



## **PORSCHE** **Re-Introduces the** **Sports Car**

The arrival of the spectacular front-engine 4.5-liter V-8 928 makes one thing immediately clear: Suddenly, a lot of very famous sports cars look very obsolete.

BY DAVID E. DAVIS, JR., L.J.K. SETRIGHT AND BROCK YATES



Messrs. Davis, Setright and Yates sample the newest product of Porsche's guts and Gemütlichkeit. Was Goethe an engineer?



**Davis:** We drove the cars on Saturday morning. Stepping out into the courtyard at the Mas d'Artigny, high above Nice, we could peer out through the gate to the parking lot and see a whole bouquet of gleaming Porsche 928s awaiting our pleasure. Sun shining, temperature about 45 degrees Fahrenheit, a perfect day to drive the most spectacular production car to come along in ten years.

Most of the cars arrayed before us were white, but there were just enough reds and dark metallic blues (like our cover car) to provide contrast and dramatize the stunning effect of the white ones. I'd already climbed all over the car they'd had on display the night before in the hotel conference room, but sitting in that navy-and-olive-checked seat, knowing that I was about to fire it up and drive it away, put my old adrenal glands on full red alert. There doesn't seem to be anything ordinary or commonplace on the whole car.

The instrument panel is adjustable in concert with the steering column. Release the flat latch on the column's underside and the whole steering wheel/instrument cluster can be raised or lowered to suit your demands. Since the height adjustment precludes an adjustment for reach, the pedals can be moved. All this, plus the range of seat adjustment, makes it almost impossible to be uncomfortable in the 928.

As I sat there fiddling with the controls and waiting for Yates to join me, 928 project engineer Helmut Flegl squatted at my elbow and said, "Put it in first." I swung the lever over to the left and pushed it straight ahead. "Put it in first," he said again. So I came back to neutral,

reflected for a moment, then put it back where I'd had it in the first place. "That's *second*, put it in *first!*" Oh god, I haven't even started the engine and I've already made a fool of myself. First in the all-new Porsche five-speed is down and to the left, in the same plane as reverse. This makes it possible for the gears most often used to lie in the conventional H-pattern we all know and love. It makes perfect sense, once you're told where first is. A Mercedes-Benz three-speed automatic built to Porsche specifications will be offered as an alternative, though none was available for us to try out at the introduction.

We were to drive a 108-mile loop that took us from our hotel at Vence, west through the hills overlooking the French Riviera to Grasse, thence to Draguignan and back to home base via the Autoroute. The first leg was mine, and Yates immediately began to get carsick. We tried to deal with the problem via the vents, but the ventilating system just wasn't up to the job, so we were forced to make the whole run with the windows cracked open. Yates's malady was traced to the unpleasant smell of undercoating that seemed to permeate our car. The inability of the ventilation system to deal with it was unforgivable. Any American car, any BMW 320i would have kept the air inside fresh and odor-free.

We began our drive by getting lost. After screaming past the same bemused villagers from several different directions, we spotted a sign for Grasse and we were on our way. The flexibility of the car's all-aluminum V-8 is remarkable, and we found that three gears would be

quite ample to transmit all that power under any circumstance. The five-speed box is really a cosmetic device in this car, so willing is the engine. The 928 is the most stable and reassuring Porsche I have ever driven. Coming off a rough corner in any intermediate gear, at any point in the mid-rev range, you just open the throttle and the sensation is like that of dialing up a rheostat. More and more and faster and faster, change up, the process repeats itself, and so on until the trees are all blurred and the kilometer stones seem to be coming by every ten seconds. The car never hints that this awesome display of advanced vehicle dynamics is anything out of the ordinary. A driver's car, unquestionably, but a very civilized touring car at the same time. Yates says that the 928 is the fulfillment of an old enthusiast's dream—the sports-racing car tamed for use on the street—and he's right.

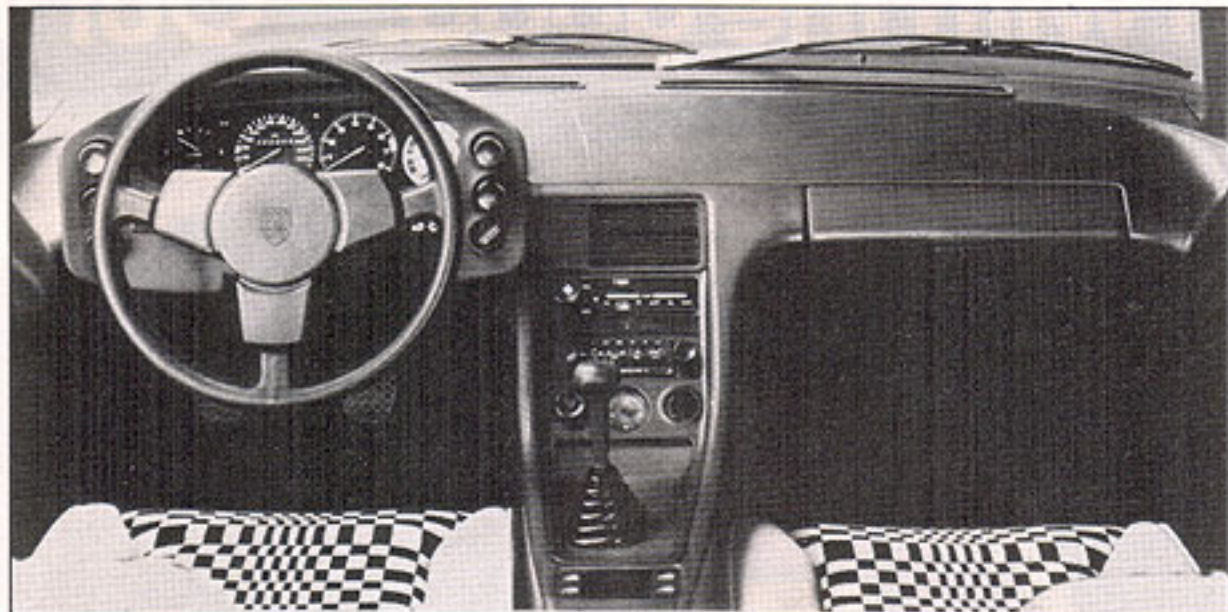
**Setright:** *The Dynamics of the Idea.* The late Dr. Ferdinand Porsche pursued, as a car designer, a retrogressive career. He began as the first protagonist of front-wheel drive, when working for Lohner. He proceeded, or perhaps receded, by designing for Mercedes-Benz some front-engine, rear-wheel-drive cars of some historical and considerable aesthetic importance. Finally he made his name inseparably linked with cars whose rear wheels were driven by engines immediately in front of, or behind, them. In the Grand Prix racing cars he proposed for Auto Union, the otiose weight of a propeller shaft and its infringement upon the ideal location of the driver (and hence upon either the frontal area or the transmission efficiency of the



