the burned gases from the cylinder by the time the piston reaches the end of its exhaust stroke. And, in addition to this, if you can at the same time create an additional degree of suction as the intake stroke commences, so much the better.

The basic reason for striving at perfection in the scavenging action is that even a trace of burned exhaust gases remaining in the cylinder will dilute the incoming mixture and thus, the full output potential of the engine will not be realized. Once the piston has reached top dead center of its exhaust stroke, it has done all it can do in that cycle. You can, though, materially increase the overall scavenging efficiency by overlapping the opening of the intake and exhaust valves (described in this column last September), reducing friction in all of the openings and passageways involved (to be discussed in detail at a later date) and, by "tuning" the exhaust system itself which is my topic for this month and next.

To fully understand the problems if not the solutions involved in designing an optimum exhaust system, one must visualize what takes place exactly 25 times a second in each cylinder of a Volkswagen engine running a full-race 6,000 revolutions per minute. At the instant the exhaust stroke starts, a positive pressure wave is created that will emerge through the exhaust port and into the manifold or header and muffler, if any, at the initial rate of approximately 1,700 feet per second.

Then when the individual pressure wave reaches the end of the exhaust piping another, negative, wave is created which theoretically should travel without loss of efficiency a reverse route back to the cylinder and aid in pulling out left-over, burned gases. This reflected wave accomplishes what is technically known as rarefaction, a word defined by Webster's as "to make less dense." In current day terminology used by the speed equipment manufacturers, an exhaust system designed to take advantage of the reflected wave is called an "extractor."

When this negative, or vacuum wave reaches the exhaust valve, it sets up a low pressure area in the vicinity and the high pressures being created by the piston moving up on its exhaust stroke will naturally flow more directly to the valve rather than wasting energy swirling around uselessly in sealed areas of the cylinder. It follows that the higher the pressure differential at the exhaust valve opening, the faster and more efficient will be the scavenging.

The effect of the negative wave is cumulative. It not only "dumps its vacuum" to help suck out additional gases but changes back into its original positive form, reverses direction and races back out the exhaust system to further aid extraction. As the exhaust valve goes through its cycle of opening and closing, this business of positive and negative waves traveling back and forth through the system occurs continuously as long as the exhaust valve is open. Obviously, since the valve is opening and closing 25 times a second at top engine speed, the speed and frequency of these waves are hardly measurable with commercially available instrumentation. In practice, the various speed equipment manufacturers design by trial and error and test the various configurations either on a dynamometer or on the track and therein, of course, lies the continuing controversy over details.

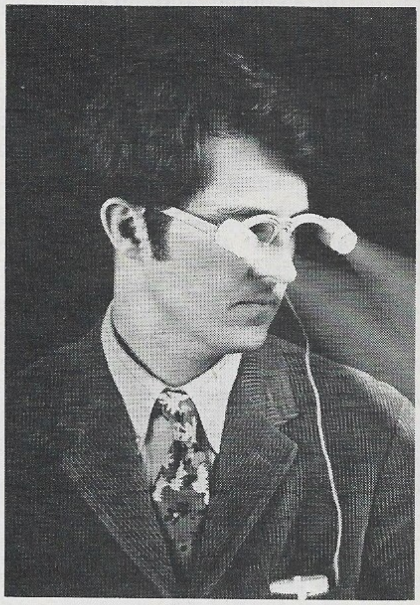
Thus, the secret or mystique, whichever, to exhaust tuning is to control the last pulsation, or cycle of negative

(Continued on Page 54)

things for cars

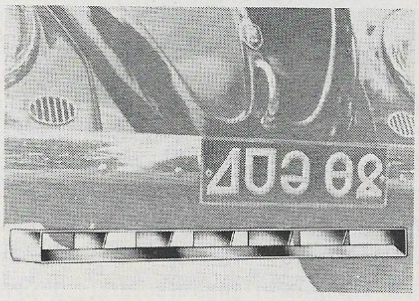
new products ideas services

This is an editorial report and not an offer for sale on the part of the publishers. Every effort has been made to ensure accuracy, but please note that prices and availability are subject to change without notice. Manufacturers who wish their new products considered for publication in this section should send a brief description like those below and a glossy photo to: World Car Guide, 4207 Palos Verdes Drive South, Palos Verdes Peninsula, Ca. 90274.



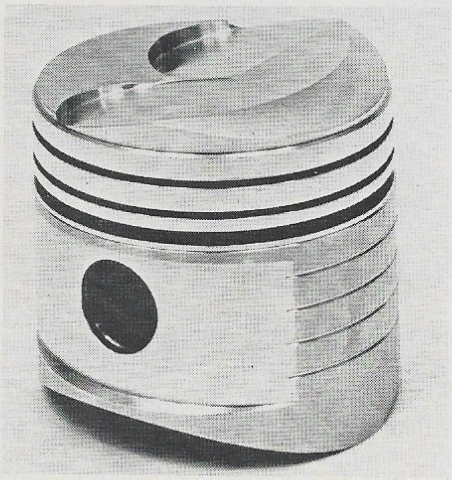
JEEPERS! NEON PEEPERS

These "Eye-Lites" would seem to be a handy way to get hands-free illumination for road-side car repairs, map reading, girl watching or you name it. They operate from two dry cells and will fit over your glasses. Cost postpaid, less batteries, is $7.50 from Eye-Lite, 1697 Elizabeth Ave., Rahway, N.J. 07065.



