M/T's 3 VALVE THREAT

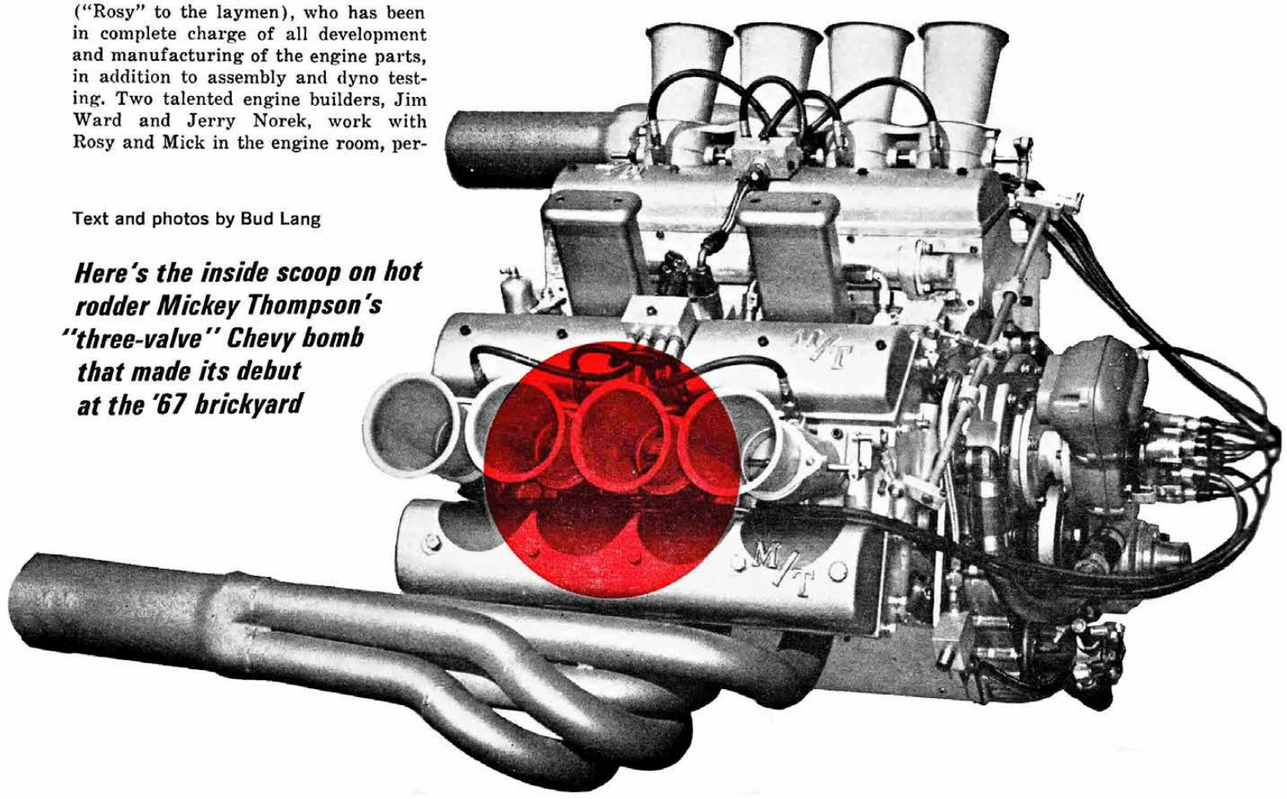
Here's the inside scoop on hot rodder Mickey Thompson's "three-valve" Chevy bomb that made its debut at the '67 brickyard

Text and photos by Bud Lang

Never content to take the easy way out when it comes to indulging in some activity, Mickey Thompson, well-known hot rodder and manufacturer, has done it again. When he decided to make a bid for a berth in the 1967 Indy 500 starting field, Mick not only began construction of two new cars, but he also "went the route" with a totally new engine. Though based on a block design similar to the Chevrolet 350-incher, the new engine is a Thompson design. Practically everything in the engine is completely new, including a three-valves-per-cylinder head design.