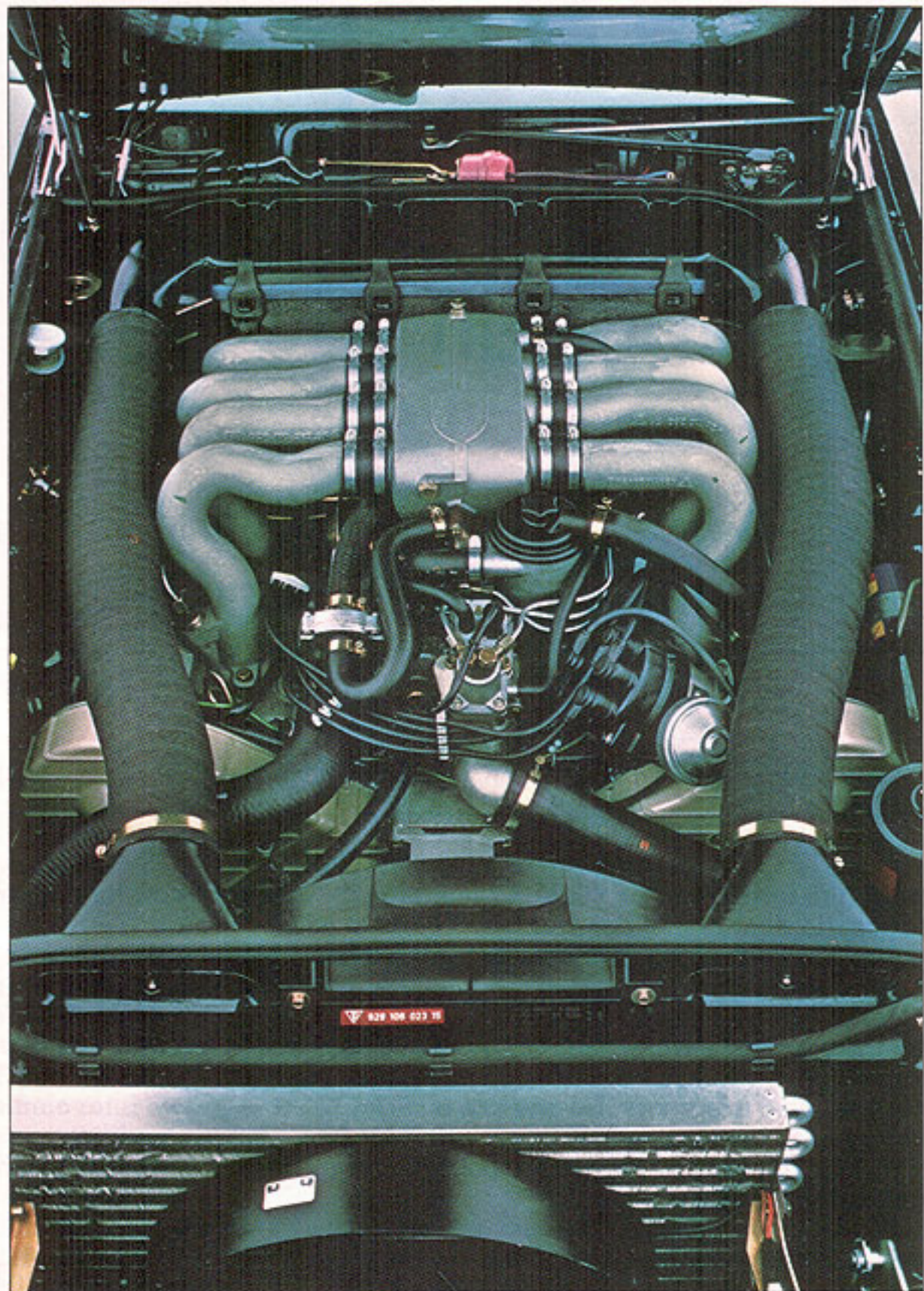
car) combined with the superior traction given by the greater load on the rear tires of the inherently tail-heavy car to give it a theoretical advantage in performance over the then-more conventional rivals, although the solecisms of his independent suspension made that advantage always difficult and often impossible to realize in practice. In the people's car that he created for the KdF (*Kraft durch Freude*: Strength through Joy) movement, superior traction again constituted an attraction of driving in mountainous or agricultural country, and this combined with the advantages of mechanical simplicity and unrivalled manufacturing economy to make the tail-engine Volkswagen a similarly persuasive design. After the fall of Hitler (a customer whom he accorded surprisingly scant respect), the remembered glamour of the Auto Union and the revived availability of useful components from Volkswagen offered another persuasive combination, which led to a series of rear-engine sporting cars that have borne the name of Porsche with increasing distinction through all the years that have followed. No such arguments, neither the exigencies of racing nor the constraints of humble circumstances, could prevail upon his successors in title when they conceived the 928 as a materially new answer to a notionally old question.

In a car weighing 3200 pounds, a modest length of Cardan shaft is not an insupportable burden. In a car putting 1.2 square feet of tractive rubber firmly in contact with the road, there is no need to pile a quarter of a ton of engine on top of them to amplify a grip that is already sufficient. In a car whose occupants, sitting side by side, may be presumed to require more elbow and shoulder room than they need at pelvic level, the separation of their seat cushions by a drive-shaft tunnel has no effect upon the frontal area of the car, nor much effect on the sociability of its passengers.

On the contrary, the 928 has been made as a dynamic dumbbell, with its major masses disposed at its extremities to give it a high polar moment of inertia. The effect of this has been exaggerated by an admittedly deliberate attempt to keep the wheelbase short, an attempt so successful that the overall length of the car is 78-percent greater than the length of the wheelbase. Porsche may come in time to regret this piling of Tedium upon Ossian, for it has an unnecessarily cramping effect upon the room in