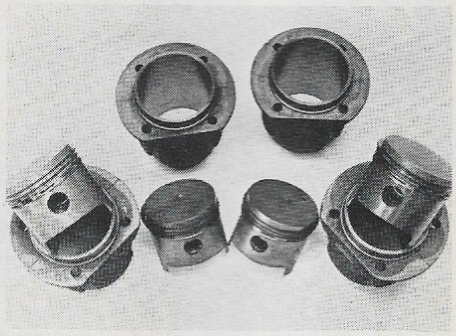
STABILIZER FOR BEETLES

Claimed to reduce up to 90% of the effects of side or crosswinds – which if only partially true would make it a bargain at any price – is this new stabilizer that bolts onto any '55-'69 beetle. Made of aluminum, the seller says that the device creates reduced pressure *under* the car which holds it more firmly down on the road. The higher the speed, the more effective the stabilizer becomes. At least it's not obvious cop bait like the units supplied with some of the Detroit muscle cars. It measures 32 x 10 x 3 inches and will be shipped to you postpaid complete with mounting hardware and instructions for $16.50 from J.C. Whitney & Co., 1917 Archer Ave., Dept. 461, Chicago, Ill. 60616.



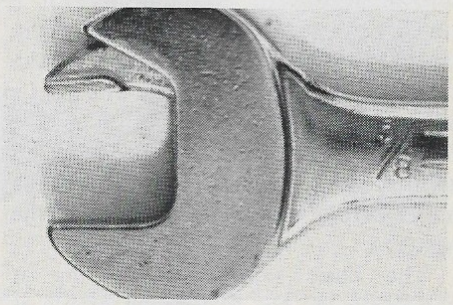
MORE POWER FOR DATSUNS

Latest effort of Brock Racing Enterprises is the Datsun 2000 U-20 series racing pistons for the 2,000-cc Datsun roadsters raced so frequently in SCCA C and D Production classes. Designed by Brock and built by Venolia, these pistons have a compression ratio of 12.5 to 12.8 to 1 and come with taper ground 4340 alloy piston pins. No milling of the cylinder head is necessary but combustion chamber rework is required for installation. A set of four may be had for $144.70 from Brock Racing Enterprises, 137 Oregon St., El Segundo, Calif. 90245. They're presently available, though, only in 0.040 oversize.



CUSTOM ENGINEERING FOR VOLKS

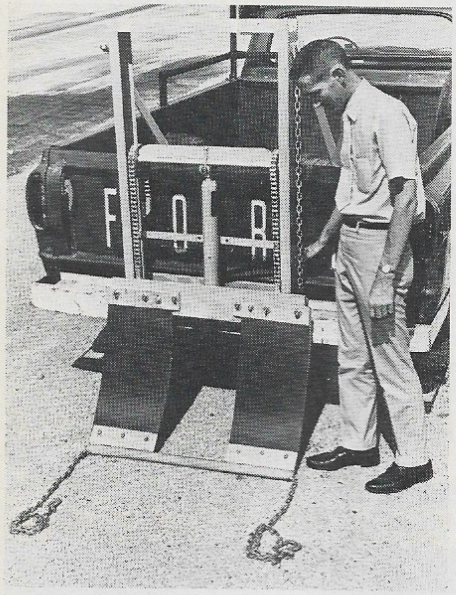
Giant bore 92mm sets and 82mm stroker roller bearing crankshafts for the Volkswagen are always in plentiful supply at Competition Engineering but even more important is the quality of the machine work performed in this shop to mate these goodies to your engine. A multi-thousand-dollar Bridgeport milling machine with special fixtures and cutters is used to achieve the rigid tolerances so vital to these adaptations. $1 will get you a catalog, decal and more details on custom machining costs for VW and Porsche power components. Write Competition Engineering, Dept. WCG-15, 2095 North Lake Ave., Altadena, Calif. 91001.



OPEN-END RATCHET WRENCH

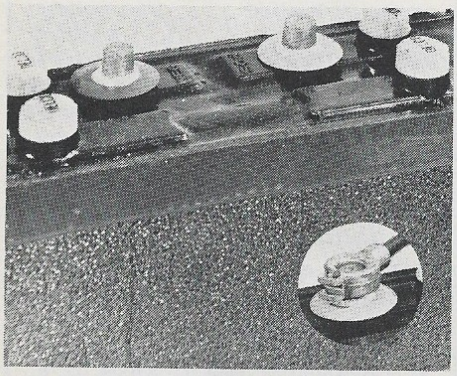
Nothing is more convenient and faster to work with than a ratchet wrench but we've never seen one of an open-end design before. Trufit now has it, though, and they call it the

"Pawlock." It's sold in hardware and variety stores in a kit containing the five most common sizes – 3/8, 7/16, 1/2, 9/16 and 5/8 inches. You never have to re-position this wrench and you don't even have to align it on a blind hex nut. The suggested retail price is $18.95 for the set and if your local dealer doesn't yet handle it, write Trufit Industries, 16490 Woodward Ave., Highland Park, Mich. 48203.



WORLD'S CHEAPEST TOW TRUCK

Not really a tow truck as such but an adaptation for your existing pickup truck is the Mini-Max which has a lifting power of up to 4,000 lbs. and costs less than $400. Installation can be made in 10 minutes and it's equally easy to remove if your truck is required for conventional duties. One man can operate it and turns of up to 60 degrees can be made with a vehicle in tow. To buy one or to obtain an area dealership, contact Richard Harris, VP, Hou Chemical Company, Box 941, Decatur, Ill. 62525.



PREVENT BATTERY CORROSION

Corrosion around the terminals not only drains battery energy but it's unsightly as well. Coating with grease helps except that it's difficult to protect the area between the cable clamp and the battery post where protection is needed the most. These new "Battery Savers" are claimed to increase battery life by 50% when installed as directed. Secret of the device is its vinyl honeycomb core construction which suspends ordinary motor oil and provides a continuous flow of anti-corrosion lubrication by capillary action to all parts of the connection. Installation is simple, fast and can be performed by anyone. Price is $1 per set postpaid from Jaqueline Todd Mail Order, 53 Moundview, Jackson, Tenn. 38301.

