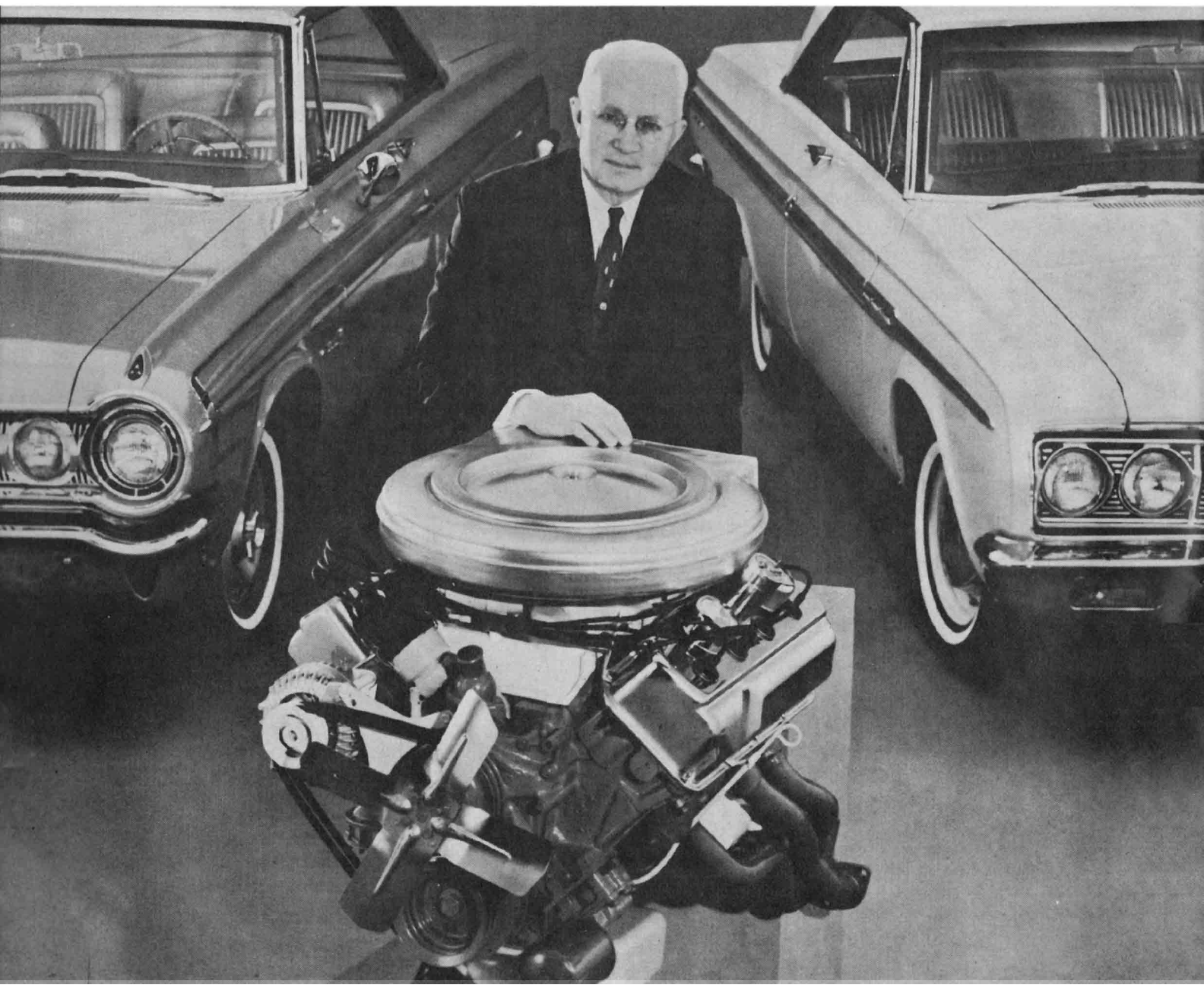
MODERN HEMI FROM CHRYSLER

by Ray Brock

photos by Chrysler Corporation

After years of anticipation, the rodder's dream is reality as a new 426-inch hemispherical-chambered V8 makes its debut in high-performance ranks



Don't get too excited, fellows, but the day you've been waiting for has finally arrived! Chrysler has revived the "hemi" engine! That's right, the all-time champion on the drag strips – the engine that holds countless records at Bonneville – the *must* powerplant for hot boats – it's been brought back to life in a modern version. The first public appearance was at Daytona's Speedweeks.