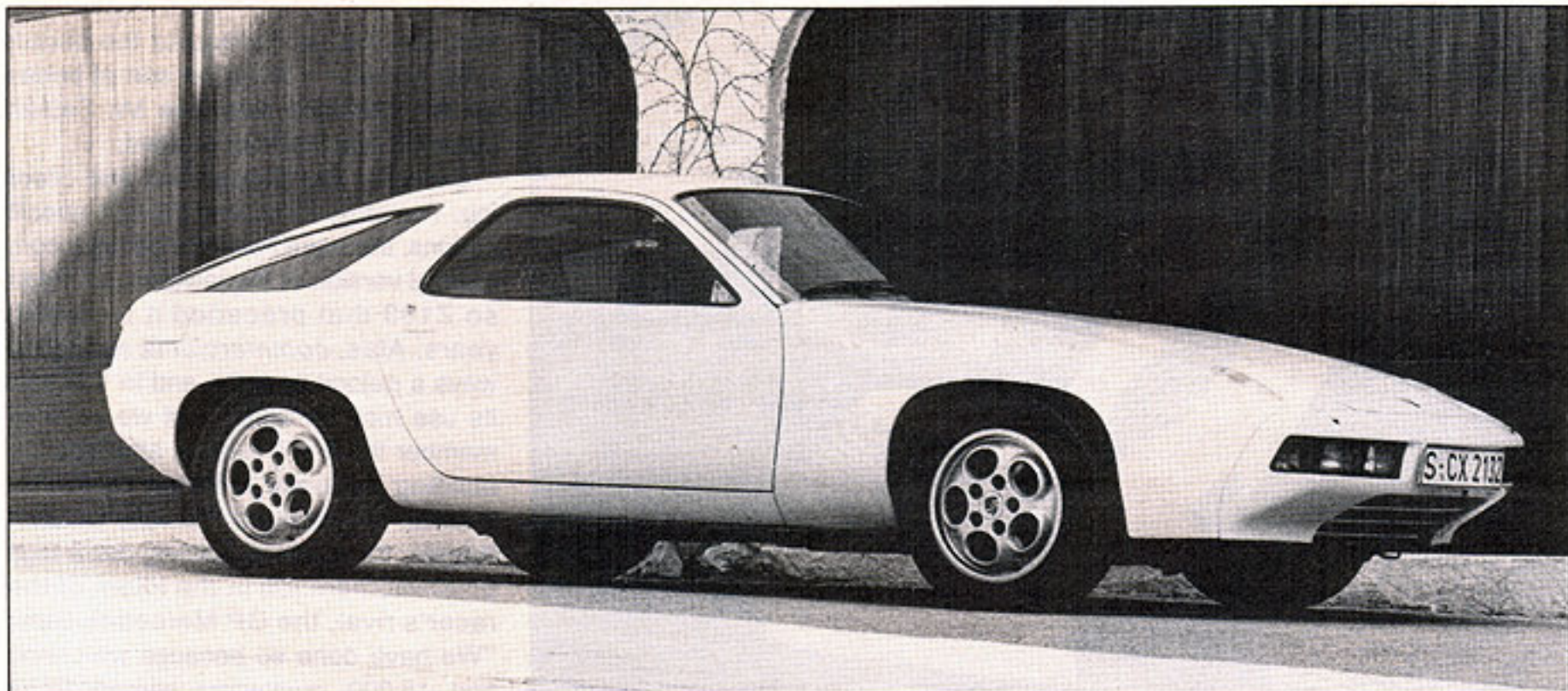


*Yates: I can't remember driving a car with more perfect ergonomics. The steering wheel and instrument pod adjust as a unit, and the pedals can be moved to accommodate the short. The engine is gorgeous—the best possible marriage of German and American technical acumen. There's torque all over the place, and it stays smooth all the way to the 6300 rpm redline.*



KEN OSBURN





*Yates: I'd seen the 928 in a number of preview pictures and quite frankly had been less than staggered by its apparently common styling. Then I spotted my first 928 in the flesh in the courtyard of the hotel and was completely staggered by its aggressive, organic contours. The wide, low, space-age shape is unadorned by external trim of any kind, but the sixteen-inch wheels create perfect accents. Superb style.*

the posterior seats: It would have done little behavioral harm and much spatial good had the whole apparatus been stretched by a few inches inserted between the axles. The car is only fourteen feet, eight inches long, the same as a Lotus Elite; if it grew another four inches it would still be a foot shorter than a Jaguar XJ-S. However that may be, it seems that Porsche recognized that it was going to build a car with uncommonly good responses and that, if an ordinary driver's capabilities were not to be unreasonably strained, it would be advisable to exploit a fairly high polar moment to mollify the twitchiness that they would otherwise have expected.

A high polar moment of inertia is not altogether a good thing. Its advantages have been sought in the yawing plane where it makes no small contribution to directional stability. All too frequently overlooked (remember the MGC?) is its effect in the pitching plane, where the high-pitch frequency and small-pitch amplitude of a rear-engine or mid-engine car (or indeed any other with a low polar moment of inertia) is altogether preferable. Yet if these two pitch factors can be separated, the picture may be changed: A low-pitch frequency can be more restful, provided that the pitch amplitude is not suffered to grow correspondingly larger as it would if uncorrected. The means of correction are a commonplace of modern suspension design: By geometrical artifices that resist tail-squat in acceleration and nose-dive in braking, the detrimental habits of

a short-wheelbase car with a high polar moment of inertia can be eradicated, leaving the advantages unobscured.

Even more important than the polar moments of such a car is the position of its center of gravity, which in the 928 is located ideally at mid-wheelbase. The weight distribution of a rear-engine car is inimical to that first-class adhesion for the front wheels that is particularly important in a fast car. This would be most apparent when the car was in the accel-



*Yates: You'd expect German captains of industry to be Junkers-stiff, but like Dr. Zahn at Mercedes-Benz, Porsche's Dr. Fuhrmann is a warm, wryly humorous man who loves cars.*

eration mode, when the opposition of its great tractive effort at the rear wheels and the inertia of the car's mass acting through its center of gravity would produce a transfer of load onto the rear wheels and off those at the front. This transfer is sufficient in a front-engine but well-balanced car such as the 928 to insure an adequate coefficient of friction between the rear tires and the road so as to permit full-power acceleration without wheelspin. It would be a mistake to suppose that its needs are extravagant: Capable of accelerating from standstill to 62 mph at an average rate of 0.42 G, the 928 will not exceed a peak instantaneous rate of 0.77 G in bottom gear.

The value of weight transfer on the front tires is greater in braking, where again the adhesion between the tires and the road increases in proportion to the vertical load on the tires. Even when the car is merely in the overrun condition, this forward load transfer is significant, though its magnitude is naturally less; but the concatenation of Pirelli P7 tires, anti-dive suspension and beautifully judged balance makes it feasible that on a suitable surface a rate of retardation of 1.2 G might be reached, and this may informatively be compared with the rate of acceleration already quoted.

There is a further disadvantage common to tail-heavy cars that the balance and morphology of the 928 naturally combat. In a well-streamlined car (and it is inconceivable that Porsche should produce any other), the aerodynamic center of pressure moves forward as the





**Yates:** The Purina Checkerboard Square seat coverings may seem a trifle outre in pictures, but the selection of color tones and comfortable fabrics makes them very appealing in reality. And unlike numerous so-called 2+2s, the 928's rear seats will accommodate a pair of adults.

speed increases: Should it move ahead of the center of gravity, the car becomes directionally unstable. There are sundry body-shaping tricks that can serve in mitigation, but most of them look ugly or increase drag if not both.

**Davis:** As Yates began to feel better with the windows open and I became accustomed to the 928, we began to hurry. The power steering is a Porsche design, using a special Bosch pump, and its boost eases off as the speed increases.