SHIFTER FOR BEETLES

This "Formula Vee Competition Shifter" completely replaces the whole gearshift lever mechanism on all Volkswagen sedans from 1958 through 1970. A spring-loaded reverse lockout is provided that eliminates pressing the stick or pulling a ring to engage reverse. The regular VW shift pattern is retained but this shifter provides a shorter throw. All wear points are protected by nylon bushings and thrust washers, including a bearing quality nylon ball on the linkage engagement joint. The average home mechanic can install the unit himself by first removing the regular VW shifter completely, including the reverse gear locking plate, and bolting the new part in its place. The price is $42.95. For further information contact Vanguard, Inc., Box 405WCG, Medina, Ohio 44256. •

NEWS FROM THE

Compiled by Carole Kepes

The VWCA, P.O. Box 963, Plainfield, N.J., 07061 is a non-profit organization dedicated to helping the VW owner enjoy his car to the fullest. For more information send 25 cents for postage and handling to the above address. Annual dues $7.00 plus $5.00 initiation fee first year. Dues include subscription to this magazine, WORLD CAR GUIDE.

TRUSTEE MEETINGS – WHY?

Most local clubs have a Trustee, and three times a year (excluding the convention) most trustees assemble at a pre-determined location for a meeting of the Board of Trustees. At these meetings the policies and actions of the Volkswagen Club are made and approved.

There you have a brief but accurate description of what comprises a meeting of your Board of Trustees.

You should be there. Or your Trustee. Why? Because attendance at the board meetings brings to each local club a greater awareness of the why and how of the Volkswagen Club of America. Your Trustee should be there to make known the wishes of your Local. You should be there to make your wishes known to your trustee, and to give yourself this broader understanding of your national organization.

My own local club existed for many years without a Trustee, trying to garner national information from Board meeting minutes which few of us bothered to read anyhow. As a result we were frequently unhappy about decisions which were made affecting us, unhappy because this ghostly "National" didn't explain things to us, and disgruntled because no one asked our opinions. Who did this "National" think it was raising our dues, for instance, without consulting us?

We finally sent a Trustee to a meeting (one of our more mercenary members, me, who realizes that most expenses were paid by "National" with an assist from our local), and found that we had as much say as anyone else as to what was done to affect our club on the national level. This Trustee also reported to the local on the actions taken by National and carefully explained these actions to us. Wonder of wonders, we no longer had to direct our anger at an unknown "National;" we could now heap abuse upon a tangible object, our Trustee. If he were not persuasive enough to run our pet programs through the gauntlet of the Trustees meetings, we had no one to blame but him, for going ill-prepared or for voting against us at the final roll call. But now we were a part of things, no longer step-children sulking in the boondocks. Now we could see the benefit of belonging to National, taking an active part, and we were even conceited enough to believe that National was also receiving the benefit of our membership.

If you have something to say to National, a pet program, an idea of benefit to all, tell it to your Trustee – ask him to bring it to the Board meeting and explain it to us. I can assure you it will receive thorough discussion, and be voted for or against on its merits.

If you are a member-at-large, there are three Trustees-at-Large to represent you. If you would rather deal direct, drop a line to me, Glen Wells at R.R. No. 2, Ankeny, Iowa 50021, and I promise to bring your idea, your problem or your gripe before the board for consideration. Better yet, come to a Trustee meeting and present your idea yourself. You have as much right to be heard as anyone, and we are there to do your bidding. See you at the next meeting?

Glen L. Wells
Chairman of the Board of Trustees

DATES TO REMEMBER

April 25 – Trustees Meeting, Dayton, Ohio.

May – Maifest, Hawkeye VW Club, Cedar Rapids, Iowa.

June 19-21 – National Convention, Atlantic City, N.J.

June 14 – Departure for Mexican tour.

July 19 – Flight No. 1 to Europe, Returns Aug. 16.

Aug. 27 – Flight No. 2, Returns Sept. 20.

Aug. 30 – Flight No. 3, Returns Sept. 27.

SECOND MEXICAN TOUR

The itinerary has been set up for the second Mexican tour, with departure date from McAllen, Texas, set for June 14, 1970. Contact Florence Killian for additional information.

HAVE YOU ANY QUESTIONS?

If you have any questions concerning VWCA activities in the following areas, write directly to the committee chairman listed:

MEMBERSHIP – VWCA Membership office, 10100 Gregory Ct., St. Louis, Mo. 63128.

ACTIVITIES – Bill Morris, 12447 Sharon Rd., Oakley, Michigan 48649.

CLUB HOST – Ted Ubbelohde, P.O. Box 395, Davenport, Iowa 52805.

CLUB TOUR – Carl Ziemann, 910 S. Stewart, Lombard, Illinois 60148.

RECRUITING – Maria Grayson, Rt. No. 1, Box 174, Dittmer, Mo. 63023.

MEXICAN CARAVAN – Florence Killian, 6123 Lillian Ave., St. Louis, Mo. 63136.

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VW BUS (Continued from Page 13)

misleading as it's not spongy and control is good, thanks in part to double acting shock absorbers and the constant spring rate inherent in the torsion bar system used fore and aft.

The detail finish is exceptionally good, even by Volkswagen's traditionally excellent standards and here, of course, is the visible evidence that the VW bus is not just a van outfitted with seats and windows. Its vices are the traditional ones associated with the products of Wolfsburg (or rather Hanover in this instance) and include perhaps the most inaccessible of all the inaccessible batteries in the family and susceptibility to wind wander. It's not just a matter of lifting a seat cushion with this battery; you have to remove it (first removing the air cleaner) from its hiding place in the engine compartment to even check the water level. The wind wander is to be expected from any van shape but obviously it's aggravated by the machinery being concentrated at the rear. At least the steering is not as precise as that of the squareback or beetle so there is less danger of overcorrecting.

