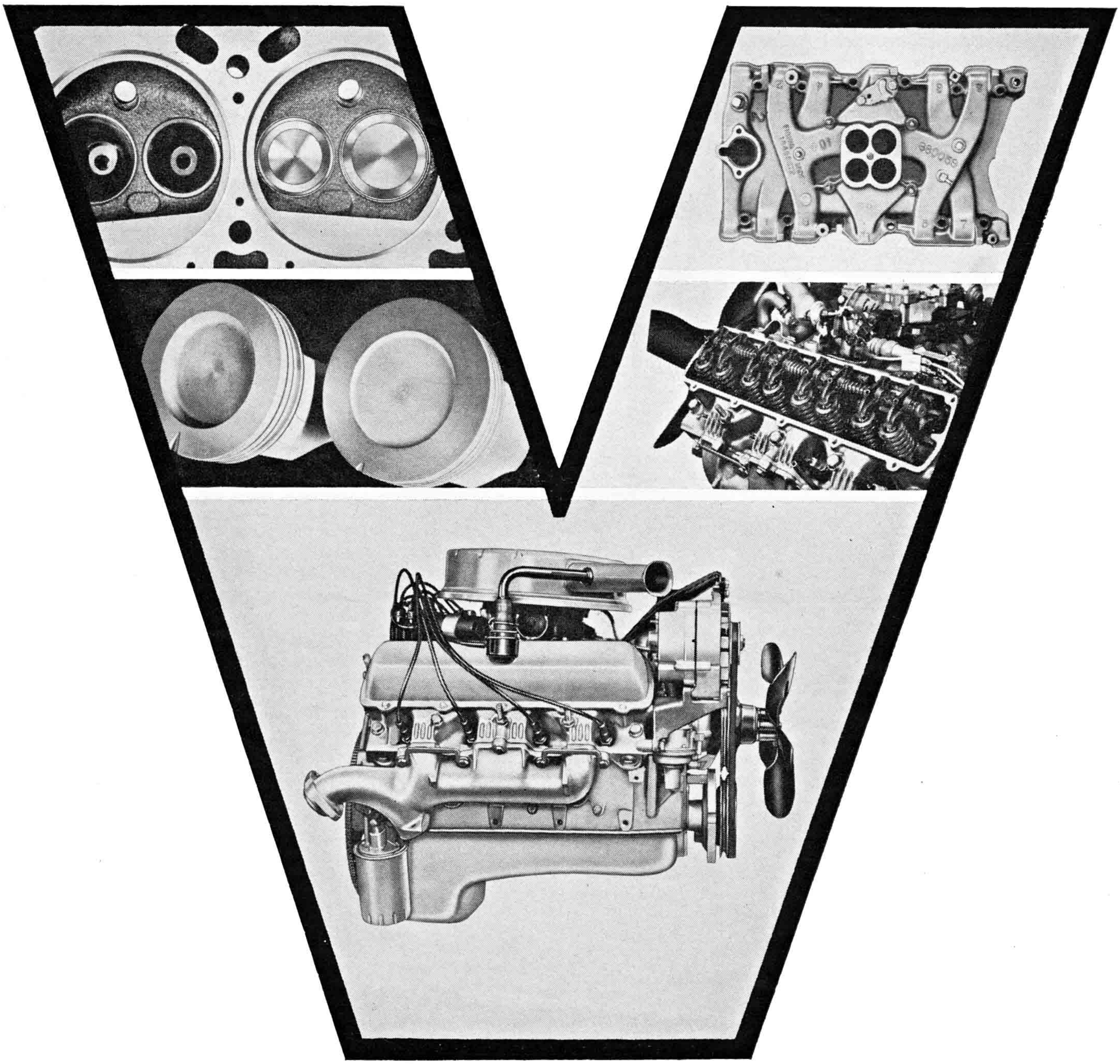
A new V-8 for the F-85

by Roger Huntington

OLDSMOBILE'S new 330-cubic-inch cast-iron V-8 is the only all-new engine in Detroit's 1964 model crop. It combines all the latest in engine design know-how for long, reliable performance and economical mass production. And Olds badly needs this new engine. The basic tooling for their big Rocket V-8 was laid down in 1948. The design has been improved tremendously since then, but it's still pretty big and heavy by today's standards.