Rumors we've had on dynamometer performance makes it evident that the new hemispherical-chambered V8 will certainly take up where the old one left off in 1958, and then some. The new "hemi" Chrysler will be made in three versions: one for oval track racing and two for the drag strips.

As we go to press, Plymouths and Dodges are smashing lap records at Daytona's 2½-mile Speedway with fantastic speeds. In an unofficial practice lap, Dick Petty registered 176-plus in a Plymouth. Last year, the 427 Chevrolets shook up everybody with speeds up to 166 mph and now this mark has been shattered. In a pair of 50-mile qualifying races at Daytona, Paul Goldsmith won the pole position with an average of 170.940 mph in a Plymouth and Petty won the second race and outside position on the front row with an average of 171.919 mph. Both were clocked in excess of 174 mph at various times during the races.

In keeping with a ridiculous practice currently followed by Detroit companies producing high-performance stock car engines, horsepower ratings merely serve to identify one engine from the other and don't have the faintest similarity to actual output. Chrysler places a tongue-in-cheek rating of 400 hp on the NASCAR-USAC version with single four-barrel carburetion. Rumors circulating Detroit indicate that it should be closer to 550 horses. As for the dual four-barrel, short-ram drag strip models, the model with 11:1 compression is rated 415 hp and the 12.5:1 version is rated 425 hp. Probably their actual output, corrected to SAE standards, would be about 560 and 570 respectively. Now, let's get on to the new engines and see what they look like.

First of all, for those of you who might have a car powered by 413- or 426-inch Chrysler, Dodge or Plymouth engines, you are out of luck if you've jumped to the conclusion that you can buy a pair of heads, some pistons and a few other parts to convert your engine into a hemi. The blocks differ in the areas of oil drain-back holes from the rocker chamber and an extension of the inner edge of the deck provides support for four hold-down studs on the top edge of each cylinder head. These four studs are secured with nuts tightened from inside the tappet chamber, similar to the method used on Ford's '63 pushrod Indy Fairlane V8.

An additional difference between current 426 blocks and those for the new hemi is the use of cross-bolted main bearing caps for numbers 2, 3, and 4, like those used in 427 Fords and Mercs. Hemi blocks will also feature beefed sections in the main bearing webs.

Crankshafts for the hemi 426's will be similar to those used in current engines but they will feature an 8-bolt pattern on the flywheel flange instead of six. Fillets on journals are shot-peened to reduce fatigue and bearing surfaces are

