

Porsche Potency

Belts! Chains! Four cams! 32 valves! 288 horsepower!

BY DON SHERMAN

• The tide has turned. Never before in recorded history has a European car manufacturer tooled up such an elaborate package of technical advances and aimed it first and foremost at America. For the next two years or so, Porsche will be shipping 928 models to the U.S. with sophisticated twin-cam, four-valve cylinder heads *that will not be available in its home market.*

This radical move is a creative way to pump a bit more life into Porsche's flagship and simultaneously to throw the gray market a surprise curve ball. Thanks to the new under-hood technology, the 928's horsepower, torque, fuel economy, acceleration, and top speed are all significantly improved. Naturally, the price will take a fat hike as well: the final figures haven't yet been released, but John Cook, president of Porsche Cars North America, advises that the window stickers for the 1985 models will be pushing \$50,000, an increase of roughly \$5000.

In joining the rapidly growing four-valve-per-cylinder club (Ferrari, Lotus, Saab, and Toyota have four-valve engines on the U.S. market, and Jaguar, Mercedes, Oldsmobile, and others will join them in the near future), Porsche has added a few

of its own technical twists to the 79-year-old idea. Though the 928's pent-roof combustion chambers, centralized spark-plug location, notched pistons, and free-flowing ports are standard practice with four-valve designs, the visionaries of Weissach have come up with what we believe is a unique system of driving the quartet of camshafts.

The new cam-drive system was crucial to Porsche's goal of preserving as much of the existing all-alloy V-8 as possible. Obviously, new cylinder-head castings were a must, but Porsche engineers, led by Paul Hensler, the firm's director of powertrain design and development, did manage to salvage nearly every last detail of the original engine's toothed-rubber-belt drive mechanism. This accomplishment was significant because a new layout in this area would have scrambled all the accessory drives and demanded a new design for the front half of the engine.

Several fresh features have been added to the layout, however. The drive belt has stronger reinforcement fibers, and its tension is now automatically maintained by a hydraulically damped bimetallic-strip device. (Similar materials are used in home thermostats; in the Porsche's case, heat causes the tensioner to shift position and take up any slack in the cam belt.) The new

