

PORSCHE

# PANORAMA

April, 1977





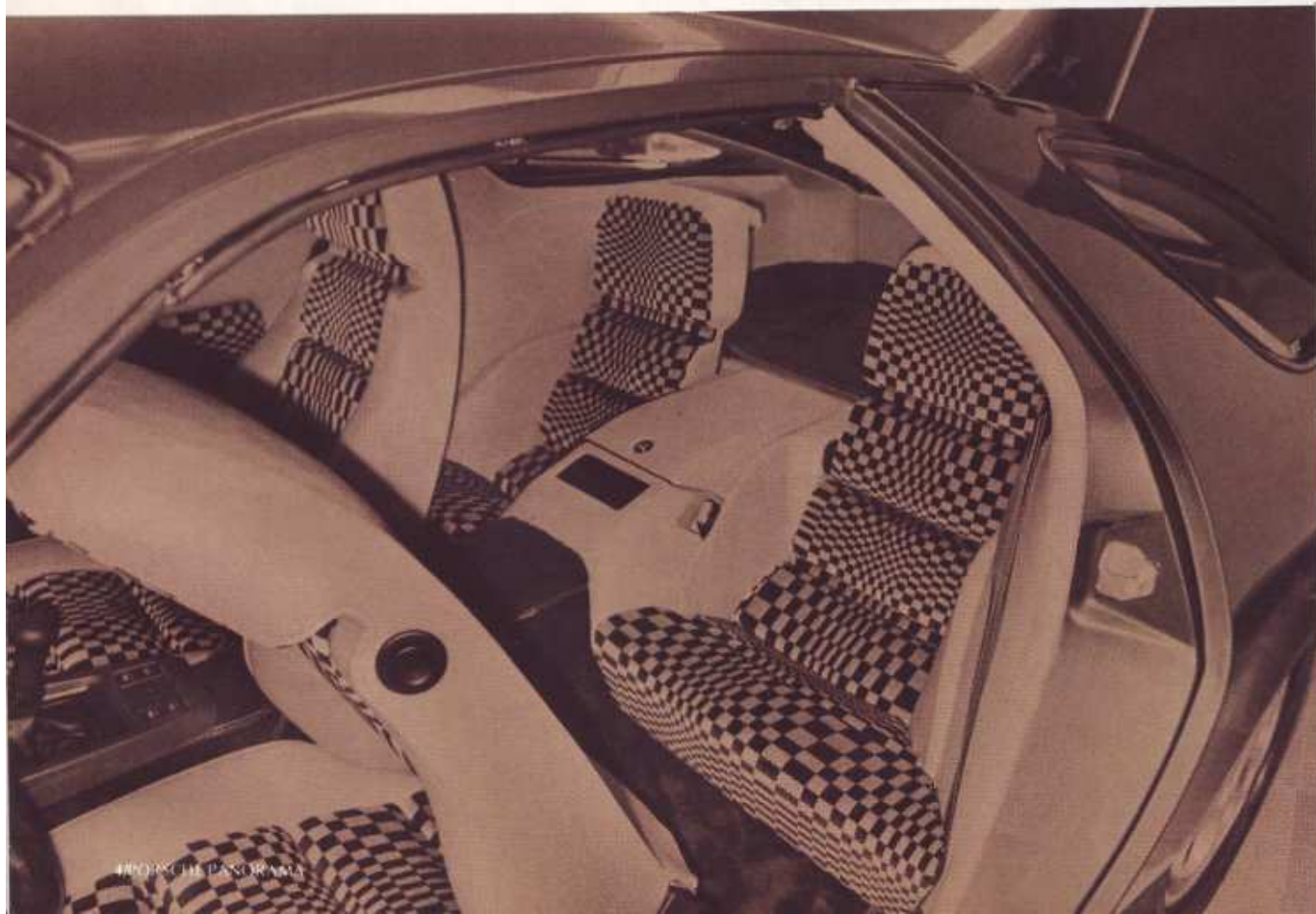
# PORSCHE

The new,



Porsche's decision to build the 928 was made during the energy crisis, a time when the future of the sports car was very much in doubt. Production figures at Porsche had dropped from 16,000 to 8,000, back to the levels of the early Sixties, and in Zuffenhausen drastic alternatives were being explored. Motorcycles, cross country vehicles and luxury sedans were all seriously considered and ultimately rejected. Heinz Branitzki, one of Porsche's three man top management board, provides the historical background of the 928 in a separate article in this issue, from which a clear fact emerges: the commitment to produce the Porsche 928 was an act of courage, risk and faith at a very critical time.

The styling of the 928, with its fluid silhouette, rounded at the rear, with headlights laid back in the front fenders, is somewhat similar to its smaller sibling, the 924. Actually, the 928 design, which was begun at the end of 1971, preceded the 924 which was marketed earlier, but

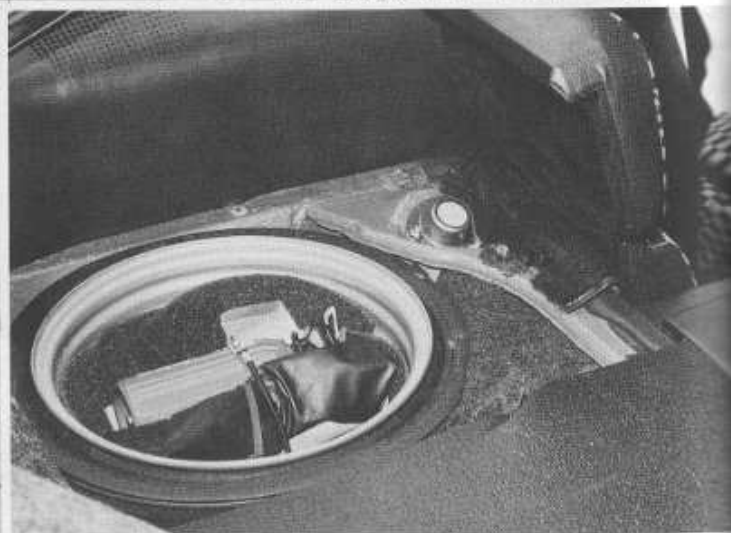




# THE 928

grand touring car from Porsche





developed only after the 928 concept was laid down.

The shape of the body is functional rather than fashionable, following a credo long held by Porsche. To see the car in the flesh is to be struck with the realization that this car is visually unique. It doesn't look like anything else on the road. If you get down at eyeball to headlight level with it and squint your eyes, you can see in its lines faint familiar traces of the 911, but that is largely an exercise of the spirit rather than reality. The body is constructed of galvanized sheet steel and the car carries Porsche's six year warranty against corrosion. The fenders, doors and hood are aluminum.

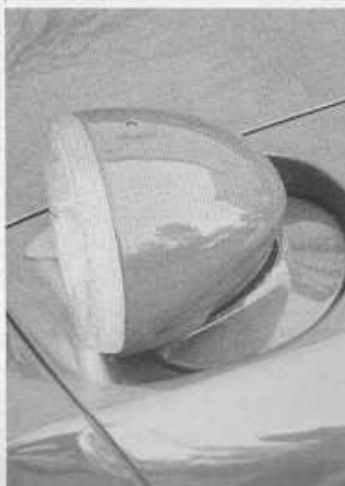
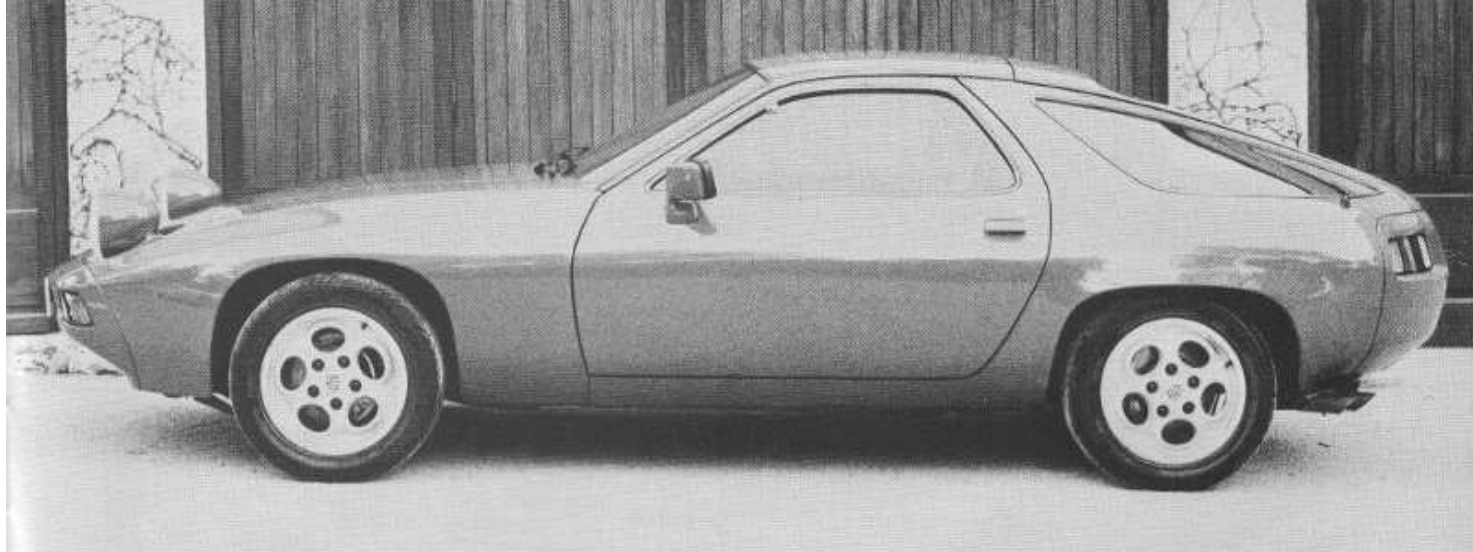
The bumper treatment is outstanding. A shock absorbing polyurethane skin, covered with a layer of special elastic paint, conceals the functional aluminum bumper attached by hydraulic shock absorbers directly to the body. Signal lights, driving and fog lights are mounted in the bumpers front and rear. Films of crash tests at speeds up to 15 mph demonstrate the remarkable resilient ability of the polyurethane skin to deform under impact and bounce back into position unharmed. This very successful solution to crash safety regulations means that there will be very little difference in the car's ap-



pearance for America. Side markers (elongated, rather than round like the 924) on the front and rear fenders and small bumper overriders to the right and the left of the license plate in the rear are expected to be the only visual differences.