This vehicle is easy to summarize. If you like the practicality offered by the van configuration and are more concerned with exceptional resale value and 22-mpg economy than you are with performance, buy the VW bus in preference to domestic offerings. Remember, though, to drive defensively as there is no power whatever in reserve to bail you out of an error in judgement at today's highway speeds. Also, there's precious little structure in front of you and yours should you ever have to pay the piper. ●

FIREBIRDS (Continued from Page 27)

Plain Firebird is perhaps the prettiest of them all, being unencumbered by add-ons. Electrically heated backlite is optional, imbedded antenna and hidden wipers standard.

ammeter. If the needle reads 12-13 volts, you know that the battery is fully charged. If it drops to 11 after a cold start and fails to recover, you know that something is wrong with the charging system as would be true if it climbs much above 13. The system makes sense, compared to vague "charge" or "no charge" readings on an ammeter or the even more vague warning light but it's doubtful if the average driver will comprehend the instrument.

Owners of a variety of imports costing a third as much as a Firebird that have featured standard disc brakes at least at the front for years can take some satisfaction from the fact that these are now standard on the Pontiac product. Power assist remains optional, meaning that under the new safety rules a pedal pressure of 150 pounds will achieve something approaching a maximum stop. That's a lot of pressure, though, to expect a woman to apply.

Along with assisted braking, power steering is a highly desirable Firebird option because it is superimposed on what used to be known as the "fast-manual" ratio. In this variable ratio design, it gives you 14.5 to 1 for easy parking and a fast 11.1 to 1 for normal road maneuvers. An optional 14-inch wheel features a thick rim with a leather cover.

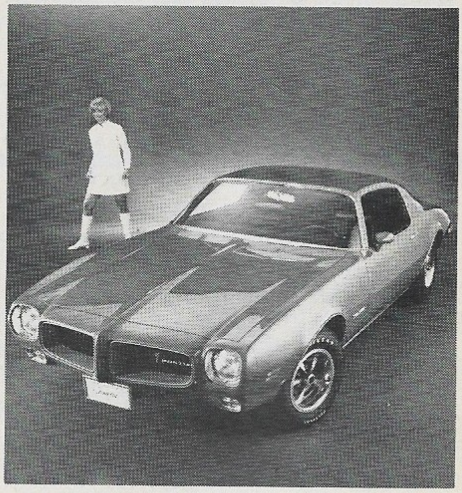
Transmission choices include a stan-

(Continued on Next Page)

Not for sale... See "Scrapbook," Page 54

FIREBIRDS

(Continued from Page 49)



Painted rubber bumper, called "Endura," is used for all Firebirds. It will absorb a 2-3 mph parking lot impact without damage to either car.

dard three-speed box made by Inland with the shifter on the floor, a Hurst-gated four-speed by Muncie and two- and three-speed automatics. Choose either the Hurst or the three-speed automatic with the optional dual gate that allows either manual or machine shifting. The two-speed automatic is an obsolete slush box and the three-speed manual will hurt you at trade-in time. ●

CAMARO

(Continued from Page 29)

panels is a cheap looking and uncomfortable hunk of stiff molded plastic.

Camaro has abandoned its single-leaf rear springs on all models in favor of the multi-leaf variety and shock absorbers are staggered on all. If you order the "sport" suspension kit springs remain the same and soft, but you get heavy-duty shocks and stabilizers fore and aft. The resulting ride is not quite as tooth rattling as Detroit's normal concept of what a sporty ride should be. Someday, perhaps, their engineers will discover the Citroen or the Renault 16, or even one of the newest VW busses, and discover what can be accomplished with advanced springing concepts. ●

MERCEDES

(Continued from Page 35)

Singer Enzo Stuarti is much more fond of his 300 SE cabriolet with air suspension than he is of his spaghetti sauce commercials but realizes that the one pays for the other.

handle all the stress so that no member was ever subjected to a bending moment. The result was that a very light body could be used. Beginning in 1954 the famous gull wing coupe with roof-hinged doors and standing a scant fifty inches high was offered to the public, and an open roadster version followed later. Access to this contemporary classic *can* be a trifle precarious but there are compensations, like watching a mini-skirted passenger trying to mount gracefully.

Into this unique chassis the final expression of the M 186 (the M 198) engine was laid obliquely at a 40-degree angle to preserve the low silhouette and visibility. The 300 SL engine was fed with a direct fuel injection system which, for all its notoriety, is often misunderstood. Despite its computer-like complexity, the Daimler-Benz *einspritzer* works with a deceptive simplicity. Fuel is pumped from the gas line directly to injection nozzles located just above each intake valve. At this point the gasoline has not yet been atomized with air and can be metered very precisely into the cylinder according to need, assuring that the mixture will never be too rich or too lean. Then, the measured fuel is fed into the cylinder, mixed with air, and ignited.

The advantages of doing things this way instead of atomizing fuel in a carburetor and sending it through an intake manifold to the cylinders are several. First, because there is always just the right air-fuel ratio, there is more complete combustion and the engine runs more efficiently and produces greater torque over the whole range of engine speeds. Secondly, at equal power output a fuel injected engine will use less fuel than a carburetor-fed engine of identical specifications, a valuable edge in racing. Finally, because of their more complete combustion, fuel injected engines send less pollutants out the exhaust, a factor which is now causing engineers to look hard at simplified versions of fuel injection (e.g., the now familiar electronic Bosch system on the 1600 Volkswagen) as one of the answers to air pollution problems.