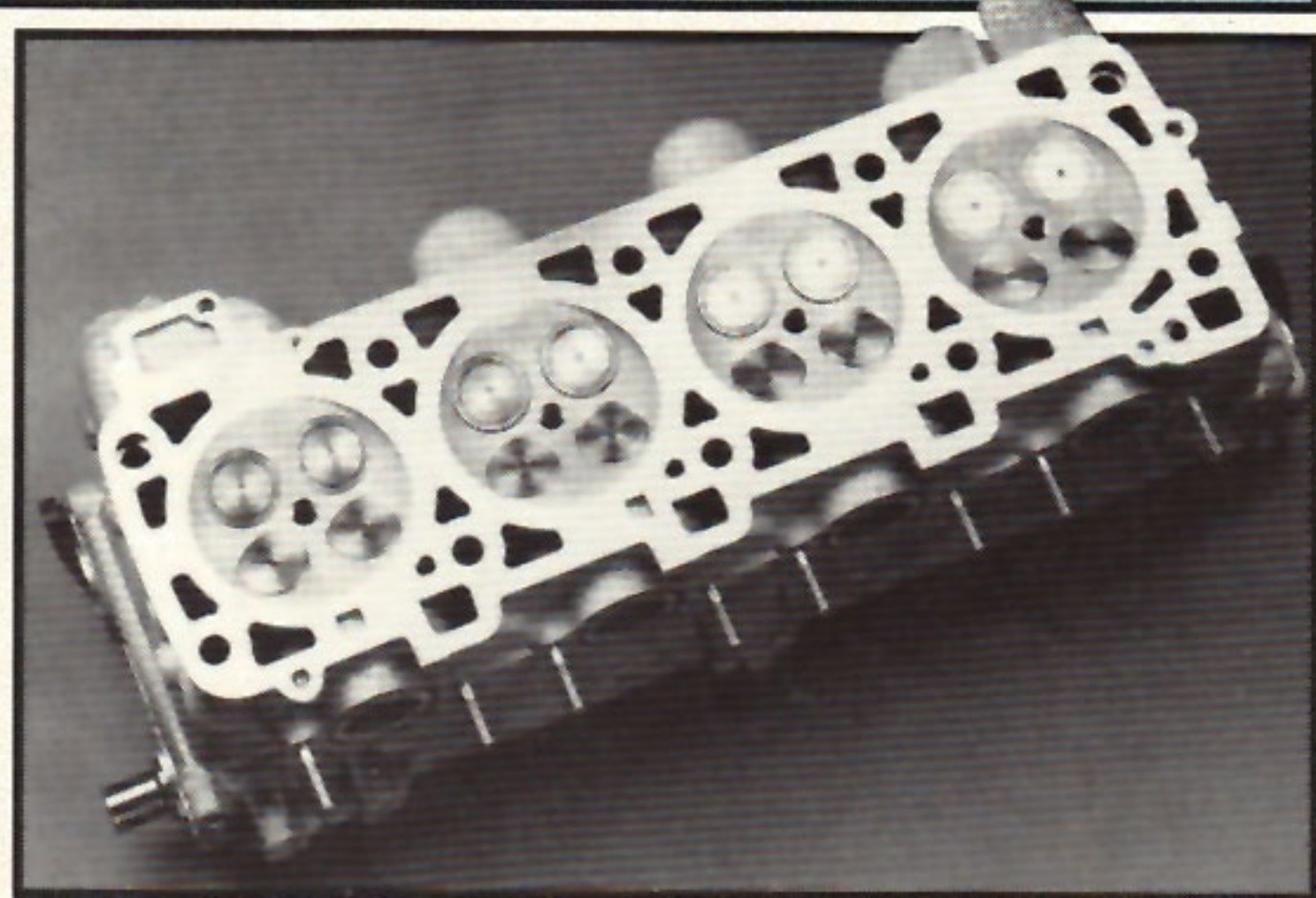
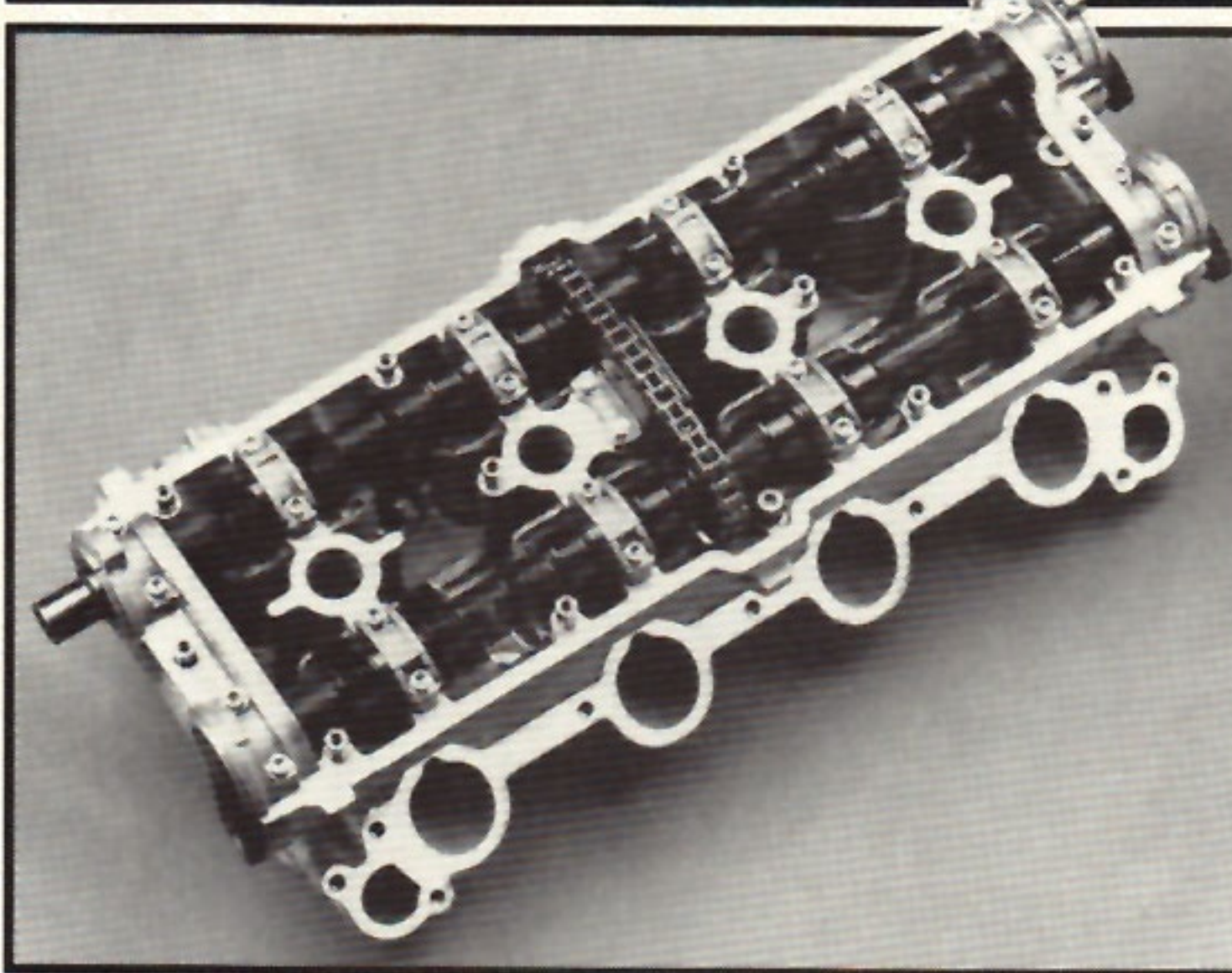
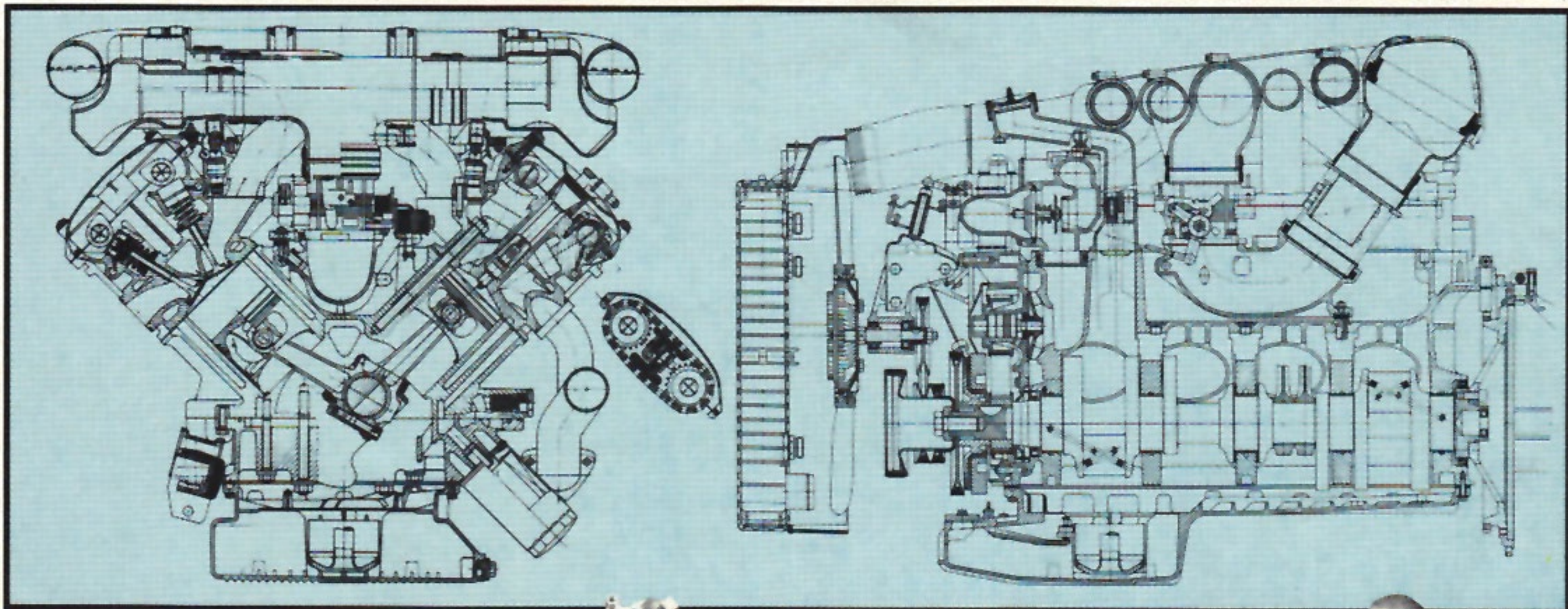
exhaust camshafts are driven directly by the long rubber belt, and they lie in the same location used in the single-overhead-cam head. The intake camshafts are positioned several inches inboard and are driven by a short run of single-row roller chain that loops around both of the camshafts in each head (see drawing). Each of the chains is positioned centrally along the length of its head and has its own automatic tensioner-damper device.