The interior of the 928 is an amalgam of luxury, some neat tricks and a down-to-business arrangement of instruments. The seats are unusually comfortable and retain plenty of lateral support. The rear seats are far more substantial than anything Porsche has done previously. Standard equipment includes inertia reels and sun visors for those back seats and





provided the front seats are not pushed all the way back, it is possible to travel in the rear with some degree of comfort. Heavy velour, in a psychedelic pattern, is used for seat and door inserts. Up front, leg room is very much like the 924, considerably better than in the 911.

A series of adjustable features makes it possible to custom design your own driving position. The seats adjust in the usual fashion; electric operation is optional with additional capacity for height adjustment. The steering column is adjustable, taking the instrument carrier with it so as to keep the dials in eye range in whatever

position you choose. Furthermore, the pedals, the wide left foot rest and the shift stick can be adjusted. Not to put too fine a touch on it, the door arm rests may be tilted.

A newly developed central warning system signals trouble to the driver automatically by illuminating a warning lamp on the instrument carrier which cannot be ignored. A set of indicators located on the center console pinpoints the problem. In case of vital trouble (loss of engine oil or braking fluid, for example), the warning lamp blinks and cannot be shut off. If the lamp stays lit, it indicates something needs refilling or replacing, but can at least temporarily be postponed (washing fluid, brake pads). In the latter case, the lamp may be shut off by pressing a button. It will automatically turn on again when the ignition is shut off and then switched on again.

For the record book, the first combination instrument on the right contains a voltmeter (8 to 16 volts) and an oil pressure gauge which at any speed over 1000-1500 rpm pegs all the way to the right. The tachometer reads to 8000 rpm with a redline starting at 6400 and ignition cutout coming in at about 6600 rpm. The speedometer reads to 280 kph and contains a trip meter and six digit cumulative odometer.





Aside from the usual switches and controls on the dash, switches are located to the left of the driver's seat for speaker balance and to regulate the main headlamps which are adjustable for correct lighting distance under varying load conditions. The superb radio previously marketed as the Blaupunkt Bamberg is standard equipment minus the microphone. A vacuum locking system automatically locks and unlocks the door on the passenger side in tandem with the driver's door.

An electric sliding roof, which can be slid open or tilted up, is optional. The only carry-over from the 911 is the outside mirror, electrically adjustable by four way button. After all my lamenting over the lack of a courtesy mirror in new Porsches since the 356SC, I am obliged to congratulate Porsche on the inclusion of this nice detail in the 928. Concealed behind the right sunvisor, the mirror flops down from a little panel in the headliner and is illuminated. Thanks, fellows.

The heating system is far better than on the 911, thanks to that water cooled engine, and is largely independent of the car's speed. Of five blower speeds, the first is in permanent operation. The flap system is vacuum controlled and allows for considerable variation in warm and fresh air distribution. What is described as a very efficient air conditioning system is available which also includes cooling of the glove box (there must be a reason). The unit can be built in after delivery.

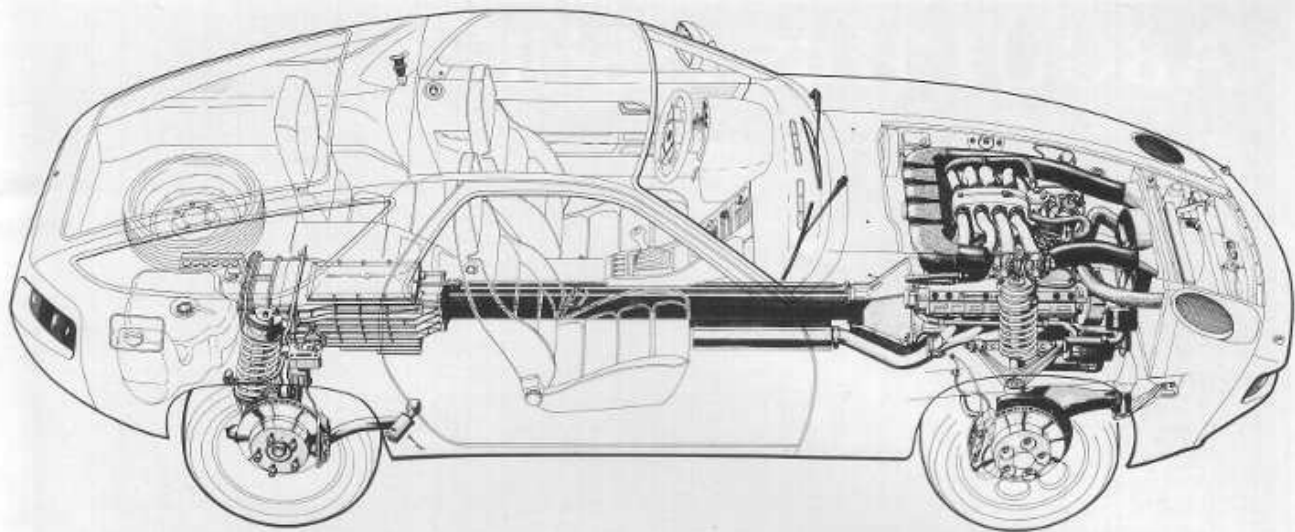
Finishing up the passenger compartment, an extensive tool kit is located at the rear of the luggage area as well as space-saver tire and pump. The rear wiper motor is mounted to the body rather than to the rear hatch as on the 924. The center of the car's electrical system is easily accessible, mounted under the foot room of the passenger.

The power plant for the 928 is Porsche's new 4.5 liter, 90 degree V-8 engine. Made entirely of light metal, it weighs 585 pounds without oil and water, but including air conditioning compressor and radiator. Coated aluminum pistons run directly in the high silicon content aluminum alloy block which, by the way, can be rebored. The engine has virtually the same length and height of a four cylinder unit and is broader only in the upper section.

The car starts quite easily whether cold or warm; engine idle is extremely quiet. The exhaust note under load is definitely V-8, but somehow maintains a relationship with the air-cooled six. There is none of the deep underwater burble of the large American V-8, but in the upper rpm range there is a curious combination of rich exhaust note and a pleasant higher pitched winding whine.

Acceleration is impressive. There is none of the initial lag experienced with the Turbo and wheel spin can be induced rather easily. This car will handily take an unmodified 911, but not a Turbo . . . yet. Any earlier fears that this might be Porsche's version of a 450SL can be laid to rest.





With a zero to 100 kph time of 6.8 seconds, this car will out-accelerate, out-brake and out-handle anybody's 450SL.

The tractability of the engine is likewise exceptional and encourages you to run in a higher gear than you would select in a 911. The engine is perfectly content at 55 mph in fifth, at which speed the loudest noise you hear is caused by wind on the outside mirror. Although an automatic transmission (from Mercedes) will be offered, it seems a little redundant. This car could be run forever using second and fourth gears alone. Acceleration in fifth gear will not frighten your grandmother at American road speeds, but it's very definitely there and if you don't want to downshift, you don't have to.

The two disc clutch was specifically developed for the 928. The pedal comes out

relatively high, but the clutch is very slowly progressive and it is hard to look like a fool with the car even the first time out. Brand new, the transmission is not stiff at all and promises to be buttery smooth after normal break in. A noiseless fifth gear transmits power directly to the driven wheels without using cog-wheels. Shift pattern is the old style with low gear down and to the left. To keep gearbox vibrations from being relayed to the shift stick, the shift mechanism is fitted with a special link.

