

Head KAASE

The Better Windsor Performance Head

BY RO MCGONEGAL ■ PHOTOS BY MOORE GOOD INK

The P38's Advantage:
Extra Cylinder Filling



01. The head of the 2.100-inch intake valve maintains stems measuring $11/32 \times 5.450$ inches, the stems of the 1.600-inch exhausts are $11/32 \times 5.460$ inches.

Engine philosopher Jon Kaase of Jon Kaase Racing Engines in Winder, Georgia had one of those nagging ideas. You know the type; the ones that make you look at something and say “why not?” For years he watched the ubiquitous Ford 302 market amass part upon improved part, but observed nary a deviation from the original cylinder head configuration. He thought he could produce cylinder head castings that looked like an ordinary Windsor 302/351 on the outside but inside would perform entirely different from the original blueprint. Being a racer, he knew the value of stealth. But more importantly, as an engine builder he knew the prime advantage of canting the valves to open towards the center of the cylinder, thus mitigating the natural shrouding effect of the cylinder wall.

The Ford P38 cylinder head was designed primarily for the 302W (8.2-inch deck height, 4x3 bore/stroke, 5.095-inch rods). It's derivative of the popular 347-ci (over bored by .030-inch and stroke increased to 3.400-inch), the 351W (9.5-inch deck height, 4x3.5 bore/stroke, 5.960-inch rods) and the 427-454W Sportsman-type Dart block (9.5-inch deck height with 2.750-inch Cleveland main journals). Combustion chamber volume is typically 60-62cc.



02. With a mechanical roller camshaft, the valve springs have an installed height of 1.950 inches and generate seat pressures of 240 pounds. Open pressure is 500 to 600 pounds. Because the action is quicker on a mechanical roller system, greater spring pressure is required to maintain contact between the roller tappet and the cam lobe. In contrast, seat pressure for a hydraulic roller system might be 145 to 150 pounds.

03. Naturally, the P38 head employs stud-mounted rockers. Most rocker arms will readily adapt to the P38 cylinder heads, but because the valves are canted, the ends of some of the fulcrum shafts may need a touch-up with a hand-grinder. Trend pushrods operate within these guide plate slots, which prevent the rockers from rotating on their axis and ensure that the ends of the rocker arms remain centered on the tips of the valves.

04. In addition to the P38 head kits, Kaase constructs fully built P38 engines, each complete with dynamometer sheet and video.





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THE REVISED ANGLES ADVANTAGEOUSLY PLACE THE INTAKE VALVE IN THE CYLINDER BORE AND THE CNC PORTING IS MUCH MORE EFFICIENT THAN THE ORIGINAL.

For better cylinder filling, Kaase envisioned valves canted at 8x4.5 degrees on the intake and 10x4 degrees for the exhaust. The new territory produced by this modification would allow him to increase the diameter of the valve heads to 2.100 inches and 1.60 inches and by astute CNC porting he would induce far superior airflow and cylinder filling compared with any conventional layout. The revised angles advantageously place the intake valve in the cylinder bore and the CNC porting is much more efficient than the original. It also has the qualities of a sweeping short-turn radius (on the floor of the port) and deeper valve bowls, giving the atomized fuel improved entry to the combustion chamber.

Assume a 2.100-inch intake valve yields 350 cfm in a port with a given cross-sectional area. Then assume that you increase valve size to 2.200 and the engine yields 360 cfm; the result could actually indicate a loss in performance. Such is the consequence of increasing the intake port and losing the air velocity because the opening is now larger. Sophisticated petrol heads know it doesn't pay to increase cfm unless there is a simultaneous gain in airspeed.

Then, because the P38s flow so well at 0.400-0.500 inch of valve lift, the camshaft could be tailored with 5 to 10 degrees less duration. This usually results in smoother idle and better low-end manners. These Kaase heads favor camshafts with close lobe centers that tend to produce more power.

05. As a canted-valve construction, the arc of at least one of the rockers on the P38 interferes with the conventional rocker cover. Kaase's exclusive cast aluminum covers eliminate the problem. As a clean-sheet design, it was also easy for him to increase clamping power: the rails on the P38 head are configured for eight (rather than the usual six) fasteners.

06. The P38 conversion accepts any Windsor intake manifold, including EFI types, but the Edelbrock Super Victor and Victor Jr. have proven the most effective so far.