It is about as good as any power-assisted steering we have ever driven. The car behaves itself even when driven by an over-enthusiastic editor/publisher fresh from America's polite traffic and boring speed limits. Only once did it stumble, and then I couldn't get it to repeat its mistake. Yates got out to take some pictures, and I was manfully tossing around the selected corner, lifting abruptly as I got past his position on the roadside. Once, not quite off the corner, I lifted my

foot and the tail jumped to the outside quite abruptly; exactly the sort of behavior the Weissach axle (see Mr. Setright below) is supposed to prevent.

**Setright:** *The Suspension and Steering.* The more I examine the 928 specifications, the more I see the car as a commercial version of the jeweled Pegaso Z103 that preceded it by twenty years. Alas, *commercial* is almost always a pejorative term, and in this case its use may be unfair. Yet we must remember the firm's reason, after years of building low-polar-moment cars in the tradition of the Grand Prix Auto Union P-Wagen, for suddenly turning out a high-polar-moment job in the idiom of that racer's rival, the GP Mercedes-Benz: "We have done so because we cannot find 15,000 customers named Bernd Rosemeyer!" In other words, it is better for Porsche to perform a *volte face* in the showroom than for a customer to do one on the road.

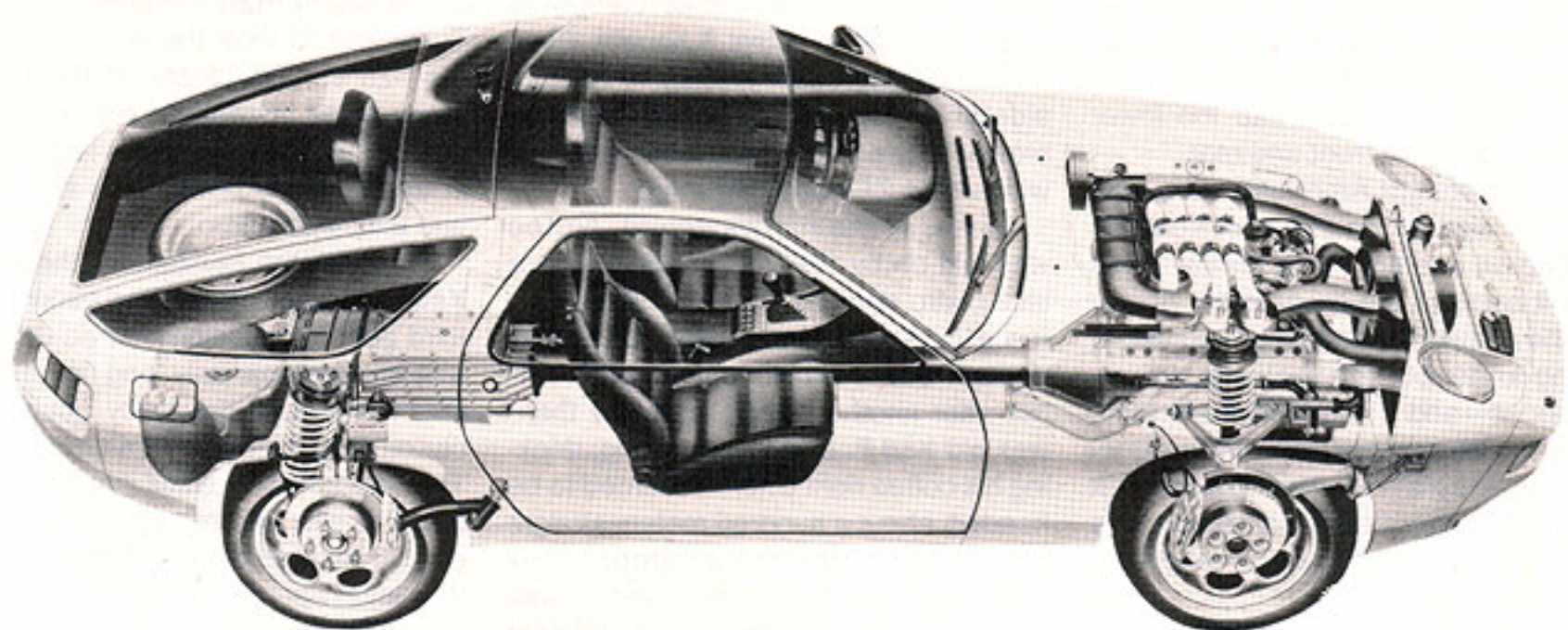
Nor would it find so many ready to pay dearly for something as severe as the Pegaso. If anything distinguishes the modern sporting car from the old-fashioned sort (and on the evidence of these two cars, there cannot be much), it must be the compliance that is built into the modern one to insulate it and its occupants from the lively tattoo of the tires beating on the road surface. Today's radial is a snare drum, from which every flam and paradiddle is transmitted to the



**Yates:** Suddenly, either by accident or well-choreographed plan, a 911 appeared beside a 928 in the covered entranceway of our hotel in Nice. The presence of the new car overwhelmed the narrow, rather tall, elder machine and made it seem almost quaint and antique. But take heart, Purists: Despite its age, the 911 will remain in the lineup with the 928. It will serve as an intermediately priced vehicle between the 924 and 928 for at least four or five years. And, although the new car resembles the 924, it actually came first. Darwinism prevails.



# PORSCHE 928



**Importer:** Porsche-Audi Division  
Volkswagen of America  
Englewood Cliffs, New Jersey 07632

**Vehicle type:** front-engine, rear-wheel-drive, 2+2-passenger coupe

**Price as tested:** \$23,000 (approx)

#### ENGINE

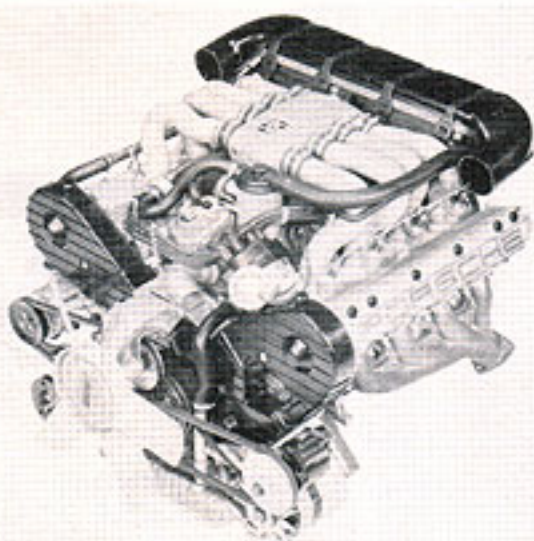
Type: V-8, water-cooled, aluminum block and heads, 5 main bearings