Steering is extremely light. There is no one-finger power steering sensation, but the front of the car responds at parking speeds much more easily than expected. The steering wheel has a very strong but not offensive self-correcting tendency and the net effect is that road feel is not impaired, due to the fact that the servo ef-

## Specifications

<b>Engine</b>	8-cylinder, 4 stroke 90° V-engine, water cooled	<b>Gearbox</b>	fully synchronized gearbox mounted in front of rear axle, with differential in same unit	<b>Wheels</b>	floating frame-disc brakes, front and rear, interior ventilation
<b>Bore</b>	95.0 mm		double rod manual shifting (Option: automatic transmission)	<b>Tires</b>	cast alloy, 7 J x 16
<b>Stroke</b>	78.9 mm		ratio:		front and rear 225/50 VR 16
<b>Displacement</b>	4474 ccm		5-speed	<b>Dimensions</b>	wheelbase 2500 mm (approx. 96.4")
<b>Compression ratio</b>	8.5 : 1		1st gear - 3.6610	track, front 1545 mm (approx. 60.8")	track, rear 1514 mm (approx. 59.6")
<b>Performance</b>	240 bhp (DIN) at 5250 rpm (177 Kw)		2nd gear - 2.4654	length 4447 mm (approx. 175.1")	width 1836 mm (approx. 72.3")
<b>Maximum torque</b>	37 mkg at 3600 rpm (365 Nm)		3rd gear - 1.8194	height 1313 mm (approx. 51.7")	
<b>Crankshaft</b>	forged steel, 5 steel main bearings		4th gear - 1.3433		
<b>Valve gear</b>	overhead, in line		5th gear - 1.0000		
<b>Valve operation</b>	via overhead camshaft and hydraulic rocker arms		rev. 0 - 3.1621	<b>Capacities</b>	fuel tank 86 l (approx. 22.7 gal) of which 8 l reserve
<b>Camshaft drive</b>	via toothed belt and timing shaft	<b>Crest</b>	rev. 1 - 2.7500	engine oil 6.5 l (approx. 6.9 qts)	engine coolant approx. 16 l (approx. 1.7 qts)
<b>Lubrication</b>	pressure feed lubrication with crescent pump	<b>Body</b>		gearbox oil approx. 3.8 l (approx. 4 qts)	brake fluid approx. 0.2 l (approx. 7 oz)
<b>Oil filter</b>	full flow type		2-door Coupe	windscreen and headlamp washer, windscreen cleaning agent, approx. 0.6 l (approx. 1.3 pts.)	
<b>Fuel injection</b>	Bosch K-Jetronic		2 + 2 seats		
<b>Fuel supply</b>	2 electric pumps		rear hatch	<b>Weights</b>	DIN kerbweight 1450 kg (approx. 3196 lbs.)
<b>Octane rating</b>	91 RON		hood, doors and wings are made of aluminum	permissible total 1870 kg (approx. 4125 lbs.)	
<b>Electrical system</b>	battery: 12 V 66 Ah, alternator: 1260 W, 90 A, no-contact ignition	<b>Frame</b>	unitized steel		
			detachable front wings	<b>Performance</b>	acceleration from 0-100 km/h: 6.8 seconds
<b>Transmission</b>	transaxle system, front mounted engine, rear mounted gearbox, both units rigidly connected by a tube	<b>Front suspension</b>	independent, double trailing arms	standing start, 1 kilometer: 37 seconds	
	elastic-rotation driveshafts in text bearings (25 mm ø), forming one unit with gearbox and final drive	<b>Rear suspension</b>	independent, diagonal trailing arms and upper transverse trailing arms (Weissach-Axle)	<b>Top speed</b>	more than 230 km/h (143 mph.)
	twin universal jointed driveshafts with drive length compensation	<b>Springing and damping</b>	coil springs and inward double acting hydraulic shock absorbers front and rear	<b>Fuel consumption</b>	(DIN) 13.0 l/100 km
<b>Clutch</b>	2 dry plates on engine side	<b>Anti-roll bars</b>	front 26 mm, rear 21 mm		
		<b>Steering</b>	rack and pinion power steering ratio: 17.75 : 1		
		<b>Brakes</b>	hydraulic, twin circuit with diagonal operation servo-assisted		

# ABOUT THIS ISSUE

If you've been a *Panorama* reader for any length of time, you'll know that devoting an entire issue to a single subject is not our general style. This issue, showcasing the long awaited new Porsche 928, is the result of some rather exciting circumstances.

First of all, by the time you read this, Porsche will have introduced the car to the world by means of the Geneva Auto Show. Not that we didn't know it was coming; as far back as September, 1973, *Panorama* ran a series of Mike Williford sketches based on rumors circulating in Europe. Now that we've seen and driven the real thing, it's interesting to compare those early drawings to the reality displayed in this issue.

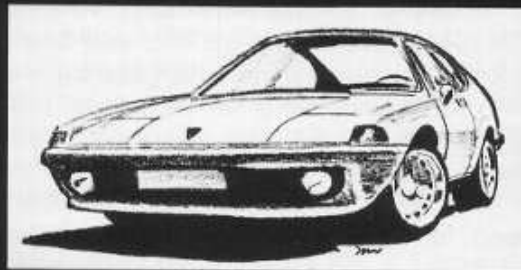
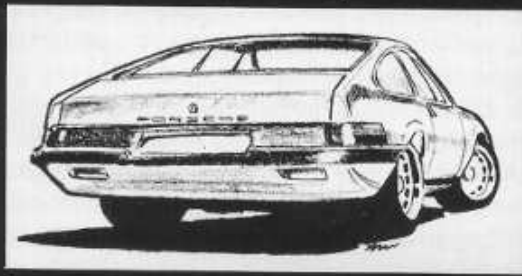
New European cars are usually previewed in Europe six months to a year before they are introduced in the United States which means major U. S. publications are obliged to depend on reports from European stringers. Small magazines like *Panorama* either miss out entirely or do a fancy paraphrase of somebody else's old news. For the introduction of the 928, Tom McDonald, Porsche Audi's public relations manager, remedied that less than ideal situation by arranging a special showing of the 928 exclusively for American publications on February 25 and 26, in Nice, France.

The idea was to introduce the 928 to the American public via the viewpoint of American

journalists and *Panorama* was included in that very select group. It was not an inexpensive undertaking and it should be occurring to you that Porsche Audi has provided *Panorama* with an unprecedented opportunity to get new model news to PCA as fast as any other magazine in the world can. This issue should finally put an end to those "Why is PCA always the last to know?" letters that we get annually.

So, sit back and enjoy your first look at the new grand touring car from Porsche. Excerpts from a presentation by Porsche's finance manager, Heinz Branitzki, will reveal some of the crisis circumstances that surround much of the history of the 928. Project engineer Helmut Flegl, a member of the development team that conceived the new car, presents its technology and explains the new patented Weissach rear axle in detail. Our impressions are included, along with every photo, chart, graph, and diagram we could lay our hands on. Finally, we had the opportunity to talk with Dr. Ernst Fuhrmann, Porsche's managing director, Mr. Branitzki and PCA's good friend Ed Peter on a variety of subjects that will interest you.

For May, it's back to our usual editorial grab bag of features, technical articles and club news, but this month we are pleased to give you a special issue on the Porsche 928, with sincere gratitude to Porsche AG and Porsche Audi Division for making it possible. —BJT



fect of the power steering is reduced as speed increases. Incidentally the turning radius of the car is phenomenally small.

The brakes are very smooth, very Porsche. The car is fitted with floating saddle brakes with ventilated discs. There is electrical indication of pad wear. Maximum temperature of the brake fluid is below boiling point at 90 degrees C, preventing any brake fade caused by steam bubbles.

There is always a little trepidation about driving someone else's automobile, let alone a virtually hand-built factory prototype. The 928 counters this uncertainty by imparting a sense of very solid competence. Soon enough, high speed turns were being tried with injudicious amounts of trailing throttle and mid-curve acceleration. None of this produced any drama whatsoever. The combination of the patented Weissach rear axle and the Pirelli P-7 tires places the cornering limits of the 928 well beyond anything we could attempt on public roads.

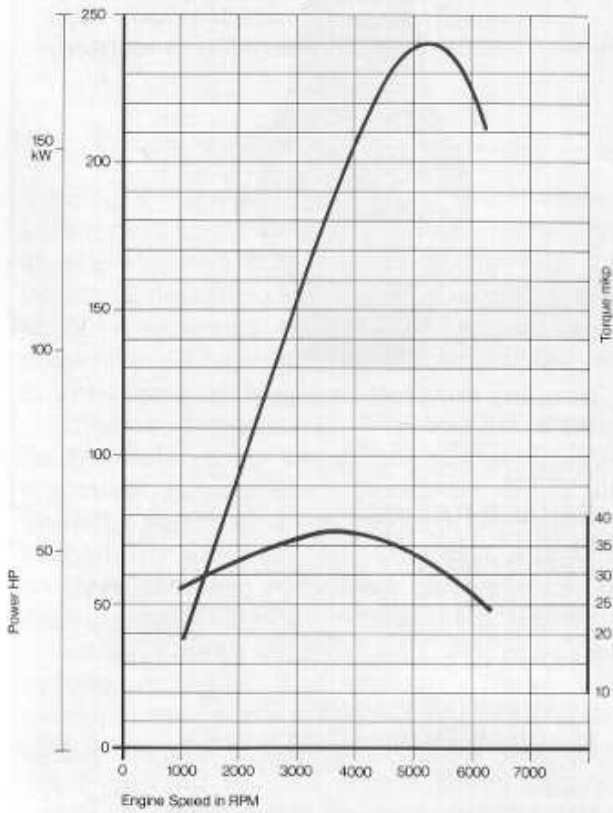
The overriding sensation left by the 928 is one of supremely civilized, disciplined strength; power in a most elegant guise. Light easy steering and very sharp maneuverability make it an ideal city car. On the highway, its extreme quiet, road worthiness and willingness to cruise at very low rpm all but eliminate driver fatigue. Handling may be a shade better than the Turbo and the torque and throttle response is fantastic.