On the other hand, the little 215-cubic-inch aluminum V-8 was no answer for '64 models. The new F-85, with the larger GM "A" body and perimeter frame, weighs 600-700 pounds more than last year's unit-bodied F-85. The little engine could hardly be stretched to the cubes necessary to haul this heftier package. It was relatively expensive to produce anyway. The only answer was a brand-new, lightweight, compact, cast-iron V-8 of medium displacement that could be used for both the F-85 and the lighter models of the big car – and which was designed for substantial future increases in displacement, to eventually replace the big Rocket engine.

This is the engine we have now. And the beauty of it is that the new V-8 has been designed to use much of the tooling for the old engine. The blocks are machined on the same transfer line. Vital dimensions like cylinder bore center span, valve lifter centerlines, crank-to-cam centers, main bearing bolt positions, location of head studs, etc., are the same for both engines. There are even a few interchangeable parts. This means that Olds has a brand-new engine for a much less-than-usual tooling investment. They can build a better car for less money.



Olds hits a high in mass-production techniques

Olds' new Jetfire Rocket engine is noticeably smaller than the big Rocket V-8, though it uses some of the same tooling and has the same bore center span of 4⅝ inches. It's 3.1 inches narrower, 0.1 inch shorter, 2.1 inches lower, and weighs about 100 pounds less. The bore and stroke of 3.9375 x 3.3850 inches give the 330 cubic inches. The standard model has a two-barrel carburetor and 8.75-to-1 compression ratio to get 210 hp at 4400 rpm. Torque is 325 pounds-feet at 2400 rpm. By raising the compression to 10.25 to 1, we get 225 hp at 4600 rpm and 335 pounds-feet of torque at 2400. This engine is optional on the F-85 and standard on the new Jetstar 88 series (a lightweight version of the big Olds). Then we have the power-pack engine with 10.25 compression and four-barrel carb, that puts out 260 horses at 4800 revs and 345 pounds-feet of torque at 3200 rpm. This engine is optional on all models and standard on the sporty Cutlass series. No turbo-supercharged model will be available for the time being – though it wouldn't be surprising if we see a turbo version of the new engine later on in the model year.

Olds engineers have concentrated heavily on weight reduction on the new engine. Total car weight is not only a vital factor in acceleration and gas mileage, but the companies have to buy their steel and iron by the pound. The new engine weighs about 560 pounds with all accessories (but no flywheel), which is roughly 100 pounds lighter than the big job with its latest aluminum front end. Modern thinwall casting techniques make the difference. For instance, the sand cores for the castings are now baked right in their original mold boxes – instead of being taken out and baked on trays in an oven. This reduces core distortion. The new design has only one long core for the whole crankcase section, instead of four cores for each section between main bearing bulkheads. This reduces the chance for misalignment where separate cores are fitted together. The cylinder water jacket cores are "piloted" on cone-shaped arbors right in the bore cores, instead of being supported on ends and sides. This permits precise control of cylinder-wall thicknesses.

The result of all this care is obvious: It lets the designer use much thinner casting walls because he doesn't have to allow for core distortion and misalignment. He doesn't have to make walls too thick because some of them may be thinner than they should be. And, of course, this reduces the casting weight. The cylinder block for this new engine weighs 157 pounds, compared with 186 pounds for the big Rocket. (And this includes the extra section around the timing gears.) Cylinder heads have been cut from 55 to 50 pounds. The new Jetfire Rocket is certainly one of the lighter engines in the industry in terms of pounds per horsepower and pounds per cubic inch.

Note the combustion chamber. It's a modified wedge that's designed specifically for *improved breathing through the valves*. For one thing, the valves are moved inward toward the center of the chamber, so they're nearly on the cylinder centerline. This gets the edges of the valves away from the far chamber wall, so there's much less "shrouding" of mixture going in and out of the valves. Shrouding is reduced to short areas at each end of the chamber, rather than almost the entire outside wall as on the big engine. The rounded contour of the chamber also helps breathing by gently turning the mixture flow that comes through the intake valve and normally piles up in the outside part of the chamber volume.