Bore x stroke ..... 3.74 x 3.11 in, 95.0 x 78.9mm  
Displacement ..... 273 cu in, 4474cc  
Compression ratio ..... 8.5 to one  
Carburetion ..... Bosch K-Jetronic fuel injection  
Valve gear ..... belt-driven overhead cam  
Power (DIN) ..... 240 bhp @ 5250 rpm  
Torque (DIN net) ..... 268 lbs-ft @ 3600 rpm  
Specific power output ..... 0.88 bhp/cu in, 53.6 bhp/liter  
Max. recommended engine speed ..... 6300 rpm

#### DRIVETRAIN

Transmission ..... 5-speed, all-synchromatic  
Final drive ratio ..... 2.75 to one

Gear	Ratio	Mph/1000 rpm	Max. test speed
I	3.60	7.4	47 mph (6300 rpm)
II	2.47	10.7	67 mph (6300 rpm)
III	1.82	14.6	92 mph (6300 rpm)
IV	1.34	19.8	125 mph (6300 rpm)
V	1.00	26.5	140 mph (5300 rpm)



**PERFORMANCE** (factory data)

Zero to	Seconds
62 mph	6.8
100 mph	13.5
Top speed (estimated)	140 mph

#### DIMENSIONS AND CAPACITIES

Wheelbase ..... 98.4 in  
Track, F/R ..... 60.8/59.6 in  
Length ..... 175.0 in  
Width ..... 72.3 in  
Height ..... 51.7 in  
Curb weight ..... 3197 lbs  
Battery capacity ..... 12 volts, 66 amp-hr  
Alternator capacity ..... 925 watts  
Fuel capacity ..... 22.7 gal  
Oil capacity ..... 6.9 qts  
Water capacity ..... 16.9 qts

#### SUSPENSION

F: ..... ind, unequal-length control arms, coil springs, anti-sway bar  
R: ..... ind, unequal-length control arms, coil springs, anti-sway bar

#### STEERING

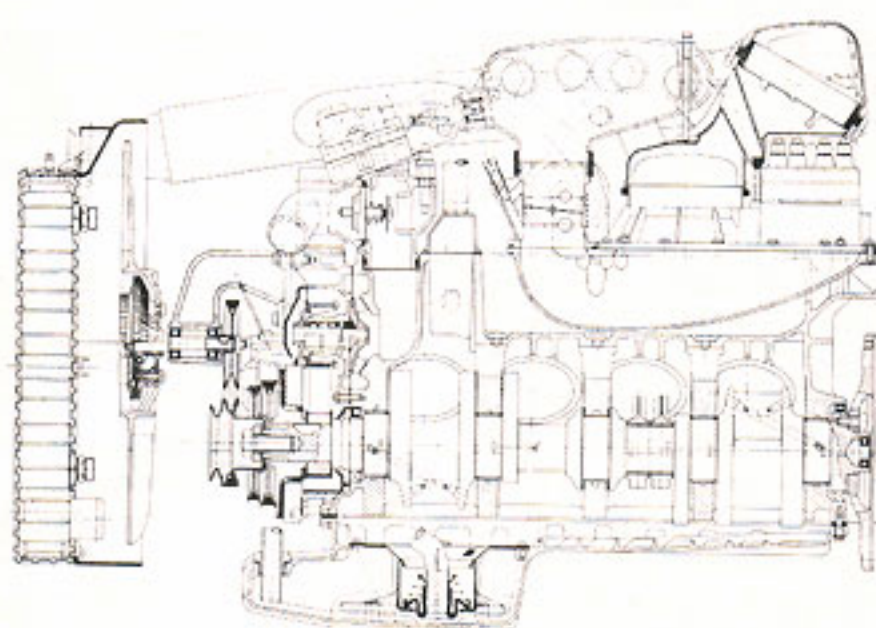
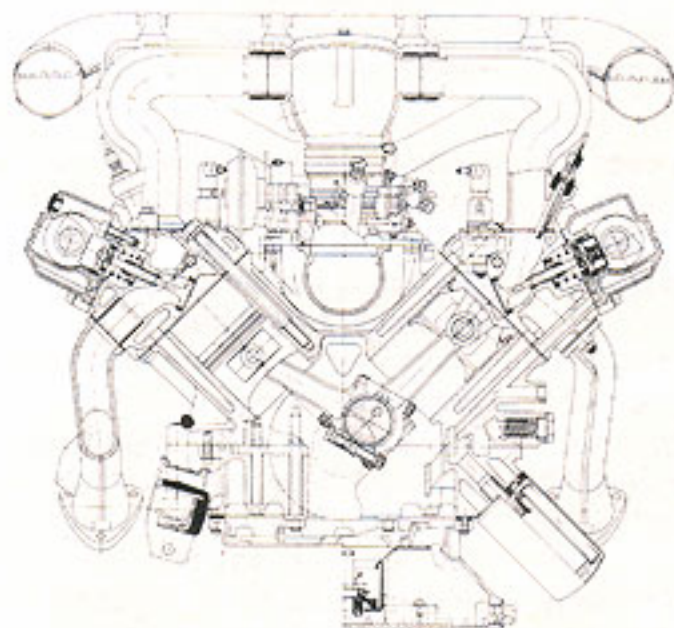
Type ..... rack and pinion, power-assisted

#### BRAKES

F: ..... ventilated disc, power-assisted  
R: ..... ventilated disc, power-assisted

#### WHEELS AND TIRES

Wheel size ..... 7.0 x 16-in  
Wheel type ..... cast-aluminum alloy, 5-bolt  
Tire make and size ..... Pirelli P7, 225/50VR-16  
Tire type ..... steel-belted radial ply, tubeless



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car's structure through the most direct route, which is the suspension linkage. Some resilience is necessary in its joints if the vibrations are to be mollified; in particular, the Pirelli P7 needs longitudinal compliance to soften the exceptional longitudinal stiffness of its belts. This degree of freedom is built into the lower wishbone pivots at front and rear.

Porsche sought American advice on the translation of the 928 specifications into English and got into a terrible mess when it came to the suspension. Somehow the company was tricked into talk of trailing arms, but the reality is double wishbones—and if you dislike the term, would you be any happier with the kinematic engineers' "four-bar linkage"? It might mean more than Porsche's new term for its rear suspension, called the Weissach axle.

Weissach is the place where they have a test track, and there is no axle. There is just a four-bar linkage, but the lower bar is wishbone-shaped and pivots about a diagonal axis on elastic bushes. These suffer axial compression when the wheels are driving the car; on the overrun, they extend themselves again and thus give the rear wheels a measure of toe-out. It happens in lots of cars, especially in the 911: Lift-off oversteer has become the handling hazard supreme. A study of cornering accidents revealed that most of the cars involved ended their gyrations *inside* the corner: Each driver thought he was going too fast and naturally lifted his foot from the accelerator pedal, producing a sharp nosing into the corner that only made his predicament seem more acute. In the 928, the cure is another degree of freedom in the front pivot of the rear bottom wishbone: As movement in one (induced by variations in tractive or braking thrust) tends to toe the wheel outwards, similarly induced movement in the other toes it commensurately inwards. The result is as near to neutrality or insensitivity to throttle as is possible in a short-wheelbase car with a great potential for longitudinal load transfer. The transfer might be more remarked were it not for the anti-dive geometry of the front suspension and the anti-squat at the rear. In both cases it is of the inertial type, which does not interfere so much with steering geometry—and in the 928 it would be bad otherwise. The negative scrub radius of the steering demands that castor be reduced to a minimum, because its jacking effect as the wheel is turned is aggravated by the king-pin inclination,

instead of being reduced by it as in conventional steering geometry. Porsche has been unable to cram the entire length of the kingpost inside the wheel, so it has to be tilted rather steeply to give the negative offset it sought. Even so, the jacking effect is likely to be considerable: Unwinding lock when going slowly in the 928 would be hard work without the ZF power steering.