The car will be introduced in America in the fall. As previously mentioned, the appearance of the U. S. version will differ only in very small detail from the European car. About 15 hp will be sacrificed with the catalytic converter for the U. S. car; there will be no separate car for California. Price has not been set, pending final discussions between Porsche and the importer, Porsche Audi, on the equipment for America, but is expected to be under \$25,000. For the first full model year, August 1977 through July 1978, 2500 of the new cars are expected to be sold in America. —BJT

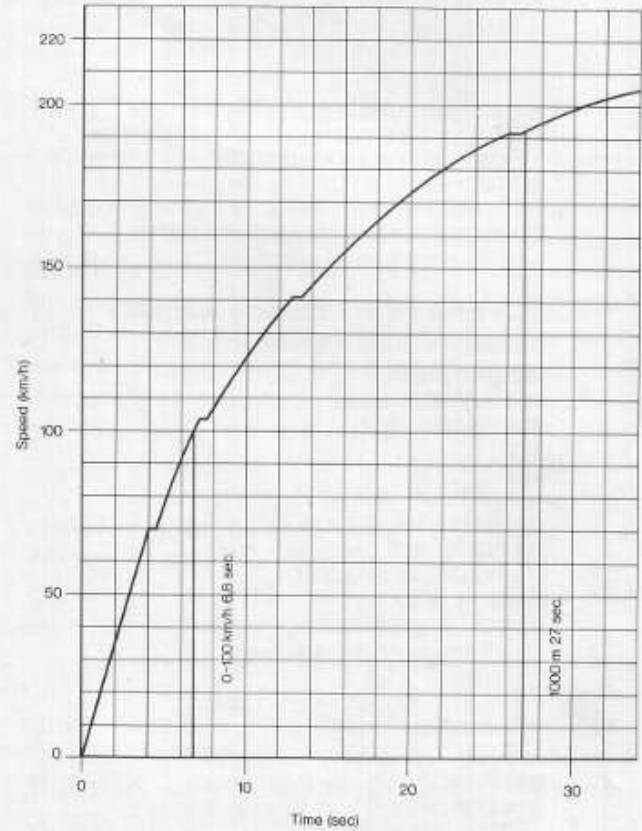


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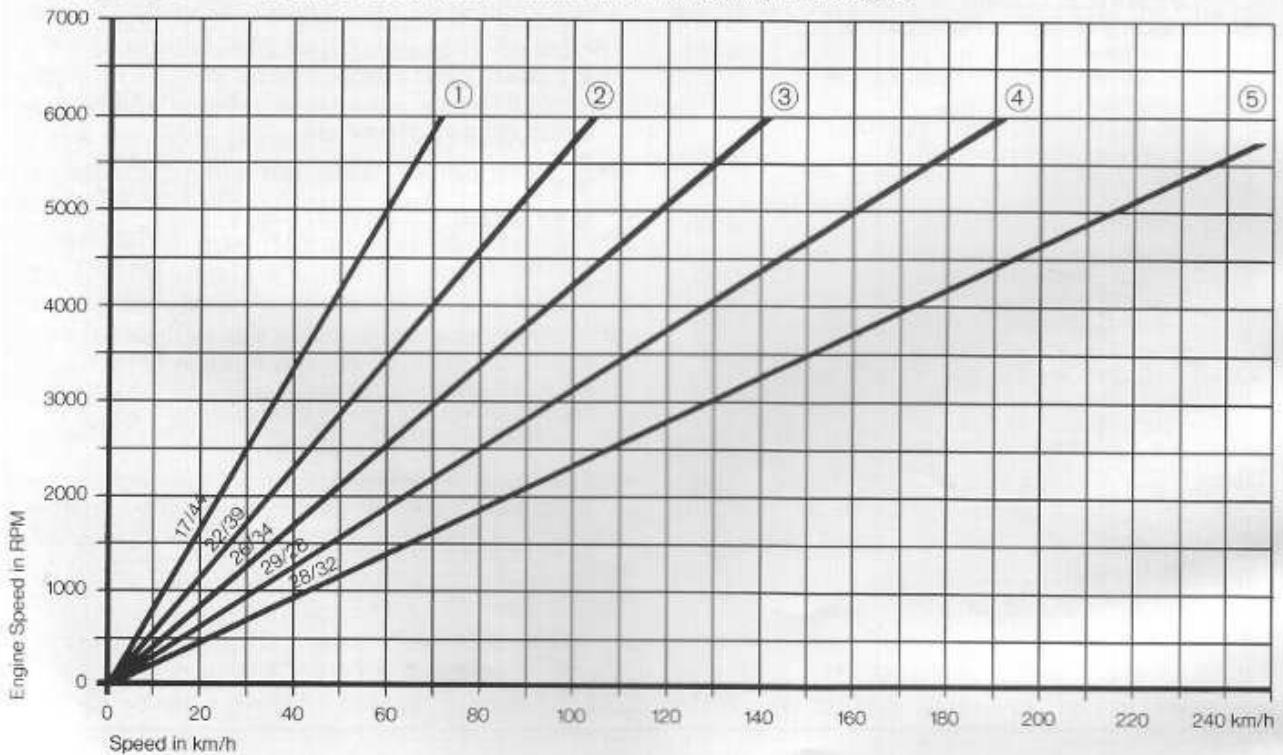
Performance and torque of the Porsche 928



Porsche 928 Acceleration Curve



Porsche 928 Diagram of Gear Ratios Speed and RPM rating in the individual gears



# The Technology of the 928

from a presentation by Helmut Flegl  
Development Engineer, Porsche 928



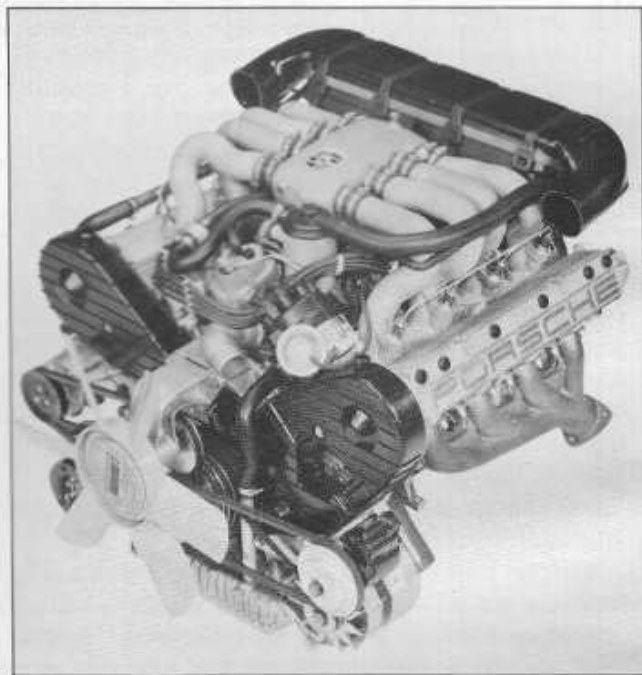
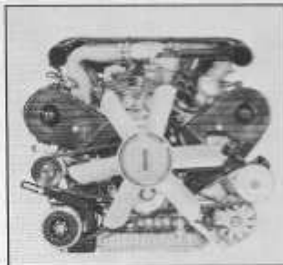
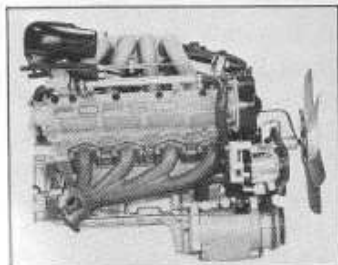
Being a member of the development team, I am pleased to introduce to you the technology of the Porsche 928. Before going into the technical details to familiarize you with the innovative features of this vehicle, I should like to show why we have built the 928 as it is and not differently.

When we started out thinking about a new car, we first defined our design goals. In order to be responsive to our present customers and to continue the tradition of the House of Porsche, the first priority was a sporting character, emphasis on sportive driving and vehicle performance. Our market research has shown that the customer increasingly wants comfort and, therefore, our second objective was comfort. These high demands for comfort, specifically smooth running of the engine and a comfortable noise level, could only be fulfilled with a power plant of relatively large cubic capacity, preferably a water-cooled, eight cylinder engine. As a third priority, we feel that a car should be economical and have a long service life, so economy was the third goal. And finally we considered primary and secondary safety an essential requirement.