To begin with, Mickey had his own cylinder block cast from 356-T6 aluminum alloy, crossbraced in the tappet galley and incorporating extra reinforcement in the main web area. Load distribution webs also connect the main cap areas with the cylinder block's upper decks. The three center mains have four-bolt caps for additional support, and outer cap screws are angled outward at 45° for greater stability. One of the remaining few differences is that the oil passages in some areas have been drilled and tapped to accomodate other engine design changes.

While Mickey considered the many avenues of approach to building a high-performance engine capable of competing at Indianapolis (and made the final decisions), it has been his project engineer, Bill Hroscikoski ("Rosy" to the laymen), who has been in complete charge of all development and manufacturing of the engine parts, in addition to assembly and dyno testing. Two talented engine builders, Jim Ward and Jerry Norek, work with Rosy and Mick in the engine room, performing the labor necessary in fitting and assembling the many handcrafted parts.



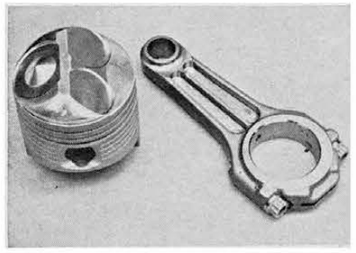
Crankshafts are Moldex billet steel shafts turned out of SAE 4340 steel, incorporating 2.450-inch main bearing diameters (350-inch Chevy size) and 2.200-inch rod bearing diameters (427-inch Chevy size). This crank also features central counter-balancing. In early engine tests, Moldex cranks were used with success in stock Chevy blocks, but the blocks repeatedly lost their main webs. Evidently they couldn't withstand the power put out by the new three-valve engine, thus another reason (in addition to a weight reduction) for the use of aluminum and a different design.

The decision to utilize a steel billet crankshaft was due to the severe abuse encountered in races such as the Indy 500. While a billet shaft costs more initially, it was thought wise to use one rather than risk losing a complete engine should a cast crank fail.

The aluminum block and cylinder castings were delivered to Henry's Machine Shop in Bellflower, California, for machining. This involved boring the block for steel sleeves, align-boring the camshaft and crank bearing bores, surfacing, and drilling all oil, water, bolt holes and other passages that required attention. Henry's is well equipped and respected for their quality machine work.

Although Thompson's M/T forged aluminum connecting rods and pistons are forged in his own plant, Mickey decided it would be best to take another approach to the connecting rods. While his alloy rods have proven themselves in competition time and again, he just couldn't take any chances. Considering the high stresses every engine component would be subjected to for so many miles, only the *finest* materials were selected. Therefore, connecting rods were machined from titanium forgings, offering both light weight and superior strength, at a considerable cost increase, too. The rod bolts are made of Vasco-Jet 1000 alloy steel while .984-inch-diameter wrist pins are of maraging steel, both offering exceptional strength characteristics.

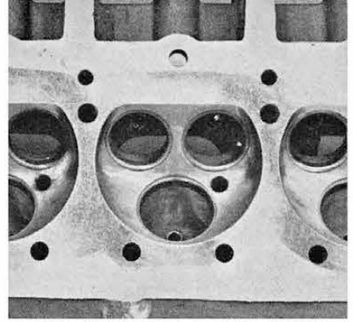
Because the engine is equipped with three valves (two intakes, one exhaust) per cylinder, rather than the conventional two, special pistons had to be made. Thompson developed new dies to



allow forging these pistons, which embody strengthening struts similar to those in the regular M/T racing piston line. The dome on these pistons appears to be a combination of a hemi and pent-roof design, due to the aforementioned number of valves used in the engine; a point we'll get to in a minute. A variety of piston ring combinations are under test at the time this article is being prepared, with the most promising combination being an M/T Power-Lock compression ring, 1/16-inch scraper and 1/8-inch oil ring.

As with the block, the cylinder heads are special castings of the same aluminum alloy. The head patterns are new, as Thompson is running twin intake valves and a single exhaust. Though a few European engines have used the three-valve principle, the Thompson design is quite different. High-temperature stainless steel valves are used throughout, being designed exclusively for this engine. Another person of tremendous assistance to Thompson in the development of this engine is Rudy Moller, who donated considerable time in drafting work on the cylinder head design.