Fuel injection did astonishing things for the basic 300 engine. Tuning and triple carburation had raised the 125-hp sedan engine to 150-hp in the 300 S GT, and now fuel injection of the same engine gave the standard production 300 SL 250 horses and a top speed of 168 mph! Armed with this machine and the organizational talent of crack *rennleiter* Alfred Neubauer and Racing Director Rudolf Uhlenhaut, Daimler-Benz proceeded to stun the sporting world with an unmatched series of

MERCEDES

(Continued from Page 51)

successes stretching from the Swiss Alps to the Mexican desert. During the 1952 season the silver Mercedes was victorious in the Grand Prix of Switzerland at Berne, the Grand Prix of Germany at Nurburgring, the coveted 24 Hours of Le Mans and the Mexican Carrera Pan-Americana. Enthusiasts watched with fascination. They could do little else, for Daimler-Benz refused to release the 300 SL for general sale while it was racking up its impressive list of credits. The 300 SL first went on sale in the model year of 1954 and remained in production, later in roadster version only, until 1962.

The 300 SL represented a close approach to the ultimate sports car, in both engineering and visual appeal. But Daimler-Benz was soon gilding the lily with the 300 SLR, a sports-racing version based on the eminent 2.5 liter Formula I Grand Prix Mercedes-Benz *rennwagen* of 1954. Relying heavily on the GP car, the 300 SLR made a major departure from its 300 predecessors by discarding the standard six cylinder sohc M 186 engine in favor of a three liter version of the eight cylinder fuel injected Grand Prix engine.

The silver star mounted between the 300 SLR's shielded headlamps (a device later picked up on the early E-type Jaguar) shone brightly in 1955. The SLR produced another string of brilliant victories for the Stuttgart works that year, including first and second at Nurburgring on May 29th; first, second and third at the British Tourist Trophy on September 17th; and first, second and third in the rugged Targa Florio in mid-October. But the really classic performance was given at the 300 SLR's formal debut on May 1st, 1955 in the free-for-all Mille Miglia run over a thousand miles of open Italian roads from the ancient city of Brescia, down the Adriatic Coast, across to Rome, and back up to Brescia.

The Mille Miglia, now defunct for over a decade, was perhaps even more of a challenge to the driver than to the car. The course was incalculably complex and subtle, which gave a decided advantage to native Italian drivers who could practice until the hills and curves were burned into their memories. It was also a course well suited to characteristically Italian machinery, where facile handling, understeer and that uniquely Italian intimacy with the road counted for much. It is no wonder that the winners list reads like the Rome telephone book, or that Alfa Romeo dominated the race pre-war and Ferrari post-war. In fact, since the first race in 1927 only one non-Italian car had ever won a Mille Miglia. That exception was, however, a happy omen for Messrs. Neubauer and Uhlenhaut, it being an SSK Mercedes-Benz piloted to victory by Rudy Caracciola in 1931. It was a thrilling win, and one which British motor writer David Scott-Moncrief has called "the greatest feat of endurance ever achieved in motor racing."

For the Italian challenge Neubauer drilled his drivers with typical German precision; each studied the course intensely and spent five thousand miles on it. Still, it was not enough. Then, the British members of the Mercedes-Benz Racing Team, Stirling Moss and Denis Jenkinson, came up with inspiration. The pair had assembled detailed notes on the course and it was Jenkinson's brainstorm to transcribe the information onto a seventeen foot scroll which could be read through a plastic window in a box. During the race, the red-bearded Jenkinson bent over the home-made "computer" on his lap like a primeval hippie in the throes of meditation, pausing only to transmit information to Moss by means of thirteen carefully rehearsed hand signals. With implicit faith in Jenkinson, Moss took blind hills at 175 mph and *knew* what was on the other side without resorting to a memory under stress. The system permitted extraordinarily high speed through the treacherous mountain passes. Once, the big silver carrying number 722 on its side was observed to pass and pull away from an observation plane.

At one point on the road to Rome, however, the scroll system failed to account for a sharp dip in the road surface and as the Mercedes crested a hill at over 170 mph, its occupants suddenly found themselves airborne for nearly two hundred feet. Miraculously, they landed, the wheels bit, and Moss roared off under the Italian noon-day sun toward Rome.

Neubauer had entered four 300 SLR's in the 1955 Mille Miglia, driven by an elite quartet of talent – Juan Fangio, Hans Hermann, Karl Kling and Stirling Moss. But even the best laid plans are subject to the foibles of fate and one of them struck Hans Hermann's car in the form of a stone through the gas tank about two-thirds of the way

home. Despite the fact that the roads of the course were officially closed, it was still a "road race" and held the hazards of stray cattle, uninformed pedestrians, and – worst of all – uncontrolled crowds of zealous spectators. As Karl Kling barreled down the scenic coast road past Rimini he was horrified to see his "audience" spread out before him in the road, expecting to part ahead of his car like a human Red Sea. At 150 mph Kling decided he was no Moses and pulled off the road, shattering mostly his composure.

The Fates felt these sacrifices to be sufficient. From then on Moss and his teammate, Fangio, sailed on to an historic one-two finish. His time of ten hours and seven minutes set up an incredible average of 98.53 mph and wrote the all-time Mille Miglia record. Moss led at the midway point in Rome and thereby defied the old adage "He who leads at Rome never leads at Brescia." But then, Stirling Moss in a 300 SLR Mercedes-Benz was not a combination to be bound by tradition.