Hydraulic lifters between the cam lobes and the valves make periodic lash adjustment unnecessary. Many manufacturers favor a separate, bolt-on carrier for the camshafts and the lifters, but Porsche has incorporated this function in the elaborate aluminum cylinder-head castings.

Unfortunately, you can't see much of the heads' mechanical beauty when you raise the hood: they are shrouded by an intake manifold that looks like something designed to accompany the Mormon Tabernacle Choir. It comprises two massive plenums running lengthwise, a huge air-filter housing across the back, eight pipe-organ-like runners, and one more tube that connects the plenums with a central air meter. To take maximum advantage of the harmonic-resonance effects inside the intake manifold, no two consecutively firing cylinders draw from the same plenum. This system, together with the 928's low hood, necessitates two different tuned lengths, a design feature that in itself helps spread the ram-tuning torque boost over a broader rpm range. To save weight, all the intake-manifold pieces are cast magnesium.

The new race-bred valvetrain is only one item in a long list of updates for the 928's V-8. The cylinder bores are three millimeters larger, bumping the displacement from 4.7 to 5.0 liters. The main-bearing webs are meatier so that they can withstand higher loadings. The compression ratio has been increased to 10.0:1 (up from last year's 9.3:1). The Bosch electronic fuel injection is now signaled by a hot-wire mass-airflow sensor. The ignition is the latest Bosch Motronic system; it selects from a map of 256 combinations of spark advance and fuel-air ratio. The new exhaust system is a true dual-pipe design, featuring lightweight stainless-steel-tubing headers, a catalyst that is much larger in frontal area and volume, a higher loading of platinum and rhodium (the noble metals inside a catalytic converter), and a twelve-percent reduction in full-load back pressure.

The fancy hardware does indeed make a significant difference, both in what goes into the engine and in what comes out. Fuel economy is slightly better with either the five-speed manual or the four-speed automatic (although the correction factors used to determine the 1985 EPA ratings produce lower window-sticker figures). The torque curve now has a nice, fat hump at a very usable 2800 rpm, and it's both flatter (overall) and higher on the scale than