Valve seat angle is 45° on all valves



TOP — View of cylinder head chamber reveals valve and spark plug arrangement in the M/T engine. Rudy Moller performed much of the design work on the aluminum heads. Layout is kind of a cross between a hemi and wedge.

ABOVE LEFT — Because of the unique combustion chamber design, M/T made up new dies for his piston forgings. The forged connecting rods are of titanium to reduce overall weight, give an increase in strength.

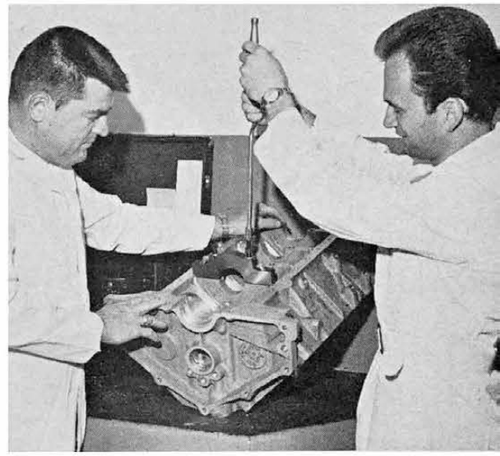
ABOVE RIGHT — Assisting Bill Hroscikoski, project engineer on the M/T Indy engines, is Mickey Thompson, at left. The three center main caps on aluminum block are four-bolt type, will support a Moldex billet crank.

OPPOSITE LEFT — Completely assembled, the M/T engine is an impressive sight. Engine builders Jim Ward and Jerry Norek have been kept busy these past few months assembling engines of this type for Thompson's entries.

while seat width is .050-inch on the intakes and .070-inch on the exhausts. In addition to running three valves per cylinder, perhaps the wildest feature on the M/T mill is the valve train assembly. The two intake valves are actuated by a single rocker arm unit. A Smith Brothers pushrod, working off a special Crower needle-bearing-equipped roller tappet, moves the rocker unit through its offset arm, the valves working in unison. Single exhaust valves in the cylinders are located on the exhaust pipe side of each head. These valves operate via two rocker arms; a bellcrank-type final rocker arm actuated by a transverse pushrod and another bellcrank-type mounted on the shaft which carries the intake rockers. All valve contacting ends of the rocker arms are rollerized, while the rockers themselves are made of cast chrome moly steel. During engine tests, Meehanite valve guides fared better than the bronze ones, so M/T has employed these units in the heads. They are also knurled to retain oil and cut friction.

Like many other components, different camshafts are being tried in the engines. Custom grinds by Winfield and Crower have been tested. The shaft and grind that will eventually end up in the engines on race day is something that hasn't been determined yet. The cam is gear-driven off the crankshaft. A small sprocket attaches to the cam sprocket and, along with four other sprockets connected by a double-row Diamond chain, drives oil, water, fuel pumps and the Schiefer magneto.

A special front cover plate was produced by Mark Cummings for the M/T engine. Bolting to the face of the block, it provides a mounting place for the additional drive sprockets. Looking at the engine from the front, the magneto is driven off the camshaft. To the right of the crank is an accessory-drive sprocket. At the lower right is the water pump drive, while the fuel pump



drive is at the lower left. These two sprockets also drive the oil scavenge pumps located on the back side of the front cover plate. To the left of the crank is the adjustment sprocket used to set chain tension.

The two scavenge pumps just mentioned are for the dry sump oil system. Designed and machined by Al Barnes, the twin units feature Chrysler pump rotors and draw oil from the engine pan, pumping it through an oil cooling radiator into a separate tank. A special M/T-built oil pump, mounting in a conventional location on the rear main cap, returns this oil through the filter and into the engine. The M/T pump features an aluminum housing, hex drive, and larger diameter and longer gears for greater capacity.