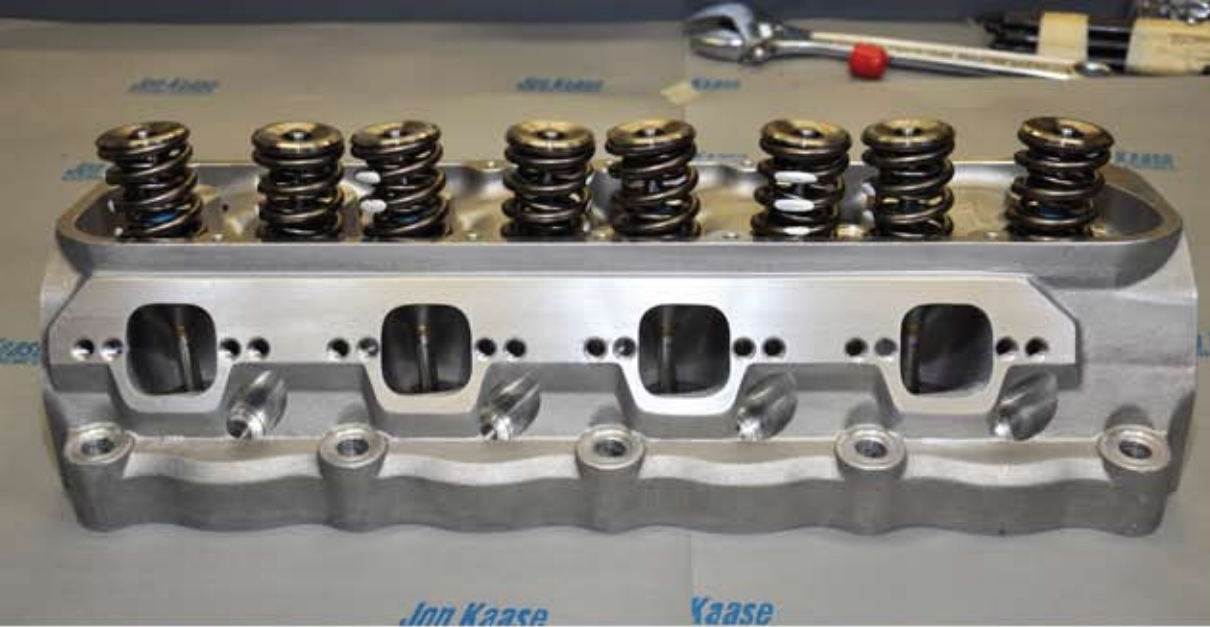
07. When Kaase ships a complete engine, a Demon carburetor will likely accompany it; the carb is flow-rate matched to displacement as well as purpose.



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Though the 351 Cleveland could be coerced, its coolant flows through the front of the block and into the cylinder heads. With the Windsor, coolant flows through the intake manifold. Certainly the Cleveland's redundant passages could be blocked off, but Kaase's wisdom is to use the Windsor block that is stronger, readily available and requires no modification.

On pump gas and with barely 9.0:1 compression ratio, a modest mechanical roller camshaft and an Edelbrock Victor Jr. intake manifold, the Kaase 302 easily produces 500 hp at around 7,500 rpm. At the other end of the power spectrum, a Kaase-equipped 392-ci OE cylinder block belts out 650 hp all day long but is fully capable of producing 700 hp and beyond if desired.

Including valve covers and valve cover gaskets, the P38 heads are supplied with larger valves, springs, seals, retainers, rocker studs and guide plates installed. Complete P38 engines are also prepared at Kaase's facility. These are accompanied with dynamometer test results and often a video. Dyno tests ensure the engine is producing the expected power output and is free of oil and water leaks.

The bottom line is a Ford 302 or 351 Windsor with much improved throttle response and more usable power. It also allows the Windsor to be competitive with far more expensive modified Cleveland engines. One more thing, Kaase's annoying, nagging feeling is a thing of the past. **M**

SOURCE

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08. The P38 cylinder heads have a mounting provision (2-inch centers) for conventional tubular exhaust headers as well as wider (3 inch) centers that allow for larger exhaust ports.

09. Most Kaase crate engines employ Diamond forged pistons engineered for the application. On the other hand, if conventional pistons are required, they need a small valve relief (no more than 0.125 inch at the outer edge) to accommodate the canted angle of the intake valve. This is a simple fly-cut operation aided by a hand drill.

10. Kaase P38 heads waiting to be shipped. Next stop, your better-performing 302 or 351 Windsor engine.