The Three Hundred Mercedes-Benz was a creation of the 1950's, a time of patient recovery and dramatic resurgence for Daimler-Benz. The series underwent changes to meet the times; the 300 A, B and C sedans acquired automatic transmissions and power accessories and later gave way to the 300 D with the fuel injected 180-hp engine and updated hardtop coachwork, and finally to the 300 SE sedan with the more pedestrian body of the 220 series. This car eventually evolved into the 300 SEL 6.3 liter, a lightweight five-place sedan with the "Grand 600" V-8 engine capable of zero to 60 mph in 6.5 seconds, and an easy 135 mph top speed. Commercially, it has been a rousing success even at $14,000 the copy; 1968 production was sold out well in advance of the model-year's end. Except for the standard engined 300 SEL sedan, the 300 SEL 6.3 liter is the last car to bear the title "Three Hundred Mercedes." It carries the name with the flashing performance, if not with quite the flair, of its illustrious predecessors. It will likely be sometime, however, before it replaces the mental image conjured up by the words "Three Hundred Mercedes" – a silver streak devouring a long road, an open landau framed between Corinthian columns, or a sedate sedan with flags flying from the front fenders. •

DECAMBERING THE VW

(Continued from Page 40)

arm off the torsion bar (it may be necessary to hammer lightly on the bar's end to keep it from pulling out of its inner mount) and raise the arm one notch on the outer spline. This setting will give almost zero camber with narrow wheels, and some degree of negative camber with wide wheels and tires. It is a good setting for buggies that are used in autocross and gymkhana competition, but may cause the inner edges of the tires to wear slightly faster if the vehicle is chronically overloaded. Some very light "rail" type sand buggies can even stand two notches on the outer spline.

A more practical setting for the average vehicle falls somewhere between the factory setting and the one-notch-up setting suggested above. An easy way to mark this range of possible settings is to raise the radius arm one notch on the outer splines and make another mark in the shock mount casting. This will be about 5/16" above the one made earlier to show the factory setting. There are nine settings that fall in between these two limits. It *is* possible to arrive at other settings, but the difference is so slight that their usefulness is highly questionable. In the following table "up" and "down" refer to the direction in which you must move the radius arm in making the adjustment.

The first three decambering adjustments are those normally used in decambering stock-bodied Beetles while the remaining ones, particularly the 5 degree setting, are those most often employed on dune buggies or light GT-bodies street specials. Since tire size, wheel width, wheel offset and vehicle weight distribution all have a definite effect on rear wheel camber, it is not possible to make specific recommendations. You'll undoubtedly have to do some trial-and-error work to find the best setting for your particular car.

Naturally the radius arms on both the right and left sides must be adjusted equally. You may not get them equal merely by adjusting them by the same number of notches, however. This is because the factory tolerance is 50 minutes – the difference between one setting and the next. After adjusting one side, measure from the edge of the radius arm to one of your reference marks on the shock absorber mount

(Continued on Page 54)

Not for sale... See "Scrapbook," Page 54

DECAMBERING THE VW

(Continued from Page 53)

casting. Then try to duplicate this position on the other side. Usually they will adjust the same, but occasionally one side will take seven notches while the other requires six or eight. The splines should be lubricated with lithium grease before their final assembly.

Step No. 5: Reassembly

Once you're satisfied that your decambering work is complete, raise the radius arms back onto their lower stops if necessary. The rubber bushings and the radius arm hubs should be coated liberally with powdered graphite. Be very careful, though, not to get grease on the rubber parts since it will cause them to soften and decompose.

Replace the half-axles on the radius arms with careful reference to the locating marks made earlier. Check that the mating surfaces are clean and then torque the bolts to 70-75 lbs. ft. There are approximately five minutes of rear wheel toe-out adjusted at the factory on new, unladen vehicles. However, the suspension's design causes toe-out to increase somewhat as the wheels move toward zero camber. If zero camber is your target, then the toe-out should be decreased somewhat. Moving the axle forward on the radius arm one-half millimeter will reduce toe-out by approximately four minutes. Since toe-out again becomes less as the wheel moves upward into the negative camber range, a change of toe-out is not needed for cars being given negative camber.

So that's the story on decambering. Remember to mark everything, work carefully and count the spline notches accurately. If you do, you'll obtain just as fine a decambering job as is possible in any VW shop. •

HI-PERFORMANCE

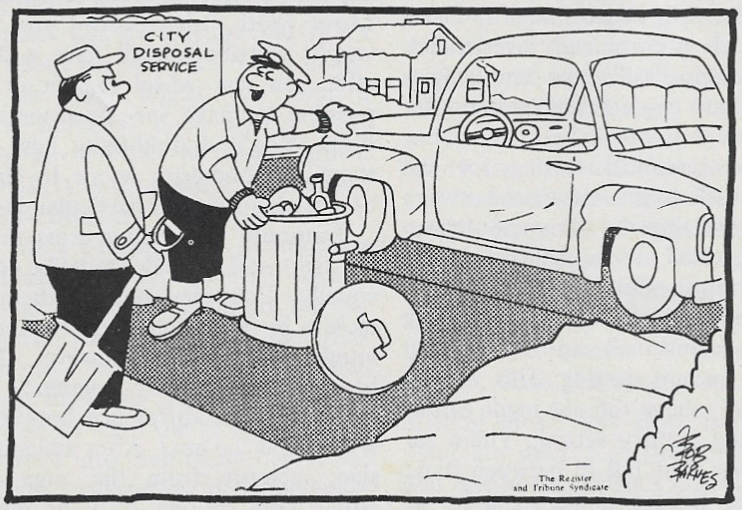
(Continued from Page 45)

and final positive wave, to occur at the exact instant when the intake valve has started to open and the exhaust valve is about to slam shut. Ideally, you don't want to leave any burned gases and neither do you want to suck out any of the fresh mixture. Actually, a measure of both is bound to happen even in a high performance engine and engines as they come from the factory and are used on the street are downright sloppy, relatively speaking.

And as you can imagine, this same basic problem is important in the control of emissions from street machines. These don't achieve combustion as complete as does a racing set-up and thus, extraction that is too efficient loads the atmosphere with partially burned hydrocarbons. Also, efficient extraction combined with valve overlap tends to pollute the air with unburned hydrocarbons. So, you can see why advances in emission control tend to be gained at the expense of performance.