The present fuel injection system be-

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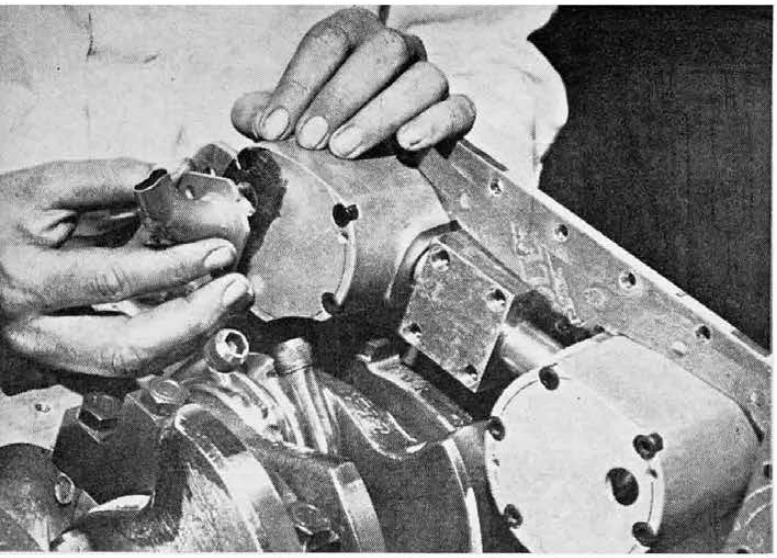