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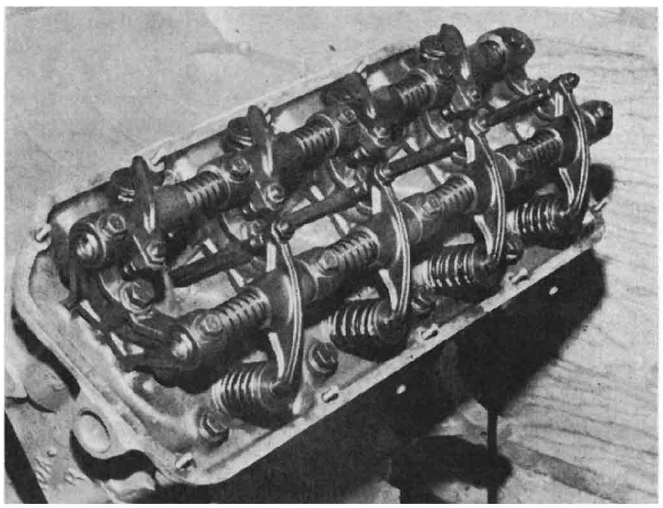
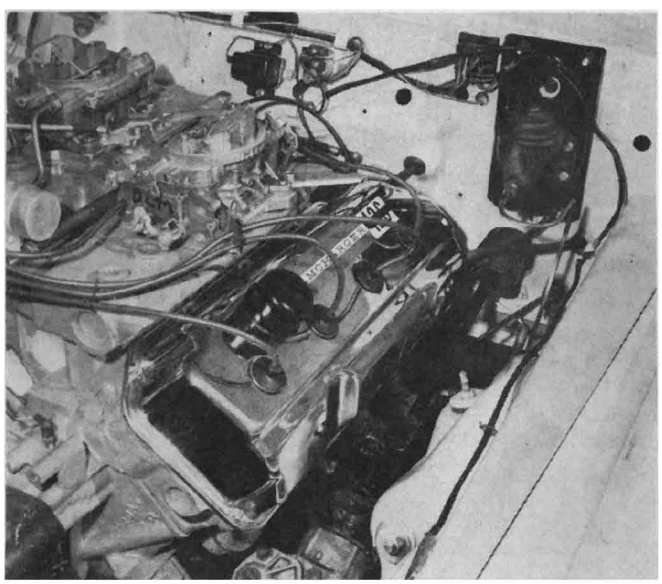
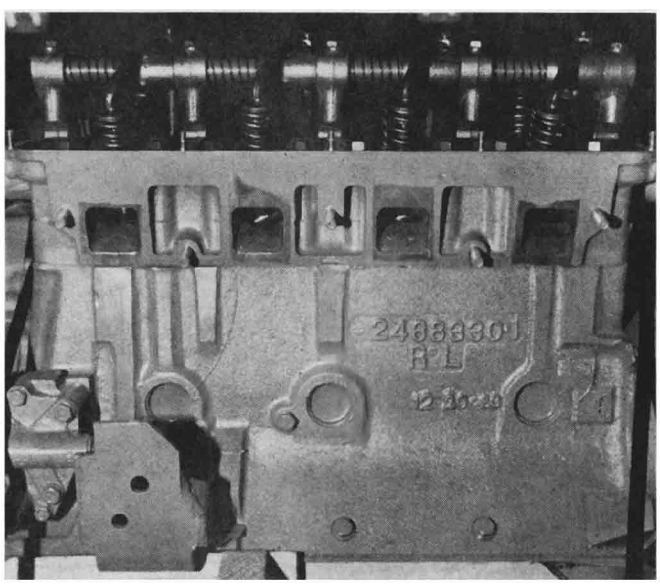


Dual rocker shafts are supported by cast stands which use a single row of head cap screws to hold them in place. Both intake and exhaust rockers are forged steel for maximum strength at minimum weight. Adjusting screws use jam nuts.



ABOVE—Dual four-barrel, short-ram hemi nestles in Dodge chasis with plenty of room between engine, steering. Big Carter carburetors use special ducts to match hood scoops. LEFT—Paul C. Ackerman, Chrysler VP in charge of Engineering, displays new 426 hemi and cars it will power.



The two cap screw heads along bottom edge of block, plus another hidden behind engine mount, are cross-bolts for the main bearing caps. Exhaust ports are extremely large with short passage to valve. Note cored sections between ports to save weight. Hemi weighs 67 lbs. more than present 426.

hardened with a chemical-dip process. Drag engines will use SAE 1046 carbon steel forged cranks and the circuit-racing engines will have a stronger, 4340 chrome-moly crank. Journal sizes and the stroke (3.75 inches) are the same as earlier 426's.

Bearing inserts are also similar to earlier models with tri-metal heavy-duty material. Main inserts are grooved top and bottom to improve oil flow to rods at high rpms.

The rods are longer, stronger and have bushed small ends for pins. Center-to-center distance was not disclosed in the first specifications but it is longer than that between present 426 rod centers. These impressive looking rods are forged and are obviously much stronger than earlier rods. They use 7/16-inch rod bolts with washer-faced nuts.

Pistons for the 4.25-inch bore are impact extrusions with a domed shape to occupy the hemispherical chamber. Milled reliefs on either side of the domed top provide valve head clearance and a flat across the top gives desired compression ratio plus a pocket between piston and head for combustion flame. Piston rings and grooves are of conventional design. The full-floating pin is retained by lock-rings with grooves in each end of the pin bore. Compression ratio will be either 11:1 to 12.5:1 for drag engines, 12.5:1 for circuit tracks.

Getting on to the juiciest part of the story, the biggest change is in the cylinder head design and that's where the name hemi comes in. From 1951 through 1958, Chrysler produced hemispherical-chambered engines in a variety of displacements for their lineup of cars. The biggest and best of the lot was the 392-inch version produced in 1957-58. At this displacement, the hemi was actually stressed to the limit in bore, stroke and internal components so when the demand for more inches came along, it was both cheaper and more practical for Chrysler to produce the wedge-chambered "B" series V8. The hot-rodder, though, refused to give up the hemispherical engine with big, unobstructed valves that gulped air by the bucketfuls at high rpm. It was a natural winner.