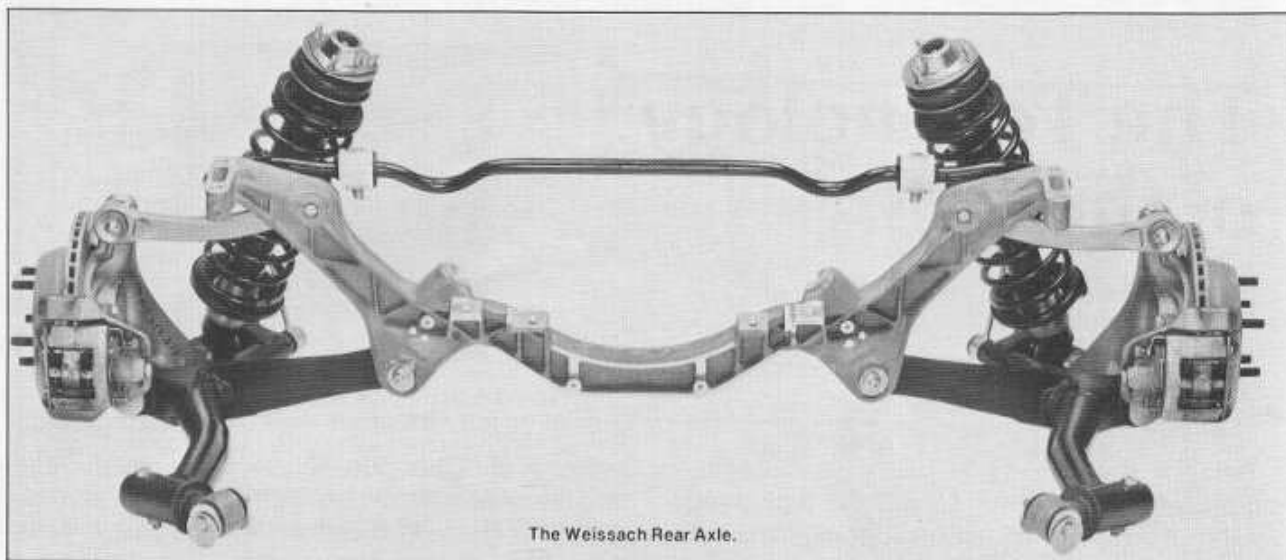
It was under these four major aspects that we prepared and reviewed a large number of layouts and vehicle studies and finally decided in favor of the transaxle principle. You will know the arrangement of the transaxle components from the type 924. In contrast with the 924, the transmission is located forward of the differential. The rear seats are located on both sides of the gearbox. Battery, spare wheel, fuel tank and exhaust muffler are located rearward of the differential. The engine, with cooling and clutch are located on the front axle. Through this uniform distribution of major masses, we

achieve an ideal fifty-fifty weight distribution and the high moment of inertia about the vertical axis. It is these two characteristics that are the most important conditions for good ride, good straight ahead travel and low sensitivity to cross wind and aquaplaning and easy handling. Due to the arrangement of the transmission forward of the rear axle, we can replace the five speed manual gearbox by a three stage automatic. By using the principle of water cooling, we have achieved good heating comfort. Through large deformation zones front and rear, we were able to meet all present crash safety laws and also have some reassuring reserve left.

All components of the 928 were newly designed. We therefore tried to test them as early as possible. The final car with body and chassis, of course, was not yet available. Therefore we installed these components more or less complete in different car makes, which also allowed us to go out on public roads without prematurely disclosing the 928. In some Audi 100 coupes we tested the transaxle, the engine and the automatic transmission. Later on we added the entire underbody and the chassis.







The Weissach Rear Axle.

The transaxle and chassis tests were made in a modified Mercedes 350SL and an Opel Admiral. There was also an adventurous vehicle, put together from some tubular structures, for measurements on the roller dynamometers.

What are the special features of the engine? In order to achieve a sportive, typical Porsche styling, the engine had to be as low as possible. By choosing a V-8 engine and specially designing an oil sump and cylinder head, we achieved a body silhouette which is not higher than that of the 911. The V-8 arrangement at the 90 degree angle gives perfect balancing of the masses, with two connecting rods each, supported by or acting on one crankshaft journal. In order to keep the engine weight as low as possible, all housings are of light metal. The iron or chromium coated light metal pistons run directly in the engine block which is of an aluminum alloy with high silicon content. The connecting rods are of forged sintered steel and in addition to high durability have particularly small weight tolerances.

The valves are swung sideways and are controlled by overhead camshafts via hydraulic valve pushrods. Valve play adjustment is not necessary, just as the maintenance requirements for the power train are kept at a minimum by breakerless ignition and long oil change intervals. K-jetronic fuel injection system is used. A cog belt is utilized to drive the two camshafts, the oil pump and water pump from the crankshaft. The belt is tensioned by a spring loaded pulley. The fan is driven from a viscose clutch which limits the fan speed to a maximum of 3400 rpm. A thermostat does not actuate the fan until the engine is hot, achieving lower noise and a quicker warm-up of the engine.

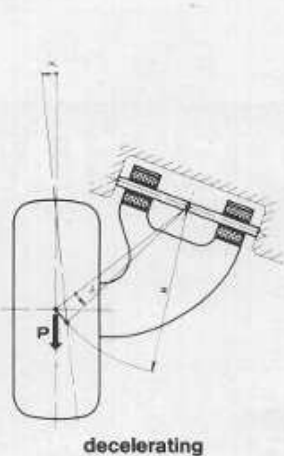
Special attention was given to the chassis. We have worked intensively on the riding characteristics, especially by means of the rear axle. As you know, almost all rear axle designs

have a tendency that the car would jack-knife when it decelerates and the inside rear wheel pulls inward. This is due to the fact that the decelerating force pulls the wheels in the tow-out direction and then the desired large lateral guiding forces are no longer transmitted. Therefore it was necessary to counteract this disturbing effect.

In order to study the problem, we installed a steerable rear axle into an Opel Admiral which was steered by a second driver. Through lengthy tests we found out to what extent and to what maximum time lag the rear wheels had to be counter-steered. The result of all these tests is our Weissach rear axle. We use a double transverse control arm axle. The tubular control arm mounts the wheel carrier with rubber mounts. It is laterally supported against the body by a leaf spring strut and toward the front by a steering element. This steering element is supported against the transverse control arm via rubber springs. As a result of the decelerating force at the wheel, the transverse control arm is pulled backward. The steering element is therefore swung rearward by a certain angle. The kinematics of this steering element is such that the transverse control arm and therefore the wheel are steered in the tow-in direction.

To explain the effect of the Weissach axle by an example on the road (see diagram): If a car travels through a corner at high speed, and if at the time X the driver takes off the power because he is afraid of being thrown out of the curve, then depending on the size of the engine and the size of the trailing throttle, the vehicle will more or less pull inward. The rear axle on our 928 is designed in such a manner that after taking off power, the car will go on a slightly narrower or smaller radius track in order then to pull back to the originally planned track.

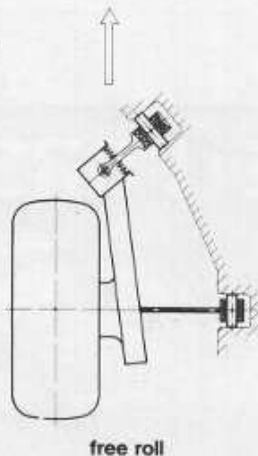
I have picked out only one very important characteristic of our Weissach axle. The longitudinal elasticity and tow-in stabilization



decelerating

#### Conventional Suspension

toe out due to elasticity. When decelerating or braking, the wheels in a conventional suspension toe out at  $\alpha$  angle owing to force P. The reason is the rubber bearings in the suspension required for noise absorption.

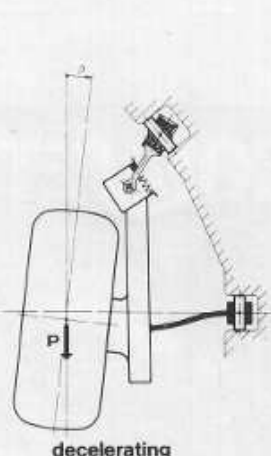


free roll

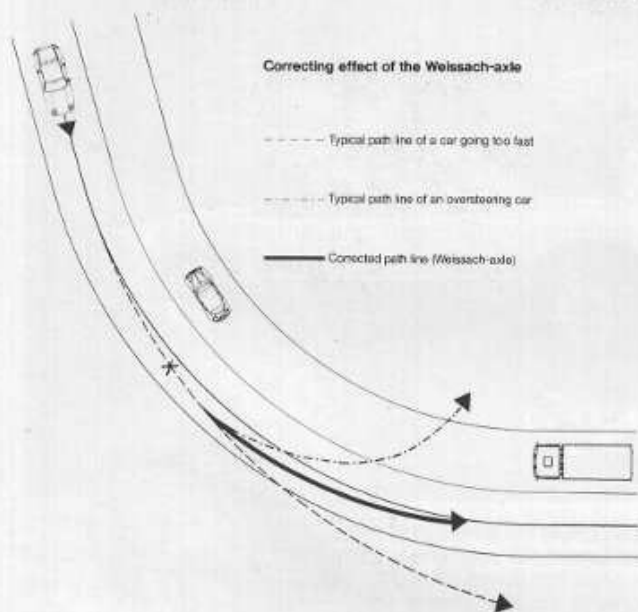
#### Weissach-Axle

toe in due to Kinematics.

In the case of the Weissach-Axle, a kinematic effect changes the angle towards toe in when decelerating or braking. For reasons of noise absorption, the Weissach-Axle, too, features rubber bearings, but toe out is immediately balanced by the kinematic effect  $\alpha = \beta$ . Thus, the Weissach-Axle prevents dangerous side movements of the car in curves. This is one of the important characteristics of the new axle.



decelerating



#### Correcting effect of the Weissach-axle

--- Typical path line of a car going too fast

..... Typical path line of an oversteering car

———— Corrected path line (Weissach-axle)

The driver releases the accelerator (at X) in a very fast curve. A conventional vehicle would immediately slant and swivel its back. The control effect of the Weissach axle keeps the 928 on a safe course marked by the heavy line.

has a positive effect on the rest of the handling characteristics of the car. The rest of the kinematics of the rear axle is routine for practiced sports car builders: 50% anti-dive control, 70% anti-squat control and adaptation of the camber characteristics to the wide tires and the small body roll of the car.

The front axle is a double wishbone with some special features. Considering changes during compression travel of the wheels, we have defined the anti-dive control at 30%, the caster displacement of the axle at 40 mm. Together with an exactly tuned power steering system, this high value contributes to a fine feel of steering and good straight ahead travel of the car. The brake system, with floating caliper disc brakes and ventilated brake discs front and rear with diagonal distribution of the brake surface and negative steering load radius at the front axle

represents the latest state of the art.

