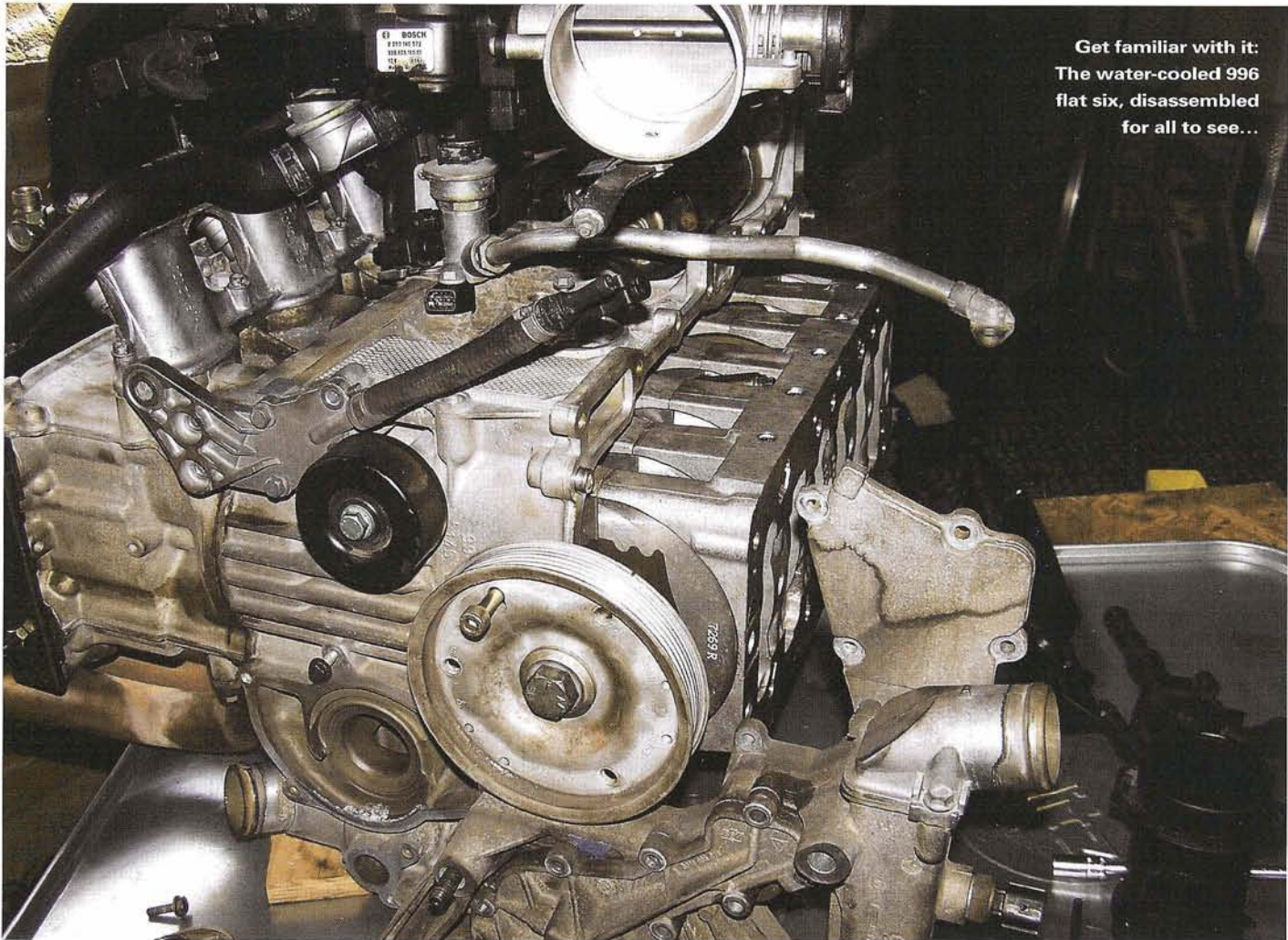


Questions & Answers

BY JIM PASHA



Get familiar with it:
The water-cooled 996
flat six, disassembled
for all to see...

Do you think the 996 engines will be as reliable as previous 911 engines were? Is the construction of the new-gen flat six robust enough to last over 200,000 miles, or 300,000 kilometers?