In any case, I've tried to explain how a modern, tuned exhaust system can aid both scavenging and the induction of

THE BETTER HALF — By Bob Barnes



"Sorry, but we can't take THAT junk away until you break it up into smaller pieces."

the fresh charge, and the good systems can add as much as 10% to the performance of even a street machine with no other modifications. In any kind of serious competition, a tuned exhaust is a necessity.

Next month, we'll delve into the most exasperating facet of all and that is how to determine which exhaust system is best for your car. You'll find that there is no such thing as an exhaust system that gives maximum efficiency under every condition. A system set up for racing is likely to be inefficient on the street and vice-versa. There are, though, certain design parameters that are common to both and I'll show you how to calculate these. •

WORLD NEWS

(Continued from Page 9)

matter is now before the German Supreme Court. The argument is over the alledged failure of NSU to deliver 1968 models that met U.S. laws on emission controls and passenger safety. Lack of cars for a long period meant Transcontinental couldn't supply its dealers and distribution was subsequently taken over, again alledgedly in an illegal manner, by NSU. Other litigation, still unsettled, is a $15 million suit by Transcontinental against NSU in U.S. courts.

* Standard Oil Company of California has developed a gasoline called F-310 which it claims will keep smog devices working at their original efficiency and reduce by 50% the emission of unburned hydrocarbons. Gasoline sold in the Los Angeles and Hawaii areas contained the additive as of last January and ultimately its use will spread to the entire 40-state Chevron marketing area.

* Simca has joined Matra in an agreement providing for technical cooperation in the further development of Formula I racing cars. Matra won this year's Formula I championship with Ford power and since Simca has no competitive engines of its own, the agreement leads to speculation that Matra will turn to U.S. Chrysler Corp. powerplants. If nothing else, this would spark further interest and competition on the European racing scene. •

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COMMENTARY

(Continued from Page 6)

adjustment is setting the push buttons to the local stations of your preference. The first step is to pull the left hand button out past its neutral setting. You then tune in the station you want on the far left of the dial and push the button back into its neutral position. This operation is repeated as many times as there are buttons, always keeping the selected stations in sequence to save unnecessary wear on the tuning mechanism.

Another basic adjustment is trimming the antenna. This must be done anytime the radio and antenna are separated from one another and also, retrimming is often the cure for progressively weaker reception. On factory-installed radios in their usually inaccessible locations, the trimming screw is most often found under the tuning knob. On others, you'll find it on the side of the receiver.

First let the radio play for about 15 minutes to warm it and then set the antenna to a position between 30 and 40 inches high. Select a weak but clear station as close as possible to 1400 kc and turn the trimming screw in small increments, progressively in both directions, until the strongest signal is received. Replace the tuning knob and the job is done until the next time the receiver or antenna is disturbed.

Capacitors to suppress interference are normally connected to the alternator or generator, the "B" terminal of the ignition coil, the voltage regulator, the fuse block and sometimes certain power accessories. Capacitors look like small size flashlight batteries without a case. A defective capacitor will cause a buzzing noise that rises and falls in pitch with the speed of the motor or the accessory. It's usually time-saving to replace all of them rather than locate the individual offender but first check your ignition wiring. Worn, grease coated wires produce a similar noise in the radio.

If the static occurs only when the car is moving, the likely cause is either the front wheels or in one or more tires. If the static stops on a smooth road when you drag the brakes, the front wheels are the culprit. If it continues under these conditions, a tire or tires are causing it with the exception that similar symptoms are sometimes produced when the little ball on the top of the antenna is lost. A special dust cap and collector spring for the front wheel are available from car dealers. Radio stores carry a powder to prevent tire static which must be injected into the tire with a special gun.

Sudden, harsh static when you hit a bump may be caused by a loose antenna mounting. This is easily tightened from outside the car but be careful not to crimp the insulator that keeps the antenna from contacting the sheetmetal of the car. Should you lose an antenna from vandalism you can fashion a temporary replacement from a wire coat hanger or brass curtain rod.

Don MacDonald

Not for sale . . .See "Scrapbook" page 54.

READER'S FORUM

(Continued from Page 7)

gasoline. Unless you want to compete on the drag strip, you'd be paying a lot of extra hard-earned dough for that R/T emblem. You can get most of the trim goodies as accessories on the Super Bee which has the top 383 engine (335-hp vs. 390 for the Magnum) as standard equipment.

Small Engines and Pollution

Sirs: With all the concern over the part motor vehicles play in air pollution, I'm surprised Ralph Nader doesn't plug for automobiles with small engines. It would seem that a 100-CID engine would pump less pollution into the atmosphere than a 350-CID engine.

H.F. Hopkins
Rangely, Colo.

All things being equal small engines have a sweeter breath. However, if the small engine has to reciprocate 3.5 times faster than the big one to do the same job, the exhaust contribution evens out. Looked at another way, if the big engine goes 3.5 times as far for a given period, its contribution of pollutants is spread out over that much more area and parts per million is the yardstick in use.

Technical Library

Sirs: I've been a reader of your magazine off and on for eight years and it has been extremely informative. Now, though, I have a need for this information and I can't find the back issues I thought I'd so carefully saved. Do you have a compilation of this technical material under separate cover?

Al Satkus
Ventnor, N.J.