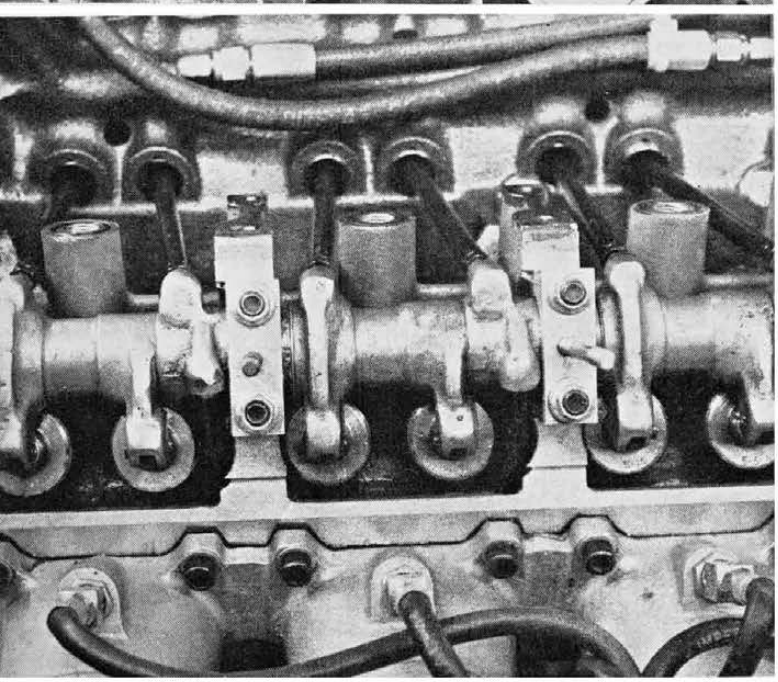

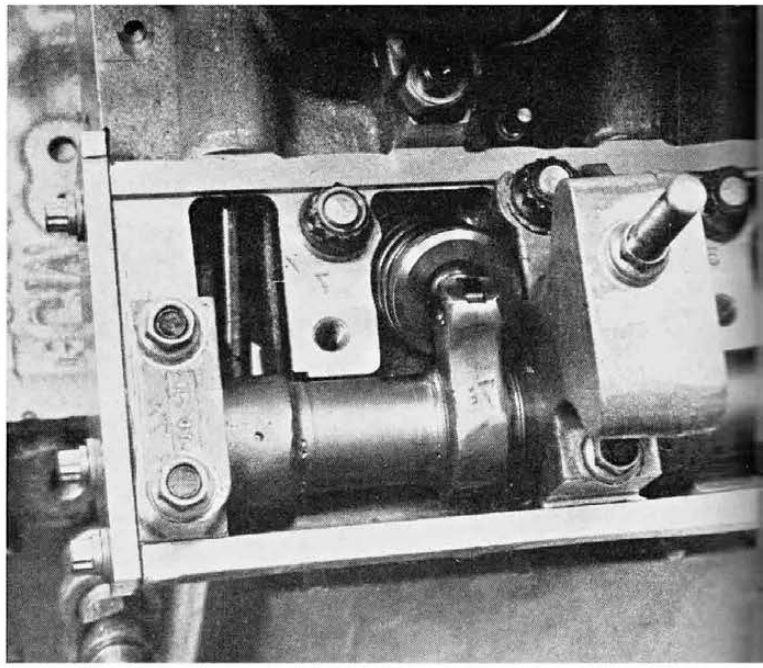

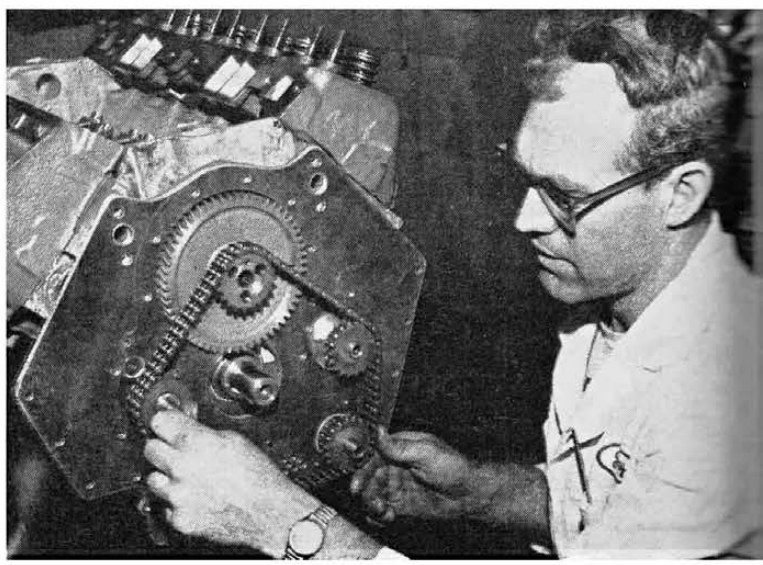

TOP LEFT — Attached to the rear side of the aluminum front plate are a pair of scavenge pumps. Featuring Chrysler pump rotors, they will draw oil from the pan, feed it into an isolated oil tank. TOP RIGHT — The exhaust valves are located along the outside section of each cylinder head. A bellcrank-type rocker arm opens them via a transverse pushrod and a second rocker on the main shaft. ABOVE LEFT — Smith Bros. tubular pushrods operate dual rockers on the main shaft. A tiny bellcrank rocker, right side of each set, works the exhaust valves. The other controls both intakes. ABOVE RIGHT — A double-row Diamond chain drives all of the accessory gears on the front cover. Jerry Norek is seen adjusting chain tension.

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ing run utilizes Hilborn fuel distribution components. It was necessary to cast new injector bodies because none were available for the M/T cylinder heads. A new injection system (Tecalemit-Jackson) manufactured in England is presently being tested by Mickey and has performed exceptionally well. It just may be that the M/T Indy engines will be equipped with these units. Designed for street as well as competition engines, they reportedly are the answer.

There are many other features of the new M/T three-valve engine, but most can be illustrated photographically far better than descriptively. Therefore, we shall cut short the wordage in order to provide space for the graphics.

Since the Indy 500 race on Memorial Day will be run just after this edition hits the stands, it is hoped that Mick's entries make the scene. Although he has the resources to build conventional cars with conventional engines, this controversial rodder just likes being different, and that's what makes the world of hot rodding tick. You all remember a few years back when Mickey introduced low-profile tires at the Speedway. They caused more concern than any of the cars at that time, but you see a lot of rubber of similar dimensions on both street and race machinery today. So maybe this will be the year when the "mouse" roars . . . and is heard by others than just the hot rod fraternity. ■■