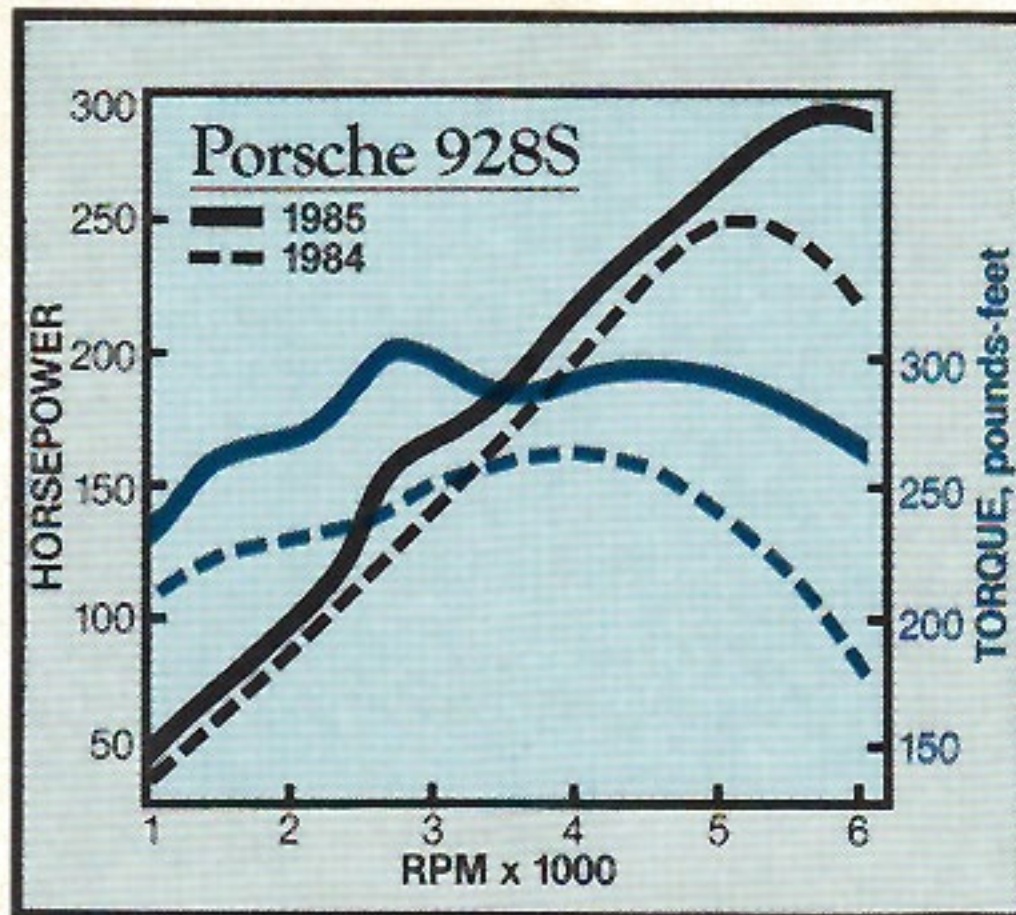


Porsche's clever two-stage cam-drive system allowed the addition of twin-cam cylinder heads without a complete redesign of the 928 V-8.

the 4.7-liter engine's output curve. Rated horsepower is up to 288 hp, a 23-percent improvement, and its peaking speed has been raised by 500 rpm.

Although we haven't yet been given an opportunity to conduct full test procedures, our initial driving experiences in American-spec 928s and Porsche's own performance figures make it clear that this car is now a proud member of the 150-mph club. The manual-transmission version is particularly brilliant in its throttle response, whether you're chugging along at 2000 rpm in third or hammering at the atmosphere at 4500 rpm in fifth.

The rationale for the new four-valve engine goes well beyond simple torque-curve plumping. A very potent 944 Turbo will be here in a few months—capable of exceeding 150 mph, according to reliable reports—and it wouldn't be appropriate for that upstart to fly by Porsche's flagship in top-speed and acceleration performance. Furthermore, it is Porsche's stated intention to eliminate systematically the performance differences that currently exist between U.S.-spec and European models. (The new Turbo will be a "world" car, equipped with the same basic hardware for all markets.) Equalizing U.S. and German



Engine type	V-8, aluminum block and heads	
Bore x stroke	3.94 x 3.11 in, 100.0 x 78.9mm	
Displacement	303 cu in, 4957cc	
Compression ratio	10.0:1	
Engine-control system	Bosch Motronic	
Valve gear	belt-and-chain-driven double overhead cams, hydraulic lifters, four valves per cylinder	
Power (SAE net)	288 bhp @ 5750 rpm	
Torque (SAE net)	302 lb-ft @ 2400 rpm	
Redline	6000 rpm	
Mfr.'s performance ratings:	auto	manual
Zero to 60 mph	6.6 sec	6.1 sec
Standing 1/4-mile	14.9 sec	14.2 sec
Top-gear passing, 30-50 mph	2.2 sec	8.2 sec
50-70 mph	3.0 sec	8.6 sec
Top speed	152 mph	155 mph
Fuel economy, EPA city	16 mpg	15 mpg
EPA highway	22 mpg	22 mpg

performance was no small feat in the 928's case, since it has been such a strong autobahn runner for so long. Fortunately, instead of slowing the home-market car down to U.S. levels of speediness, Porsche undertook the more ambitious task of pulling the American model up by its bootstraps. This upgrading is also a shrewd investment in the future, because the new four-valve head will fit the 944 engine as well; we will likely see a sixteen-valve four-cylinder from Porsche within two years. By then, the four-valve crowd will be much larger. Today, however, racy cylinder heads are still very special, and they do go a long way toward making \$50,000 for an automobile seem almost reasonable.

Unfortunately, there remains one small chink in Porsche's armor. The European 928S is still a superior automobile because anti-lock brakes were added to its standard-equipment list for the 1984 model year. We feel strongly that such hardware should be part of the 288-horsepower, 155-mph, \$50,000 deal in the U.S., and that opinion has been registered with Mr. Cook of PCNA. Porsche's best customers are here in America, and they deserve the best 928s that the Zuffenhausen factory is capable of building.