This science of shaping combustion chambers to give better breathing through overhead valves is still in its in-

Several design features of the new engine are shown on the facing page. The intake manifold is cast iron and does double duty. In addition to its primary function, the manifold also serves as the cylinder block top cover. This saves the cost of an extra part and also cuts down on engine noise. Total weight of the casting is 36 pounds. The rocker arms are cast iron and are carried on a simple, solid shaft that bolts to aluminum brackets. Valve gear gets lubrication through hollow pushrods. Holes in tops of rocker arms bleed oil off rocker shaft journals and squirt it onto rubbing surfaces at rocker tip. The side view of this new engine shows off its compactness. It's 3.1 inches narrower and 2.1 inches lower than the big Olds Rocket. Total weight is 560 pounds (with all accessories but no flywheel), about 100 pounds lighter than the big V-8. A further saving comes from the piston design, which in reality becomes a part of the combustion chamber. Upping the compression ratio is accomplished by changing the depth of the dish in the piston top. Deep dish gives 8.75 to 1, while shallow dish gives 10.25 to 1 – much cheaper than varying combustion chamber volume. Combustion chambers are modified wedges, with valves moved toward the center to reduce shrouding between valve edge and chamber wall. Breathing is excellent, and design is such that a reasonably low-octane gasoline will do.

fancy in Detroit — but there's a lot of work being done. Engineers are finding that chambers don't have to be contoured entirely from the standpoint of combustion flame travel, squish area, and pressure rise. These factors may not be so critical as we once thought. This new Olds chamber would've been rejected 10 years ago for insufficient squish area and turbulence. Today, with modern fuels, we find that the octane requirement (in relation to compression ratio) is no greater than the more conventional wedge chamber in the big engine. And yet this small engine breathes a lot better. This breathing, incidentally, is helped by big 1.88-inch intake valves and 1.56-inch exhausts, with port sizes to match. This is the same valve area used in the big 394-cubic-inch engine. The relatively cool cam timing (250-degree intake duration with 36-degree overlap) maintains the mid-range torque. There's a lot of room for hotter valve timing if Olds decides to go that way.

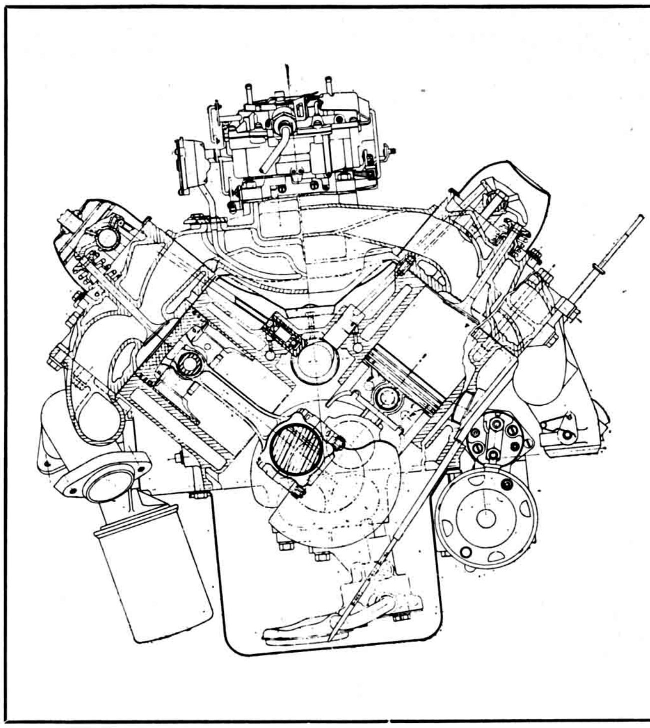
Olds engineers have designed their traditional long life and reliability into this new engine. The crankshaft and connecting rods are forged steel. The trend in the industry is toward using cheaper cast ductile iron for these parts, but the forged parts still have that extra margin of strength. And the Olds production department can use their integral forge plant to whack out these parts almost as cheaply as they can be cast. The few extra pennies are charged up to quality. Rod and main bearing diameters of 2⅛ and 2½ inches respectively assure plenty of bearing area and crankpin overlap on the crankshaft. The bearing area per cubic inch is comparable with the big V-8. The new connecting rods are only 6.0 inches center to center, giving an extremely light, rigid part. Bearings are steel-backed Durex 100 babbitt.