**Davis:** At the halfway point, coffee was laid on by the Porsche people in a little bistro near St. Cezaire. I was rushing along at a great rate, charging through one downhill second-gear corner after another, when suddenly there was old Karl E. Ludvigsen, sitting, drinking his coffee right where I seemed to be headed, about a hundred meters straight ahead. It was the coffee stop. Yates shouted, I went for first gear and braked quite sharply into the parking lot past

est things about a completely new design is the fact that we can do it right. Spoilers and wheel flares simply show that the engine and suspension have become faster than the shape. The 911 Turbo *has* to look the way it does, but the 928 can be clean—at least until it starts going faster." To prove his point, the 928 is only fractionally less efficient in aerodynamic terms than the winged and spoiled Turbo.

To prove the flexibility of the engine, Yates managed to exit the parking lot in third gear, mentioning that he thought it was an extraordinarily long first. I waited until I was sure the fancy double-plate clutch would hold before commenting. The undercoating smell got to me a bit too, but like an enthusiastic traveling dog, I breathed deeply at the open window and kept myself well. Yates thought the clutch was spongy and slow in re-



**Yates:** Tony Lapine, on the left (with David E. Davis, Jr.), is the man who created the 928 shape. Unlike so many high-performance automobiles, the 928 needs only a small chin spoiler at the front (although a faster, turbocharged version will need more aerodynamic aids). Thankfully, the high-style plastic nose will meet U.S. bumper standards without awful alternatives.

Ludvigsen, who watched coolly over the edge of his espresso cup. As we disembarked, he ambled down and allowed as how ours was the most spectacular arrival so far.

Looking at the test cars in the parking lot, perched on the edge of a deep gorge complete with a mountain stream rushing below at full chat, we couldn't help being impressed with the "rightness" of the design. The absence of wheel flares and spoilers is especially welcome. The night before, designer Tony Lapine had said, "One of the nic-

est things about a completely new design is the fact that we can do it right. Spoilers and wheel flares simply show that the engine and suspension have become faster than the shape. The 911 Turbo *has* to look the way it does, but the 928 can be clean—at least until it starts going faster." To prove his point, the 928 is only fractionally less efficient in aerodynamic terms than the winged and spoiled Turbo.

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ists going by in reverse, a film run backwards. I maintained some semblance of courage by doing a running parody of French CB, if there was any: "'Ay Beavair, een zat Deux Cheveau four-wheeler, what's you 'andle, come back? You got eet copy of me zair, Beavair? Zees eez zee Ugly American, headed for zat Nice-town. 'Ow she look ovair you shoulder, keed?'" Yates didn't even notice my forced jollity. He just blew off everybody in southern France.

**Setright:** *The Engine.* Six years have passed since Mr. Jackson of Petrol Injection Ltd., realizing the shortcomings of all fuel-injection systems including his own Tecalemit-Jackson apparatus, created a new one in which a pair of butterflies in series created a constant-depression metering chamber so that at long last the mass air flow could be directly measured instead of being indirectly (and inaccurately) inferred. Thereafter, an impressively short interval was allowed to pass by Bosch before it produced its own clumsier but equally efficacious version. Since that time, the Bosch K-Jetronic injection system has been an enormous success, and it comes as no surprise to find Bosch dominating the scene in the engine compartment of the new P-Wagen. Very modern and European it makes it look; but let us look back a few more years.

Sixteen years, at least, have passed since Chrysler devised a formula whereby to calculate the length of intake ducts that would insure the greatest ramplification of the engine's volumetric efficiency at the desired speed for maximum torque. The length of each of the eight ram pipes feeding the Porsche 928's inlet ports accords with that formula, to set the peak of the torque curve at 3600 rpm, when it renders 267.6 foot-pounds, corresponding to a brake mean-effective pressure of 149 pounds per square inch.

European and American engineering are blended well in the 928 motor, surely the nearest thing yet seen to a mid-Atlantic engine. It is a 90-degree V-8 with a two-plane crankshaft, zero-lash hydraulic tappets and parallel valves arranged in line to open into cuneiform combustion chambers allowing a modest inlet-valve area approaching nineteen percent of the piston area. Mostly Michigan, so far, but each row of valves is surmounted by an overhead camshaft, driven by a toothed nylon belt (the longest yet), and the heads are clamped down by long shear-relieved resilient studs



**Yates:** Headlights are designed for ease of cleaning and for simplified activation.

seated at the bottoms of the cylinders. Aping a current European fad, the entire engine from heads to sump is a stacked-up sandwich of light-alloy die castings, the cylinder block being of the open-deck style that always makes for good coolant flow but sometimes creates sealing problems. The Western influence shows in the material of the block: It is the high-silicon Reynolds 930 alloy that permits the relief-etched bores to be unlined, given suitably coated pistons.

Another fashion enjoying some currency among European engine-men is for the crankcase to be split along the plane of the main bearings' axis, the nether half taking the form of a ladder or crate embodying all the main bearing caps. The idea is to improve the rigidity of the crankshaft's support, but it is a poor way of holding the base of the block in shape. Chrysler's system of deep skirts embracing caps that are bolted up and across but not through (a vital distinction seldom appreciated in Europe) has more to commend it, but Porsche (probably for production convenience) has chosen the latter and suffered for it: An oil-pressure relief gallery had to be introduced before the thing would remain weep-free, despite the miracle-of-modern-science plastic gasket that alone was thought capable of perfectly sealing the joint. *Es irrt der Mensch so lang er streht* (Man errs so long as he strives): Goethe must have known a thing or two about engineering.