Of what use would be the best components if they were not installed in a good body? After many preliminary studies and models, we arrived at a styling which met the required sporting character. Our plastilene model of the so-called Stage 1 928 was, in its dimensions and proportions, approximately the same as the final edition, although we were not quite satisfied with some details. For example, we didn't like the bumpers. The displacement travel that is required for the U.S. laws caused joints that were too wide. The bumpers just didn't organically fit in with the general styling of the car.

As a result of new possibilities in plastics engineering, we were able to achieve a fully integrated arrangement of the bumper with the body and the styling, therefore, was considerably improved. The new bumpers are just non-existent for the beholder, but nevertheless are still effective. The aluminum bumper is mounted by hydraulic shock absorbers and rests against the body. The polyurethane skin is connected to the body and rests against the bumper. The skin is so soft and resilient that at crashes of up to five miles an hour, there will be no damage to the vehicle front section.

Actually, the 928 can comfortably take still higher collision speeds as can be seen in a film prepared for the German insurance industry. First you can see the impact of another vehicle against the rear of the 928 at fifteen miles per hour. The damage to the other vehicle is considerable, but you can watch the deformation of the polyurethane skin on the 928 and how it regenerates after the impact. The next sequence shows a front crash of the 928 at the other car at a speed of about fourteen miles per hour. The damage to the other car is quite severe, whereas the 928 sustains hardly any damage. The headlights, flasher and other lights remain com-



pletely functional and operable.

The headlights of the 928 are interconnected by a shaft and they are swung upwards about 60 degrees. The flasher, long beam and the fog light are recessed into the bumpers. It is especially the shape of popped-up pivoting headlights that are always a problem because they are often square and have sharp edges. Here we have soft round contours that will not damage pedestrians in an accident.

Wind tunnel tests show the drag coefficient of the 928 to be the same as the 911 and the front and rear lift values fully met our requirements and expectations.

The comparison of important interior dimensions and trunk space between the 911 and 928 shows clear differences. Interior space length is about 4½ inches longer in the 928. This is, of course, beneficial for the back seat passengers. Trunk space is 200 liters or 400 liters when you have the back seat rests folded forward.

A decisive contribution to passenger comfort is made by the quality of the heating and air conditioning systems. A four stage blower either takes in air from the outside or in the case of the air conditioning system, from inside. The intake point has been placed at such a point where you have approximately uniform airflow rate at any vehicle speed. The air is cooled off and the condenser heats up in the water heat exchanger. Subsequently, it is passed to the individual vents through air ducts. The water heating system has the advantage of inertia. In other words, when you have different loads on the

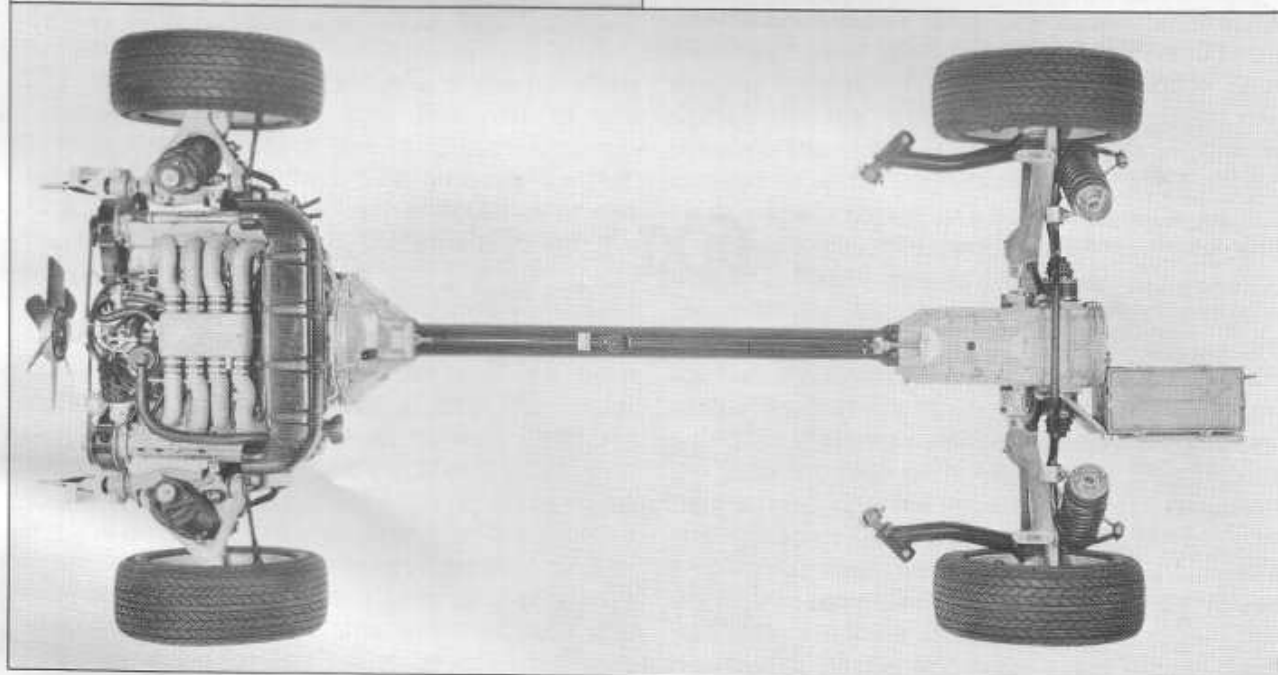
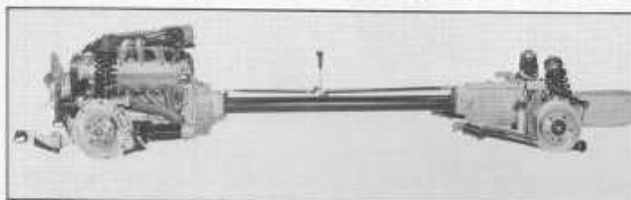
engine, the heating output of the heating system remains the same.

In summary, the 928 employs a water-cooled engine of 4.5 liter capacity. The V-8 structure provides smooth running, water cooling provides for low noise and good, problem-free heating. The relatively large engine puts out its power effortlessly. We have 240 hp (DIN) at 2500 rpm; in the U.S., it is 225 hp (DIN). Maximum torque is 37 mkp at 3600 rpm. Upon request, we can equip the 928 with a three stage fully automatic gearbox. The normal standard equipment is a five speed manual gearbox.

The 928 has standard 50 series tires on 16 inch rims. The wheel base of about 100 inches was increased about 9 inches longer than the 911. The length of the car was increased by about the same amount. The curb weight of the larger more comfortable car is clearly above that of the 911 at 1450 kg. The payload has increased; the allowable total weight is 1870 kg. The 928 is also excellently suited for trailer operation. The axle load distribution is ideal. The nose-heaviness of large automobiles has been completely avoided. The trunk space is approximately twice as large as in the case of the 911.

Finally, the performance capabilities of the 928 are in line with the best Porsche tradition. In its European version, it accelerates from 0 to 100 kph in 6.8 seconds. It takes 27 seconds for one kilometer from standing start and has a maximum speed of more than 230 kph.

At the last, I return to the requirements that we had set for ourselves: sportive character, improvement of comfort, maintaining economy and increasing safety. We have intentionally worked on meeting these requirements with the 928. When the opportunity comes to test the success of our efforts, we hope that the new car will please our Porsche customers. ■







# The Story Behind the 928

from a presentation by  
**Heinz Branitzki**  
Finance Director, Porsche Vorstand

After having so many years of a successful concept, why does Porsche so brutally and suddenly change its philosophy with the new design, the 928? This is a long story, and it is not a very funny or happy story. It is a story full of dramatism, dating back to the year 1971. At that time we had decided, and it was certain for us all, that a car designed by Porsche would go into volumn production with Volkswagen. This was the well-known Porsche project number 1966 with a mid-engine underfloor engine. However, the situation suddenly changed in October 1971 when the Board of Management at Volkswagen had a change in personnel and the new boss of Volkswagenwerk, Mr. Leiding, cancelled this car which we had designed.\*

In this connection, it is important for you to know that at that time our model plans were based on the fact that the successor of the 911 would build upon this new type 1966 which now all of a sudden wasn't anymore. This had two very aggravating consequences for us. On the one hand, a complete development team was without work from one day to another. Secondly, our total model program had broken down.

In this situation, first the 911, which at that time was seven years old and which actually was scheduled to be on the program for just another four years, had to be made attractive again. We had some concerns, especially in the U. S. which was the main market for the 911, where there were new safety laws, exhaust emission laws, noise problems and so forth. I believe that we succeeded in solving that big task successfully by doing a face lift with new bumpers, by improvements of the handling characteristics and also particularly by essential further development of the well known six cylinder air-cooled engine. So in this manner we brought the 911 in-



to a second blossom, so to speak. Also the sports activities with the 911 had been somewhat forgotten, which we revived with the Carrera RSR. So that was the first task.

The second task was just as urgent because our development capacity was all of a sudden without orders. A new model concept had to be developed. In 1971, the automobile world was still intact, so to speak. In Europe, the speed limit problem was just not a subject for discussion. Sports cars were still the dream of any automobile factory. At that stage we got together and as the result, you now see the 928. And you may ask the justified question: Why did Porsche design it the way it is, and why not differently?