So, since 1958, the hotter cars have been powered by beefed-up, stroked, bored, blown and frequently scattered hemis. The 392 versions became rarer than gold nuggets and when located, cost almost as much. When a 1957-58 Chrysler was wrecked, somebody had a deposit on the engine before the wrecker had a chain on the car.

Ever since Chrysler Corporation became openly active in the racing game in 1952, rumors have been circulating that the hemi was about to return. It was both heavy and expensive to manufacture in its original form but rumors persisted. Well, it's finally here and although some weight has been trimmed, cost is obviously still high so it will probably be a limited-production model with deliveries not reaching a large volume until late in the model year. Chances of buying an engine without a car wrapped around it will probably be small for some time.

The heads are cast iron, not aluminum, and chambers are machined. The exterior shape is more compact than the early versions and as much weight as possible has been eliminated from around intake ports and other areas of the head.

Valves are quite large, 2.25 inches for intakes and 1.94 inches for exhausts. Present 426's have 2.08 and 1.88-inch valves. The hemi valves also have .060-inch smaller diameter stems to reduce valve train weight and improve engine rpm limit before valve toss. Valves for circuit-racing engines are made from more expensive materials for improved durability.

Dual rocker shafts are used but they're positioned closer together than on earlier model hemis and are held in place by the five cap screws in a line down the center of the heads rather than by two rows of cap screws. Malleable iron V-shaped rocker shaft supports carry the shafts. Rocker arms are forged steel and have adjusting screws with jam nuts contacting pushrod sockets.

Specifications have not been released on the camshaft timing but it will probably be close to the current 426's duration for hemi drag engines, probably slightly milder for track

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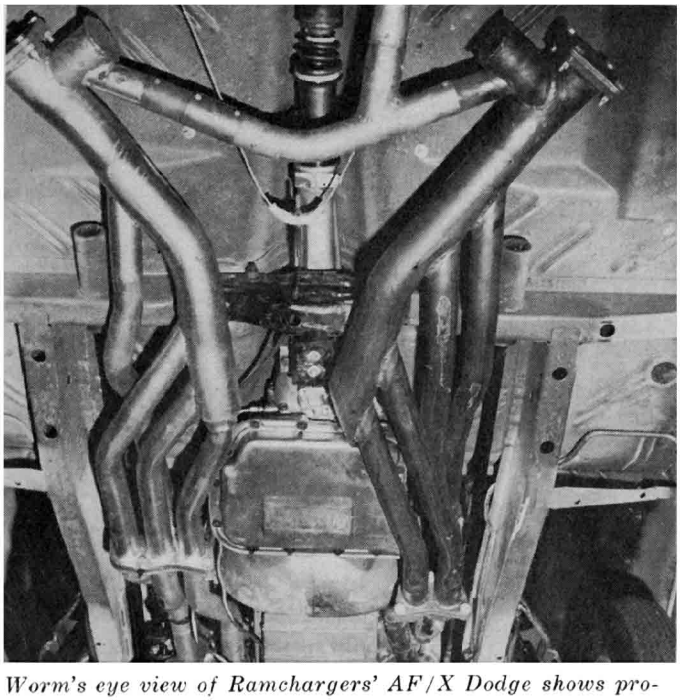
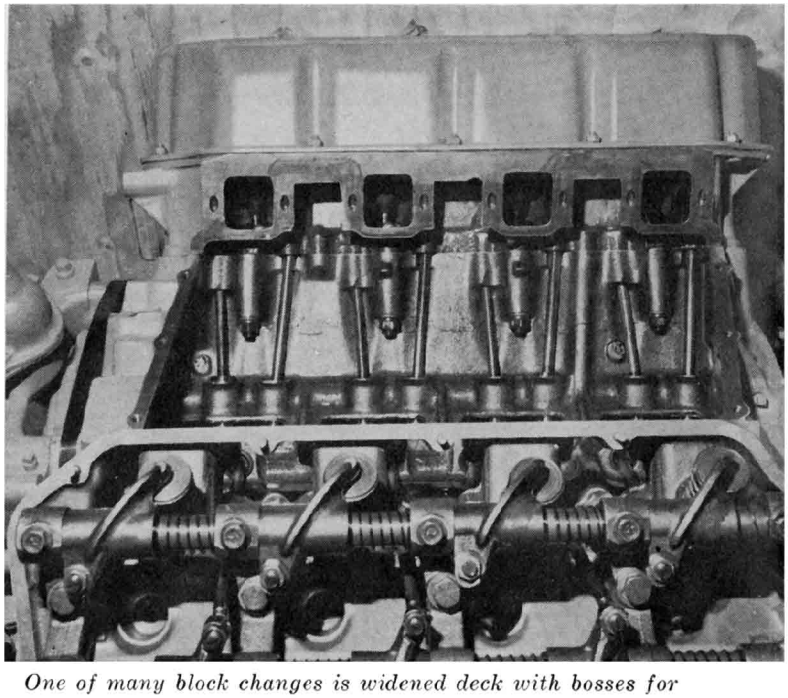


