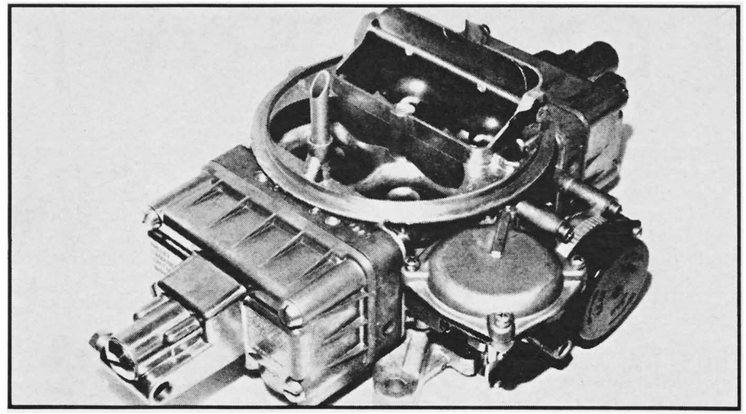
Some Special Pieces Put More Power Into the Ford HP Racing Engines

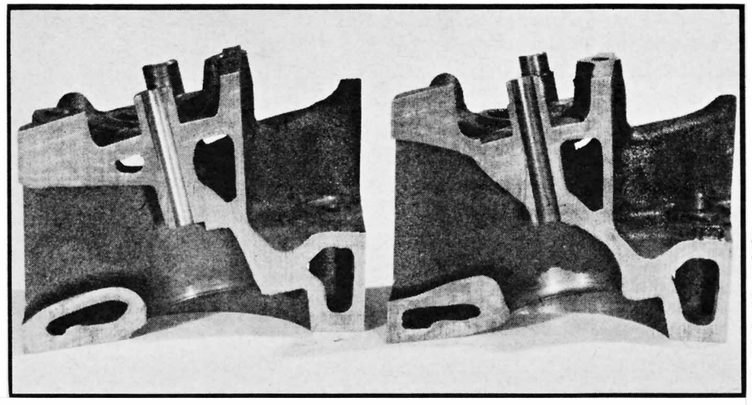


7000 RPM —all day!

LAST FEBRUARY we described the latest changes made by Ford engineers to their big 427-cu. in. high-performance engine. But development of a racing engine is a continuous process, with new items or ideas always underway or coming along. And, always, the goal is more horsepower with reliability. Last April Ford introduced some further changes in its 427 High Performance engine and these were approved by NASCAR for its stock car racing circuit.

These engines have come to be known as the "7000 rpm" series, primarily because they are designed to run reliably at 7000 rpm. Ford engines, prior to April, were limited to about 6500 rpm, this being the point where the valve mechanism would begin to "float," or no longer follow exactly the camshaft's contours. These engines were producing between 500 and 520 bhp at 6200 rpm.

BETTER BREATHING is secret of higher rpm. Head sections show how air flow passages have been cleaned and enlarged (right).



FORD MOTOR CO. PHOTOS

The easy way to get more power is to provide better breathing and turn up the rpm. However, improvements come slowly and substantial gains are very hard to come by. Sometimes the engineers can find more power, but then weak spots show up which never appeared before.

Ford's 7000 engines incorporate changes for better breathing, a lighter valve mechanism, new connecting rods and refinements in the lubrication system for bottom-end durability.

The high-rise manifold was revised last fall and provides all the passage area that can possibly be used by the valves. Here the only change has been enlarged throttle bores in the 4-barrel carburetor, with corresponding larger holes in the mounting flange on the manifold. This raises the air-flow capacity from 780 to 850 cu. ft./min., a gain of 9%, while the rpm increase from 6500 to 7000 rpm amounts to 7.7%.

Valve spring pressures were already close to the limit of cam and tappet durability. New valves with hollow stems are now being used. Valve heads are thinner, with a narrower seating surface, to save weight. The intake valve is made from a special alloy. The exhaust valves, being smaller, use sodium cooling without much weight penalty. Here the hollow stems are partially filled with sodium and sealed. The sodium becomes a liquid at high temperature and keeps the exhaust valves much cooler by transferring heat more rapidly from the head to the stem, and hence through the valve guide . . . not a new idea but one that's reliable.

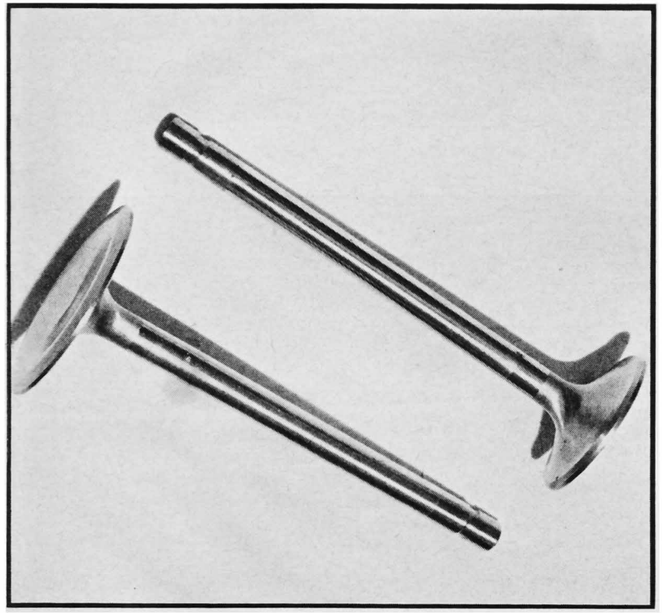
The new connecting rods are rather interesting; readers who remember the old Ford rods might even wonder why that design wasn't adopted. (The rod-cap bolts were forged integral with the rod.) However, the 7000 design replaces the long through-bolts with a capscrew which is threaded into the rod. This eliminates the usual notch required to hold the bolt head in place. The capscrews are made of the best alloy steel and are heat-treated for maximum possible tensile strength—something not feasible with the old Ford integral-bolt design. The new fastening scheme was necessary because of the higher speed, which causes greater inertia loads. These go up as the square of the rpm.

While the forged crankshaft is much the same, the oil-hole drilling system is changed. Formerly a single angled hole ran from each rod bearing surface down to the nearest main. Circumferential grooves in both the main bearing shell and the journal itself were employed to insure a continuous feed. In the 7000 crankshaft the main and crankpin journals are cross-drilled and the big lightening hole in each crankpin is now utilized as a part of the oil feed circuit. Of interest too is the fact that the oil feed system is continuous from end to end—if the line to one main should plug there would not be an immediate failure. The cross-drilling at the mains allows removal of the oil feed channel or groove in the lower bearing shell half. The upper shell is still grooved, but the crankshaft is not. Special machining (see photo) at the outer ends of the cross-drilled hole insures oil flow at the instant the holes are horizontal and only partially in line with the feed groove in the upper bearing shell.

The full-flow oil filter has also been redesigned to allow the higher rate oil flow without excessive restriction.

No output figures for the 7000 engine have been released by Ford, but conservative estimates put the figure at 550 bhp at 6800 rpm. It may be even higher, as Ford's NASCAR competitors can testify. —*John R. Bond*

NEW VALVES have hollow stem construction, thin flexible head with narrow seat, are swirl-polished.



CRANKSHAFT has cross-drilled lightening holes plugged and sealed, more bearing area with oil groove removed.