So did Ts'ai-ken t'an, the Taoist who wrote: "The stillness in stillness is not the real stillness. Only when there is still-

ness in movement can the spiritual rhythm appear." We may scarcely doubt that he was referring to the balancing of the inertia forces in an engine: When the pistons assume a momentary stillness at top or bottom of the stroke, primary inertia forces reach their maxima but are easily counterweighted by a two-plane V-8 crankshaft, whereas the secondary forces due to connecting-rod angularity reach their greatest values at about mid-stroke, when piston acceleration is fiercest. The problem can be eased by making the rods as long as possible (if they were infinitely long, the problem would disappear); but long rods make a V-8 both tall and wide. Porsche makes the conrods of the 928 a little shorter than the conventional length between centers, which is twice the stroke: At 1.92 times, they result in the piston acceleration at maximum safe engine speed (6300 rpm) reaching 70,980 feet per second. Thus the wrist pin is burdened twice each revolution by a piston that bears on it with 2204 times its own static weight. The pin looks as though it can stand it, as it should—such loadings are about average for a modern engine. The rods themselves, though, are rather special, being made by sintering die-compacted steel powder, followed by a coining to improve the mechanical properties. It is a good process, resulting in rods that are lighter than forgings and stronger than castings.

A sensitive driver will never put them to the 2204 G test. With maximum power (240 hp) rendered at 5250 rpm and 133 pounds per square inch bmep, and with the gearbox ratios so closely and evenly spaced, there is little point in revving the 928 beyond 5700 or even 5500, and even less to be gained if the option of an automatic transmission is exercised. Even without the benefits of hydrokinetic conversion, the engine's full-throttle torque exceeds 81 percent of maximum all the way from 5600 down to 1500 rpm. Would it be mischievous to point out that the shape of its torque curve is very much like that of the old Chrysler Ramcharger?

**Davis:** After our drive, we had lunch with Tony Lapine and probably bored him with our boyish enthusiasm. Lapine is one of the good guys. I knew him in Detroit in 1953, when he was laboring at GM Styling and sports cars were slow. Funny that somebody who was just one of the guys around Detroit over twenty years ago would be sitting here with us in Nice, about to become no-fooling-

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honest-to-gosh famous when the 928 hits the streets.

After lunch I took a nap. When I awoke it was getting dark, and all the other guys had taken a bus to Monaco and then to dinner at some Mexican restaurant. I wandered into the bar and found one of the Porsche people who graciously suggested that I have dinner with his party instead. As it turned out, his party included Dr. Ernst Fuhrmann, the head man at Porsche, and my trip was made.

Dr. Fuhrmann is a feisty little gent, deceptively dove gray in color. His suit, his hair, his eyes all suggest a monochrome until he begins to speak. As he warms up, he begins to shift into the translucent grays and blues of an industrial diamond—flashing, sparkling, by turns ironic and comic. A very stimulating and entertaining dinner companion.

After the formalities were over and the first bottle of wine was two-thirds gone, he asked, "Why do Americans buy Porsches? They can't drive them as they are meant to be driven." I answered that even under America's Victorian speed laws, a Porsche was still a rewarding car to drive, that Americans treasured its

mechanical sophistication and respected its potential, even though they might never experience its performance at the absolute limit.

He then said, "It's not surprising that a car that is designed to be good at 230 kph would be good at 100. It would be very surprising if cars designed to be good at 100 kph could be good at 230. Our cars are not as they are because we are better engineers than General Motors. Our cars are as they are because Germany has no speed limits. If I was running General Motors or Ford, my cars would probably seem just as dumb as Estes's or Ford's. I run a small company with very few customers, and it is easy for me to look smart—only my risks are proportionately greater."

He warmed to his subject as we wrecked a perfect sea bass and ordered red wine for the cheese. "I design cars for a thousand people or so. I don't have to design cars for everybody. At Daimler-Benz or General Motors, I would have to listen to this one or that one: 'The car is too small; it is too big; old people won't like it; it must have four doors.' I am in an enviable position. If I don't like it, it won't get built.

"One man can design a car. A small group of men can design a car. But a large group of men will always design gray mice. I promise you that anyone who has owned a Turbo or a 928 for one year will never forget it. On the other hand, a man who has owned a gray mouse—no matter how good it is—will look back twenty years later and say to his wife, 'What was that car we had? It was a very good one, but I can't remember the name.'"

I asked Dr. Fuhrmann about Tony Lapine. He thought about my question for a moment, then grinned wickedly and said, "He is, of course, crazy. But that is my problem. One does not expect to ride a fine, spirited horse without some trouble. He is not your average citizen; he is one of the best and that will make anyone unusual."

This was the transition point. After reflecting on Tony Lapine for a moment, he was led to comment on the kind of company Porsche is. "We can bring a new design to market two years faster than Daimler-Benz. We can act out of simple conviction in a way that the giants cannot. For instance, we committed 200 million Deutschmarks to the 928



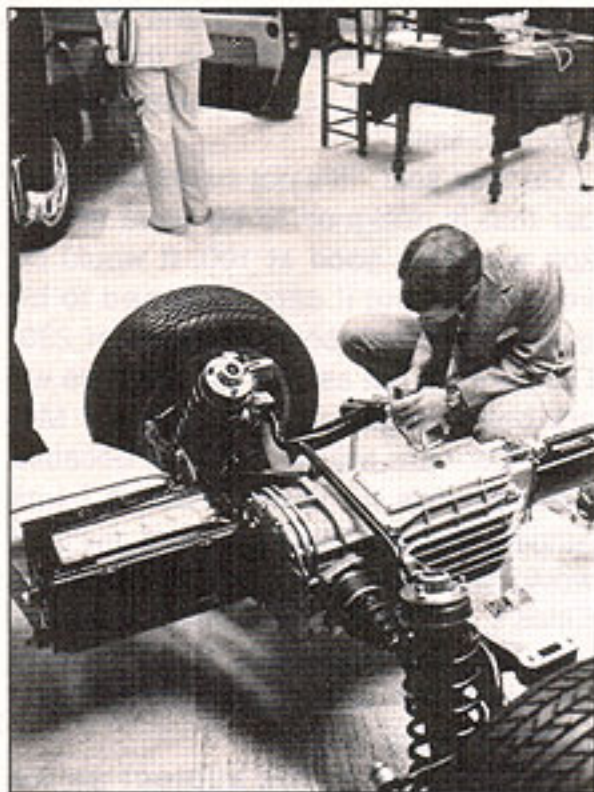
project in 1974—against annual sales of only 600 million. In 1974, mind you, when nobody would give you a penny for the future of the sports car. There was an energy crisis, a recession, and most of the people running car companies had—I don't know how to say this nicely in English—uh, brown in their underwear. But we went ahead. We couldn't look back.

"The 928 is not 'the car of the year.' It's a car for the Eighties, a car for the decade. We think it's the car of the future. The 911 is the end-product of twenty years' development. The 928 is only the beginning of a new era.

"In the old days, we developed our cars the hard way. We had no test track, no fancy instruments. We used the public roads and our own asses. Now we are much more sophisticated, with the most comprehensive facilities for research and development. But when it's time to make the decisions, we still have to drive the cars and trust our asses. There is no other way. How it feels is more important than what the instruments tell you.