Worm's eye view of Ramchargers' AF/X Dodge shows prototype exhaust system for drag cars. This will be redesigned for production cars but individual pipes of approximately 44-inch length will be retained. Drag cars will use single tail pipe, muffler. Torqueflight for hemi will be beefed slightly.



One of many block changes is widened deck with bosses for four extra head studs. Nuts are tightened from lifter chamber. Lifters are conventional mechanical type formerly used in "B" 426. Tube pushrods splay wide at top, give huge ports which have short, direct flow to 2¼-inch intake valves.

engines. A double-row roller chain and sprockets are used rather than the silent chain currently in production.

There are two intake manifolds; the single four-barrel model for tracks and a dual four-barrel for drag strips. Both are aluminum and act as the tappet chamber cover and both have large square-shaped runners to match the intake ports in the heads. The single manifold is a 180° two-level variety with huge risers extending from the carburetor flange to each level. A single, large-capacity Holley carburetor supplies the air-fuel mixture. Topping this Holley is a large air cleaner with a flange which faces rearward in the car and picks up cool air through a flexible boot that attaches to the cowl plenum.

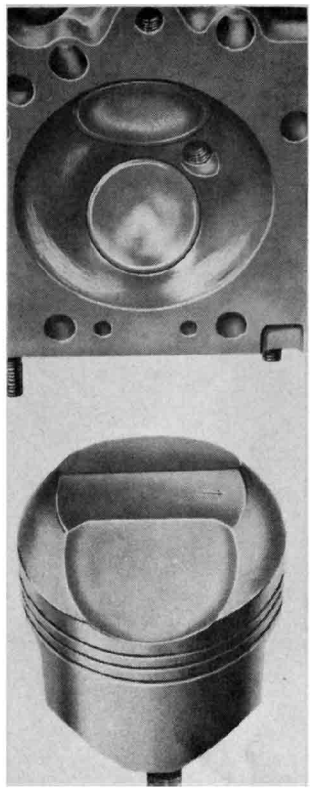
Chrysler's short-ram intake manifold is carried over for drag strip engines but with many modifications to fit the new hemi heads. Port placement and size are different but plenum shape beneath each of the two Carter four-barrels appears to be nearly the same dimensionally as before. Runners, from plenum to valve, are also quite close to the 15-inch length used on earlier 426's. A balance passage is used between plenums as before. Again, we lack specifications of the carburetors but they are probably quite close in capacity to the Stage Three Carters introduced last summer. For drag strip cars with aluminum front sheet metal, air scoops will be fitted to the hoods with ducts to each carburetor. For the 11:1 engines with steel front sheet metal, a large single air cleaner will cover both carburetors.

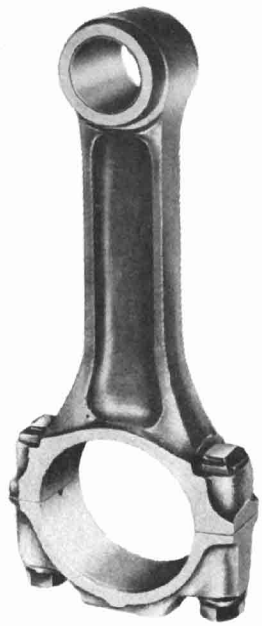
Exhaust manifolds are a combination of cast steel and steel tubing with individual tuned-length pipes from each port. A cast section bolts to the head exhaust port face and makes the initial tight bend to get away from tight spots in the chassis. Steel tubes press into these cast flanges and are welded. The tubes then pass down to the lower rear of the engine where they terminate in a single flange on the left side, two flanges on the right side. Head pipes, also with individual pipes, attach at this point and carry the gases on to collector pipes and the rest of the exhaust system.