We are presently preparing a list of back issues available, indexed as to content, and we'll print it as soon as possible. ●

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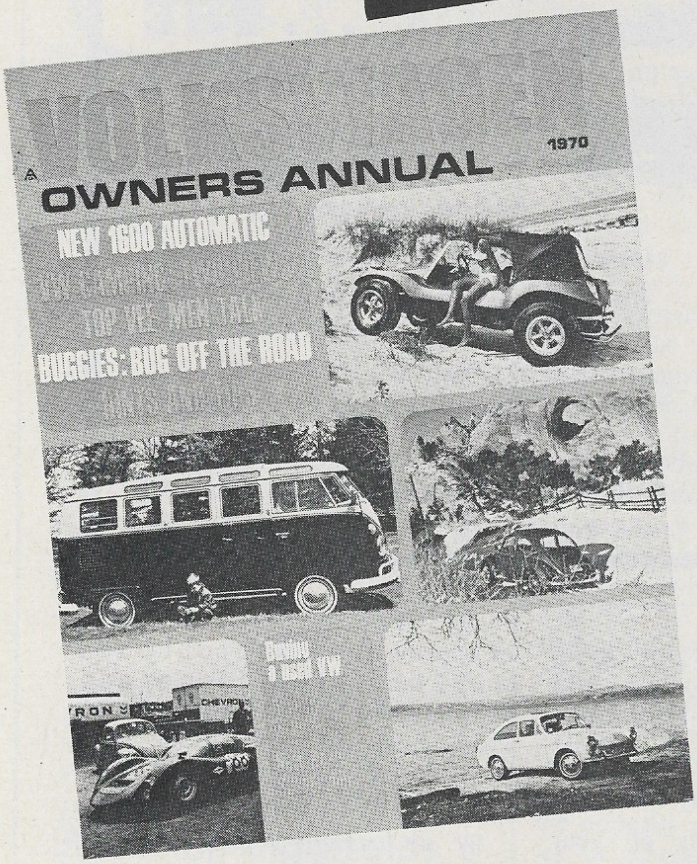

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1928 DeSoto – The car illustrated was No. 15 off the DeSoto production line and the first roadster built. Engine is a 3.2 liter flat-head six but most body and chassis components were interchangeable with other Chrysler Corp. cars then in the family. This car was restored is still owned by Chrysler-Plymouth Division. Your editor kept and maintained it in parade condition for several years when he was a resident of Grosse Pointe, Michigan. Totally reliable mechanically, the only problems were chronic warping of the wood-spoke wheels and minor splitting of the bodywork at the top of the rumble-seat cutout.

Photo by Roy Bash.

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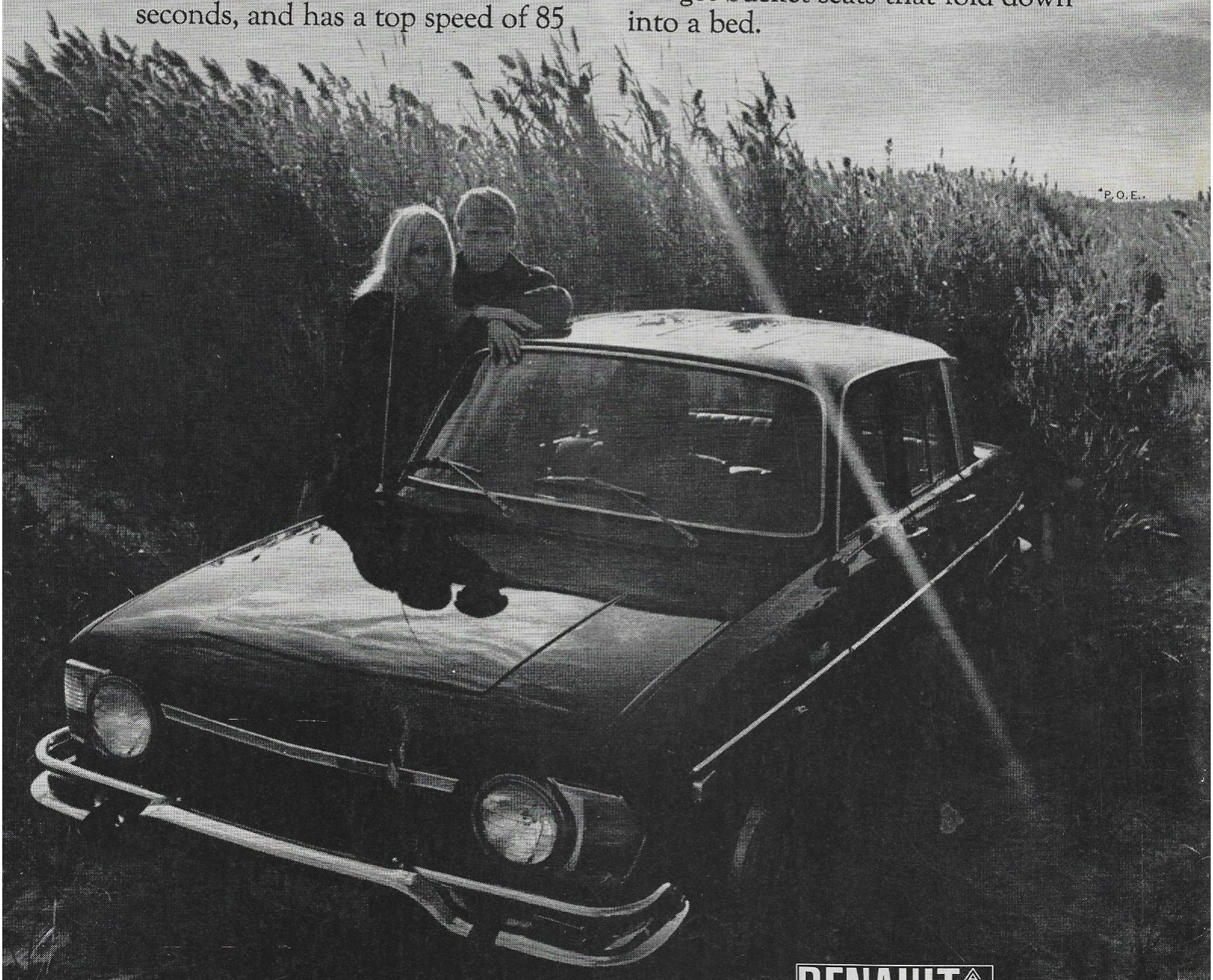

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