"You know Zora Arkus-Duntov? He was very helpful to us in our early development. He drove for us at Le Mans, in the 1100cc class, and in those days our cars suffered from instability. He told us what was wrong. Not how to fix it, but at least what he knew the problem was. Years later, General Motors sent a Corvette Sting Ray, one of the first ones, over here for *Auto Motor und Sport* to test, and they said it was undrivable. Arkus-Duntov flew over to see what was wrong, and they all went to Hockenheim and ran on the short circuit there. Duntov drove the Corvette, and one of their editors drove an NSU Sport Prinz, about 1000cc, and they lapped him in fifteen laps. They couldn't tell him what was wrong, you see, but they did point out that his car had a problem. Maybe he learned something from that."

Now we left the dinner table and went to the bar, where I had a Williams pear brandy and he had a scotch. Swirling the scotch and its ice cubes, he said, "Speed is what automobiles are all about. If it wasn't so, we would walk. The government cannot legislate a value on speed, or any limitation of it. They cannot set our priorities for us . . . they don't know how fast I want to go or how soon I must be where I'm going. Speed has little to do with energy conservation. The United States has speed limits, and it wastes more gasoline than Germany



**Yates:** *The chassis at the press conference was a sculpture of castings and forgings.*

uses. Is that fair? No. Speed is what it's all about."

**Setright:** *The Transmission and Driveline.* Given the generous torque and the characteristic K-Jetronic flexibility of the 928, it makes sense for top gear to be direct-drive, that being the quietest and least consumptive. If it had no other virtue, the arrangement would at least preserve us from lots of ill-defined talk about whether a geared-up ratio actually constituted an overdrive; instead we can content ourselves with the knowledge that the highest gear of the 928 is a fairly long-striding one, such that at the 143 mph declared by Porsche to be conservative maximum speed, the crankshaft is turning 5400 revolutions to the minute. The four lower ratios are all indirect and are beautifully close, getting closer with every succeeding upward change. Without exceeding 5500 rpm, that gives 40, 59, 80 and 108 mph for the indirect gears, all of them naturally Porsche-synchronized and selected by a double-rod linkage contrived to isolate the shift lever from vibrations.

The whole cog cluster is in a liberally finned casing integrated with the final drive, on the end of a tubular beam rigidly fixed to the barrel-housing at the back of the engine. Through this tube passes a multi-piece drive shaft supported in a couple of bearings to prevent whirling of its slender and torsionally flexible wheel. Its dimensions (the shaft is less than an inch in diameter) are governed not only by the torque it has to transmit, though that in itself is significant: The maximum torque multiplication is in bottom gear,

by a factor of 3.601, and were the gearbox bolted to the back of the engine, the shaft would have to be sturdy enough to cope with 964 feet-pounds of torque. Instead, the shaft never has to transmit more than the engine supplies, so it can be as surprisingly slender as it is. All that needs to be determined is the clutch location, and this is something that has provoked argument ever since these polarized transmissions first came into use.

When the clutch is disengaged to permit a gearchange, the driven plate rotates with the gearbox input shaft, adding its rotational inertia to the other rotating masses that have to be accelerated or braked by the synchromesh. The more power the clutch has to transmit, the greater its diameter tends to be, and its rotational inertia increases as the square of that diameter; so Porsche has done the sensible and expensive thing that follows as a matter of course in motorcycles and racing cars, increasing the number of clutch plates and thus their frictional area while allowing their diameter and rotational inertia to be minimized. So far, the thinking is sound, and, if the clutch were at the tail of the drive shaft, that shaft could be made larger in diameter, perhaps as a thin-walled tube, reducing its whirling tendencies, increasing its strength and stiffness (notably in torsion), and fitting it admirably to share with the clutch driving-plates some of the duties of the engine flywheel, enabling that customarily burdensome component to be made just a little less substantial.

Instead, Porsche has put its nice new clutch on the back of the flywheel, right behind the engine, just where you would expect to find it in a more humdrum car. The result is that, when the clutch is disengaged, not only its driven plates but also the entire length of the drive-shaft assembly is added to the rotating masses whose inertia must be overcome by the long-suffering synchromesh mechanism. To minimize this rotational inertia, the shaft has to be made as slender as possible, and in the process acquires a flexibility in torsion that may be thought undesirable. Not only does it make the driveline feel rather elastic, it also strengthens the possibility of resonant torsional vibrations passing through that slender shaft. Perhaps we need not worry unduly: Porsche's designers may have nodded when drafting the layout, but they must have done their subsequent sums well enough to insure that torsional oscillations never become in-



trusive or dangerous. Why else do you suppose that the driveline is an assembly of short shafts, rather than one long one?

**Davis:** Soon you'll be able to buy a Porsche with a 4.5-liter aluminum V-8 engine in the front. It will be nearly as fast as the Turbo, ten times easier to drive and a lot less trouble to own. It will cost you almost \$25,000, but if you can afford it, it will be the car of which you've always dreamed. Furthermore, it will make you the envy of every red-blooded adult male in the civilized world.

About once every ten years, some car comes along that forces the automotive community to re-examine all of its preconceptions and conventional wisdom. The Porsche 928 is exactly that kind of automotive phenomenon. It will blow your mind, knock your socks off, toss your hat in the creek. If some Philistine should suggest that you could buy a pretty nice mobile home for the same money, stick your fingers into his nose and rip it off his face. For ten years or more *Motor Trend* and *Road & Track* have been bilking gullible citizens into purchasing magazines with "The All-New Mid-Engine Corvette for 1968-70-



**Yates:** *The sixteen-inch wheels work in perfect concert with those low-profile P7 Pirellis.*

75-80-85" (choose one). When this Porsche hits the street, an all-new mid-engine Corvette will look at least a day late and a dollar short.

Porsche purists are already muttering that the 928 is not a "real" Porsche. They are, of course, entitled to their opinions, but they are also, of course, wrong. The 928 is an almost poetic reaffirmation of Porsche's bedrock understanding and appreciation of the fundamental automotive verities. It is a sensational car. Its technology is such that it *could* have been a BMW or a Mercedes-

Benz—and either firm would be delighted to have it, thank you—but only Porsche conceived it and had the courage to bring it to market. In 1974 with annual sales of \$240 million, with the energy crisis and its speed limits and predictions of gloom and doom all around, Porsche committed \$80 million to the realization of a totally new high-performance sports car, a super-car that would put everybody back to Square One overnight. Brave guys.

Cars like the Mercedes-Benz 450SLC and the Chevrolet Corvette suddenly look very obsolete indeed. The BMW 630CSi instantly becomes a bit more ordinary than its specifications and performance originally led us to believe. *This is a new car.* Not a rehash, not a copy of somebody else's successful theme, not a refined agglomeration of sedan components, this new Porsche is as fresh and exciting as the first Porsche 1300 Super I drove in 1953, and it will have the same dramatic effect on the enthusiast world's notions and perceptions. It will be controversial, but it will become the standard by which other sports cars are judged for at least the next decade.