There are three valid reasons to explain that. Let me start with probably the least important one. Our technical team – an engineering team which for many years has been trained and has practiced on a certain specific project and has accomplished championship in that design – of course, they are anxious to prove to the outside world that they not only have command over one concept, but they want to prove that they are flexible engineers and can make something out of any concept, of any construction which does an excellent job, has an excellent performance.

The second and much more important reason was that during this period of time, it became

\*This ill-fated car was code numbered EA266 by Volkswagen. Porsche had made a tremendous effort to design and finalize this interesting mid-engine Beetle successor. Deadlines were met and initial production tooling had been ordered. The cancellation decision was made virtually overnight by Leiding, leaving Porsche flabbergasted. Because Volkswagen had paid for the engineering under contract, Porsche was unable to salvage any of their design. In place of the EA266, Volkswagen decided to use the newly purchased designs of Audi NSU which ultimately resulted in the present Golf (Rabbit) and Audi 80 (Fox-Dasher) and thus quickly gained a whole family of urgently needed new models.

more and more clear that the U.S. exhaust emission laws and safety laws would come. Nobody in Europe knew exactly when they would come and nobody knew exactly what they would be like, but we had learned one thing. These laws would specifically be geared or tailored to standard type automobiles and not to extravagant, exotic, air-cooled, rear engine cars, for example, and therefore, with this old concept, we would always be at a disadvantage. We, therefore, decided to choose a concept which would correspond with or be more similar to the majority of cars on the market in order to be better able to meet this disadvantage in the future.

The third, and probably the most important reason was, however, that we had found that the times of the old English sports car tradition had changed. The car that is specifically and exclusively a sports car more and more disappeared from the market. Furthermore, the customer who had sporting ambitions nevertheless did not want to do without a reasonable level of comfort. Thus, it was our task to do something more in the comfort area with this new car, to do better than we could do with the previous 911 concept.

Solving the problems of heating and noise, just to name two, is much more difficult to achieve in a high speed air-cooled engine than in

the case of a water-cooled large volume engine which has low shaft speeds. We also decided to solve the important question of an automatic gearbox which we had only partially solved in the 911 six cylinder by means of the sportomatic. So therefore we designed a 4.5 liter V-8 engine with growth potential for higher power. With this engine, of course, we went beyond all present weights, data and dimensions. And, of course, we could just as well have built a sedan. I will come back to this subject immediately. However, we are a sports car factory after all, and I think we should stay in the field where we have proven that we lead the world. Thus, the concept, in spite of this larger engine, was to build a sports car which would be both sporting and comfortable. It was quite a demanding goal.

Naturally, it would have been simple to build a conventional sports car with this engine. I don't have to give you names, as you already know them. Such a car would be much too heavy at the front end. In order to avoid this feature, we returned to the well known transaxle principle which gives you a perfect weight distribution of fifty-fifty, and with its large moment of inertia about the vertical axis gives you extraordinarily enjoyable riding and handling characteristics. Of course, we knew that then the trunk space in a sports car concept would be too small. Here

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All this was done within a very short period of time. It was, I emphasize again, because the whole development team was virtually without work in our factory. It is interesting to note that it was only many weeks later that we got the order from Volkswagen to find a successor to the 914, which in the U.S. was marketed under the name Porsche 914 and in Europe under the name Volkswagen Porsche 914. For this new car, we proposed the same principle as the 928; a water-cooled engine, front mounted, with the transaxle principle. That principle was accepted and today we are particularly happy, after being able to buy back the concept, that we now have a new self-contained family of cars in the 924 and 928.

After these things had been settled, the world seemed to be back to normal for us. In the meantime, however, we had progressed to 1973. In Europe we had a gigantic political campaign against the passenger car as an individual means of transport. Then the oil crisis came along. In Europe we had speed limits of 100 kph on the autobahn and 80 kph on the highways, and a total ban on Sunday driving. There was a setback in the total automobile market which was unparalleled for all car manufacturers. And, of course, this setback shook us around quite a bit at Porsche.

At that time, we had to make the next decision for the 928; namely, the decision to tool up in the factory at a cost for tooling of about eighty million marks. We had to order this tooling and it was a very difficult decision. The Board of Directors of our company considered the problem at great length and tried to find out whether there could be any future for the 928, or whether the sports car in the first place had any future, and whether, in such a situation, it would be meaningful to spend eighty million marks which you could never earn back.

So we checked alternatives; perhaps motorcycles, or cross country vehicles, or luxury sedans like Rolls Royce, for example. All that, at first glance, seems to be tempting. But when you look at it closely, you find out very quickly that the risks are comparably the same in all those other areas as well. And there was one other point. We have decades of experience in the construction, design and marketing of sports cars. There is a good old proverb in Germany that a shoemaker should stick to his job. As they say in German, we have stuck with our job and we submitted a concept to our Board of Directors and to our shareholders as to just how these eighty million marks could be financed in this situation. The Board of Management unanimously agreed and further supported this

project and the Board of Directors and shareholders in 1973, in this very critical time, approved this project. It was a very historical decision in the House of Porsche.

In the following years, you know that the situation relaxed. The population in Europe clearly opted in favor of sports cars and against mass transport and it became evident that the sports car would remain the dream of any somewhat ambitious car driver. Perhaps our Turbo, which we rather experimentally brought on the market, is a striking proof of that assumption. The Turbo has been more successful than even we had expected. Today, more than ever before, we are convinced that the sports car, which is direct and responsive, and which, of course, demands a lot of love on the part of the driver, but can also offer more to the driver than a standard car, will be built in the future as long as the law makers will allow.

So we believe that our decision in favor of the 928 and for this concept was a correct one. We know that at first sight, the dimensions and the weights are somewhat outside our present line. We hope that after a test drive, others will be as convinced as we are that we have, in fact, succeeded in building a genuine Porsche, a real sports car.

The price of the car will be value for money, it reflects the performance of this car. In Germany the 928 will be sold at a price of 55,000 DM, including value added tax. During the next few months, it will be inevitable to have our customers wait for the car. We will build up production at a low rate and that, of course, will normalize as we go along. In the coming year, we will have a consolidated program with the 924, the 911 and the 928, with four, six and eight cylinder engines and we'll be in the price brackets ranging from 25,000 to 70,000 DM in Germany. We feel convinced that all three models will find their buyers and all three models are firm parts of our planning for the next few years at Porsche. ■

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Left to right: Anthony Lapine, Styling; Helmut Flegl, Development; Heinz Branitzki, Finance Manager; Manfred Jantke, Director of Public Relations and Sport; Ed Peter, Export Manager.

# A Conversation with Porsche Management

*Barely an hour before we were scheduled to leave Nice, we were given the opportunity to interview Dr. Ernst Fuhrmann, Porsche's Managing Director. He was accompanied by Heinz Branitzki, also a member of the Porsche Vorstand in charge of Finance, and Ed Peter, Worldwide Export Manager for Porsche. The setting was less than ideal — the busy lobby of a bustling French hotel that provided a steady stream of distraction from tinkling glasses and luncheon going to table — but the participants were gracious, relaxed and willing to talk. We think you'll find their comments interesting reading.*

**How much of 928 design and philosophy was dictated by U. S. regulations?**

**Fuhrmann:** Of course we had to consider the regulations. The concept of the 928 followed

conventionally designed cars because of that reason. If we had known exactly what the future regulations would be, we could have produced perhaps another design. But nobody knows what the future brings and here we have brought out a car which is closer to the normal road driven car than our past designs have been. We don't know, but one day there may be a crash regulation which will bring us difficulties with the rear engine. Therefore we put the engine where all the others have it and expect that problems which can be solved by other companies we can solve also. So I must answer your question with yes, it was a major consideration when we planned the 928.

**Is there any interchangeability of components between the 911 and 928?**

**Fuhrmann:** Besides the mirror, nothing.

**Between the 928 and the 924?**

**Fuhrmann:** No, there is only a similar concept

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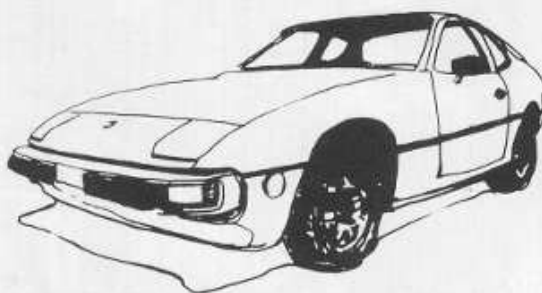
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and so it is one family, but the parts are quite different. Actually with the 928, every screw is new.

**Why were cast alloy wheels, rather than forged, chosen for the 928?**

**Fuhrmann:** That is simply a matter of price. The forged wheels are much more expensive and one uses this material only if there is a need. The cast wheels are strong enough. The 928 will be in our program for at least ten to fifteen years and undoubtedly wheels, horsepower, volume and things like that will be changed as we have done with the 911 in the last fourteen years. Our program will be to improve the car through ten, twelve, fifteen years.

**An overhead cam engine is a relatively expensive engine to build, and yet it is a harder engine to meet regulations with, isn't it?**

**Fuhrmann:** No, it has nothing to do with regulations. The overhead cam engine is now not such an expensive design as it has been in the past. The camshaft drive is now much cheaper than before because of the availability of rubber toothed belts.