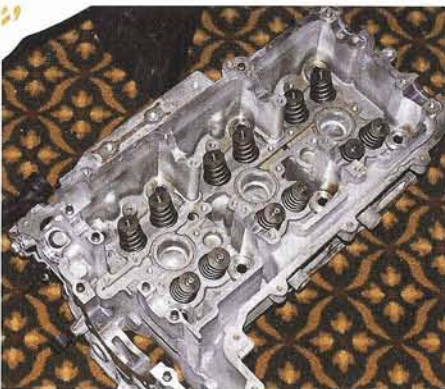
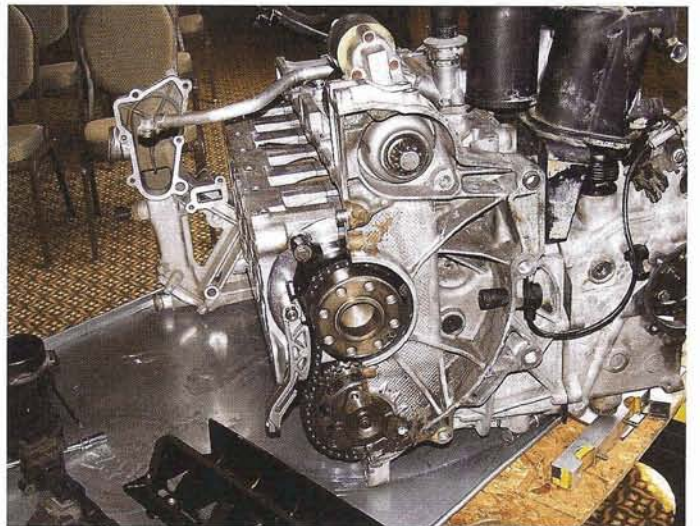
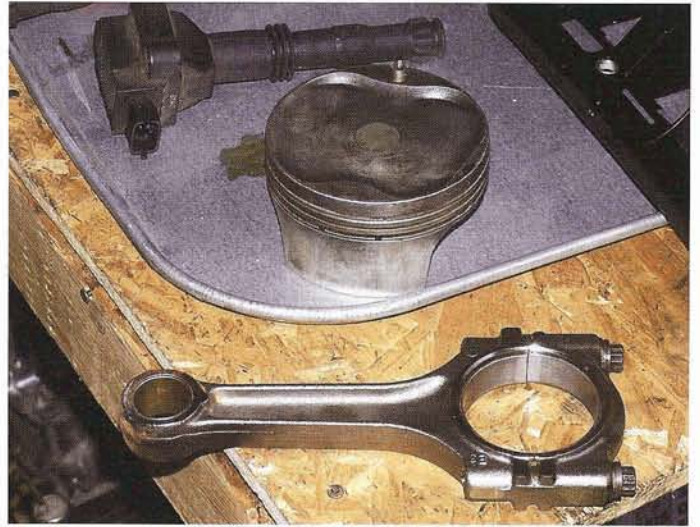
Easily. The first thing to consider about the liquid-cooled 911 engine is that the internal design was intended to make the rotating engine pieces solid in relationship to all other rotating masses. What that means in English is that the crank-

shaft, connecting rods, and pistons were supposed to be located better.

In earlier Porsche flat sixes, the case halves provided both the "holder" and reference for the crankshaft and other, critical parts. But, because of the size of the components and the space available, some compromises were made — both in the web sizes and case design. One traditional weakness in the all-aluminum Porsche engines was main-web strength.

This goes all the way back to the original four-cylinder 356/912 engines.

Over time, normal usage weakens and distorts the main webs — no matter how well balanced the rotating masses are. It may take many miles of use before these problems show up, but they *will* occur. Many 356ers know exactly what I'm talking about — as well as what it costs to replace a worn-out case. Harry Pellow had a number of crankcases he used to



Combined cylinder bank/outer crankcase casting (top, left) was chosen to simplify the manufacturing process. Connecting rod (top, right) for a 3.4-liter 996 engine; piston is dished for the four-valve heads. Partially disassembled 996 engine seen in profile, with the iron main-bearing saddle clearly evident (above, left). Another view of the main-bearing saddle (above, right). Four-valve 996 cylinder head (left) showed little wear after 100,000+ miles, though the chain ramps for the 996's VarioCam timing system did show their age...

show off. These cases looked good, but they had main webs with so much fatigue that they weren't worth salvaging. X-ray inspections revealed most of this.

Porsche has nearly eliminated this possibility in the 996/Boxster engine by utilizing a unique main-case design with an iron main-bearing saddle. The main portion of the case is cast around each set of pieces in aluminum. Porsche AG decided to make the cylinders part of the outer crankcase to simplify the manufacturing

process. This makes it a complex piece, with cylinder liners cast into the aluminum alloy outer case during the manufacturing process. This method of assembly and manufacture is new to Porsche, but it yields a robust engine — though there appears to be evidence that the weak link is a need to better locate the rear end of the crankshaft. Time will tell.

We recently inspected a 996 engine that suffered serious damage due to (purposely) contaminated fuel. Internal pho-

tos of a used or failed 996 engine have been rarely, if ever, published and few independent shops have pulled one of these engines apart. That's partly because Porsche AG doesn't make internal pieces available and partly because it offers a factory rebuild and exchange program — with enough of an incentive that few owners do anything other than turn in their broken motors as cores. In this case, though, our 996 owner opted to purchase a low-mileage engine from a dismantler instead of an exchange motor. That left his old 3.4 as a core that we were able to photograph with the help of Wickie Laurie of Renntag Motorwerks of Nashville, Tennessee.

The 296-hp water-cooled, DOHC flat six had well over 100,000 miles when it began to exhibit a compression problem. It was removed from the car and disassembly revealed upper cylinder cracking due to the fuel contamination. Otherwise, the engine was in good condition when it was disassembled. The first thing we noticed was that cylinder wear was almost non-existent. The bear-

ings and rings also showed very little wear, even at 100,000 miles. The chain ramps for the VarioCam, however, seemed to have heavy grooving that's similar to what we've seen on 944S, 944 S2, 968, and 928 S4 engines that use similar tensioner arrangements. The 996 camshaft-drive chains did not appear to be stretched or damaged, though. At least these items can be replaced without totally disassembling the engine.

Except for the valid complaints over rear main seals in both Boxster and 996 models and some early manufacturing problems, these all-new engines are surprisingly trouble-free — especially in comparison with Porsche engines of the early 1970s. We witnessed terrible failures with the air-cooled flat sixes in those days, from crankcase issues to chain tensioners to head studs. There have also been failures in the later air-cooled engines, from premature valve-guide wear to cylinder-head sealing issues to secondary air/CEL failures. Any criticism of the “new-gen” motors must take these air-cooled foibles into account, too.