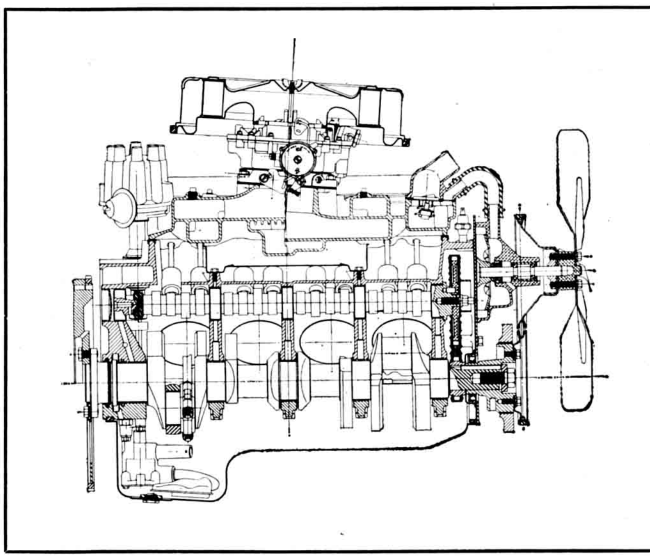
Valve gear lubrication is entirely different. The pushrods are now tubular and bring oil up to the valve gear at full engine pressure from the hydraulic lifters. The oil is fed from the pushrod seat to the rocker shaft journal through a hole drilled in the cast-iron rocker arm. Then another drilled hole on the other side of the rocker bleeds off a little oil to squirt out on the rocker tip that rubs against the valve stem. The system gives more complete lubrication to the valve gear, controls the oil flow more closely, and saves money by using a solid rocker shaft that bolts rigidly to the aluminum brackets (saving several small parts). A performance bonus is that the lighter tubular pushrods will allow higher revs before the valves float.

A unique feature of the engine's lower section is that the front of the cylinder-block casting is extended forward to house the cam timing chain. This opening is then covered by a simple one-piece stamped steel plate which, in turn, carries the die-cast aluminum water pump bolted directly to the flat plate (so the plate acts as the rear of the pump housing). Object: money. A little thought will show that this layout is much cheaper than the usual cast timing cover and separate water pump.

Also in the cylinder block, there's an unusual cast bulkhead that runs horizontally just above the camshaft area. This gives much extra bracing and strength to the block — but it also acts as a very efficient sound shield to keep crankcase noises from coming up in the engine compartment. Good old cast iron is one of the best acoustic linings you can use. Having the intake manifold acting as the engine top cover helps, too. This engine is extremely silent.

All in all, it seems to solve a number of problems for passenger cars, has tremendous potential for factory hop-up, and even more potential for the backyard hot rodder. Keep your eye on this engine in all types of competition — sales *and* race. **/MT**





Blueprint drawings show internal detail as well as thinwall casting technique used in manufacture of the new Oldsmobile V-8. The thinwall process affords more uniformity in wall thickness, and as a result the walls are thinner. In obsolete methods, the walls were cast thick — not so much for needed strength but to make up for a lack of uniformity (which would cause thin spots in certain areas). Other features of the engine include front section where cylinder block casting is extended forward to house timing chain. The front end is then capped with a simple, flat, steel plate, and the die-cast water pump is bolted directly to it. Saves money, weight, and complication. Crankshaft is short and stiff and offers plenty of bearing area for engine size. Since the bore centers are the same as on the big engine, it doesn't take too much imagination to come up with the fact that this engine, with larger bore and stroke, will eventually replace the present engine. Potential of this new mill should make it very popular with the country's hot rodders.