**Porsche has long supported the idea that racing is the ultimate test. Will we see the 928 on the race track?**

**Fuhrmann:** I am sure that you will one day. I cannot imagine that we will ever stop racing.

**Where is the 928 built? There has been some speculation that even though Porsche says the 911 will continue, there is not enough room at the factory to build both cars indefinitely.**

**Peter:** New space has been acquired. The area of the machine shop has been moved into a new factory completely. The area of the former machine shop is now the assembly line for the 928. The former Targa line in the body construction area has been put together with the coupe, so now we make coupes and Targas on one line in body construction and the second line is now the body construction for the 928. There is no question of not having enough space to produce both the 911 and 928.

**Is there any consideration given to producing an open 928 if and when the Targa 911 is no longer available?**

**Fuhrmann:** You will understand that we can't discuss our future programs, but, of course, it is possible. If we will do it or not, and when we might do it — that is inside our heart.

**Branitzki:** It would also depend on the regulations regarding roll-over tests. It is important to get more information as to what will happen this year with regulations. To go into development of an open car not knowing whether two years in the future it will be allowed any longer does not make sense.

**That brings me to a question about the 911.**

Has the point of no return been reached in gambling that the 1978 laws will be postponed and can there be a 911 if they are not postponed?

**Branitzki:** Our decision is to build the 911. I got the news a week ago that the Japanese have already postponed their regulations for another five years. This gives us a longer lead time for the research necessary to meet these regulations. We have definite plans to continue the 911.

Has the so-called "comfort package" been a popular 911 option? Will Porsche continue to expand comfort options for the 911 now that the very comfortable 928 is available?

**Branitzki:** That is not a bad question, is it? Mr. Peter knows even better than I that if you widen the program — 924, 911, 928 — then the dealer has the problem of stocking all the cars. The dealer will make the selection and may decide that the 911 is the sporting type and the 928 is the more comfortable. He will not ask the customer. When the customer comes in the store, he really does not have the whole array of choices. The dealer has a limited floor plan, we all know that, and we have now such a wide range that it can be a bit of a problem.

**Peter:** It is the same with interiors. The dealer can restrict the market by not accepting that

the future lies in the greater comfort and greater convenience of cloth because it is easier for him to take in a car which still looks nice in his opinion in two or three years, if it is leatherette. So he orders too heavy, in our opinion, in leatherette. We like to offer a greater number of cloth interiors because they are so much better for everyday use. In the summer you have better ventilation and in the winter the fabric is not so cold.

**Fuhrmann:** I would say it is important to offer different possibilities for a car; it is not important that all of them are bought. If you go in a shop, you may see a coat you like, but you will ask the salesman if he has other coats. At the end, you buy the first coat, but you like to see others. It is the same with us. You can offer a car in one particular color, with one particular style of interior and a particular set of options and it may be the best car, the car most people want. But we have to offer different things to show people that they can make choices.

**What is your reaction to the recent reorganization of Porsche Audi Division of VOA?**

**Peter:** We now have a Porsche Audi Division which is even stronger than in the past. In the past we had Porsche Audi, Volkswagen and

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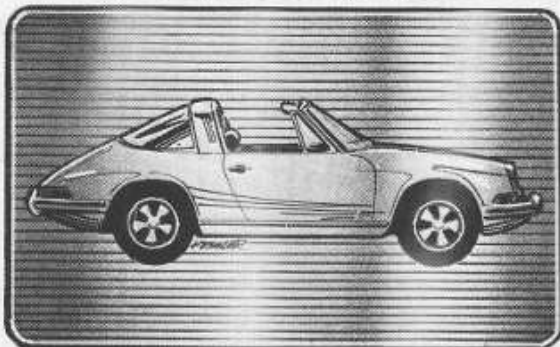
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Can you tell us something about the 1977½ 924?

**Peter:** The first cars are already on the market. We have done a running change which includes an increase of fifteen horsepower.

Does the European engine get a boost in horsepower too?

**Peter:** No, that remains unchanged at 125. We just brought the U. S. car closer to the European. We closed the big gap, which was



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something we didn't like to begin with. We had planned a change for the 1978 model year, but because of the heavy demand in the market, we made a crash program to bring this as a running change in the 1977 model year, including some interior changes to which the market objected. The two toned gray and black interior now becomes all black and we bring the 911 pinstripe velour to the seats. The rear end ratio has been shortened for improved acceleration, especially at the low end. The gears themselves are not changed, only the final drive ratio. These mid-year changes further back up our statement that we are committed to this car, that it is a Porsche.

**"It is important to offer different possibilities for a car; it is not important that all of them are bought."—Fuhrmann.**

How was the increase in horsepower achieved?

**Fuhrmann:** With the cylinder heads. We had a different layout of the cylinder heads for the

European engine and the U. S. engine. We put the European head on the U. S. engine and adjusted it for the regulations, so now we have only one type of cylinder head, valve size and things like that.

**Have there been any service problems on the 924?**

**Peter:** Dealers have reported that they can't remember having had a model that had so few things on it that they could complain about, that the car is as if it had been in production a year or two already. Dealers are quite strong on the car and its high level of excellence of manufacture.

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**"With the 928, every screw is new."  
—Fuhrmann.**

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**Fuhrmann:** You see, the start of production of a car is a matter of nerves. In the last weeks and months before production, many people see the car and know something to improve it. They get ideas and in the last half a year too many changes are put in. The result is a very bad production start. I decided not to change

anything and this was one of the reasons for a good start with the 924. We think in long range terms. This car will be built for ten to fifteen years and we will have time enough to improve it. We will bring all our ideas to this car, and of course, after ten years, you will hardly recognize it. That's the way we do it because we are a small company. That's the reason for a good start, and now, slowly, we will improve the car.

**The 928 has been as long in preparation as the 924. Do you expect it to have the same trouble-free behinning?**

**Fuhrmann:** The 928 is actually three months older than the 924 and we think it is very well prepared. We have been in the African desert many times, I was in Finland only four weeks ago, and there are no points regarding the car of which we are uncertain at the moment. Sometimes when you begin production of a car, you know some weak points, but we have no bad conscience on this car. We have made a slow start with production, producing one or two cars a day until summer. We think it is better to bring the car out a few months later and then in good condition, than to bring it on our customers rapidly because we can make quick business.

We had five years of development on the 928



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and I think that is good. Not many cars are built more quickly when every part is new. Of course, if Chevrolet makes a new car, they use the same engine, same gearbox, same axles and seats. They make a new dashboard and styling and call it a new car. And they do it in three years. But if you make a new generation, you don't make it in three years. In our company, we now build two new cars at the same time – the 924 and the 928. The 924 was one year ahead because we had many components already available. We had an engine, a gearbox, parts of the axles. Only the body was completely new, so it took one year less.

**It seems to have been smart for the 924 to come first and take some of the heat of the radical change before the 928 was introduced.**

**Fuhrmann:** You see, we have made no radical change, because it is a Porsche again. A Porsche car is not meant by having the engine in the rear or in the front, or by being air-cooled or water-cooled. That is not the definition of Porsche. It happened that for twenty years we made that kind of car, but our tradition comes from the old Professor. Since 1905, he made electrically driven cars, front

driven cars; he made everything and so we will make everything in the future. And we have not left the rear engine. Maybe one year we will make it again, but whatever we make, we will always make it Porsche. If you sit in that car, you will not know that the engine is in another place, because again it is driven like a Porsche. That is our philosophy. Not where the engine is, not how many cylinders the engine has, and not whether it is water or air cooled, but that it drives like a Porsche. That's our policy. ■

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# letters

## Thanks

Methinks Pat Garvey doth praise too much! (Letters, February, 1977). First, the artbook is still not finished (although it should be printed soon) and the Newsletter Committee had nothing to do with the \$100 newsletter subsidy – it was strictly a decision of the Executive Council. Newsletters these days are better because individual editors make them that way. The goal of the Committee is to help them. Thanks for the appreciation of this goal.

Frank Barrett, Chairman  
PCA Newsletter Committee

## And More Thanks

The excellent article which Anne Barrett wrote for the January issue describing the activities of the Executive Office has caused favorable comments and expressions of appreciation for the efforts of the staff of this office to keep PCA alive and happy. Many people who have occasion to correspond with my office have added little personal notes to their correspondence expressing their concurrence with the tone of the article.

I would like to use this letter as a means of publicly acknowledging these many compliments and offer my thanks to all who have taken the trouble to show their feelings in this warm manner. It is this attitude which is so typical of PCAers which makes my job worthwhile. Many thanks for

the kind words and evidences of support. They are proof that some of the finest people in this world are loyal PCA enthusiasts.

Jane Nestlerode  
PCA Executive Secretary

## And Still More

On January 28, I had the misfortune of trying to drive to Albany, NY, in a blinding snowstorm from my home in New Jersey. I was able to get as far as the entrance to the New York State Thruway above Suffern, NY, at which point all traffic was turned back. Upon surveying my car the following morning, I found it was encrusted in road salt. The problem I faced was where to wash my car. On Monday, I called Peter Dawe, service manager at Bell Porsche Audi in Rahway, NJ. I explained my problem and asked if I might use his facilities one evening to wash my car, provided he was staying late. He stated he was staying late that evening and I could come over. An hour later my car looked like it had just come out of the showroom. It is nice to know that in today's day and age, there are service managers who are just that. I would also like to mention that I did not buy my car from this dealer.

James A. Murray  
Riesentoter Region