You have to know by this stage of the game that cars equipped with these new Chrysler hemi engines are going to be terrors on the drag strips, the short tracks, road race courses and, as already proven, on the high-banked long tracks. An unknown is durability. Chevrolet's Mystery 427 ran away from all competition in NASCAR races last year but except on few occasions, didn't stay together long enough to win. It might take some time before all the bugs are eliminated and the hemi 426 proves durable enough to stay together for races 500 miles and more in length. If there are problems though, you can be assured they'll be corrected quickly.

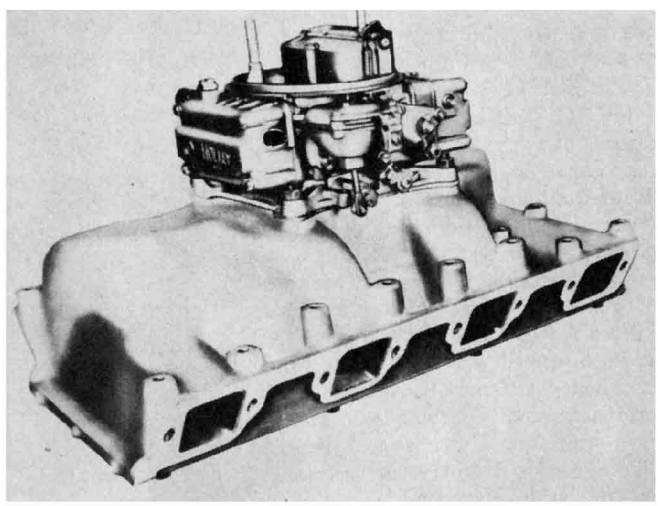
This new engine deserves and will get plenty of publicity in coming months and both Dodge and Plymouth have come up with new names for the high-performance machines which will carry these engines. If you're a Dodge fan, keep your eyes on the Hemi-Charger. If it's Plymouth you favor, Super-Commando is the name to watch.

Even if you aren't a fan of either brand, we guarantee you are going to be hearing about Hemi-Chargers and Super-Commandos often the next few months. You would have seen them at the Winternationals had time not ran out; the dual four-barrel drag version hemi's arrived on the West Coast about a week before the event but even private strip tests under such hasty circumstances showed that it would be wise to hold off until final induction tuning was perfected with the dual fours before heading for the Big Go. Meanwhile we're going to keep a close eye on drag race results across the nation for any strange fluctuation in the FX class; it might mean that the hemi's have struck! ■■

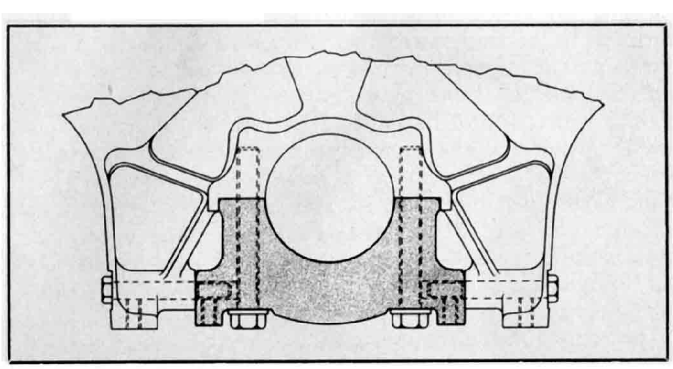




LEFT—Chamber is not perfect hemisphere but is machined circular with shallower dome. Piston has clearance for valves. RIGHT—Hemi rods are longer than "B" rods, have a very husky beam section. Small ends are bushed; rod bolts, 7/16.



Two-level intake manifold for NASCAR and USAC cars uses a single large-capacity Holley four-barrel. Runners are very large and have unrestricted flow into head ports.



RIGHT—Hemi block features beefed main webs plus main bearing caps that have extra support from sides of deep-skirt block. Main caps fit block closely, don't use side shims.