

RETURN OF THE HEMI-HEAD CHRYSLERS

*Suddenly it's 1951 Again,
For "Maximum Performance"*

IN 1951, SOME two years behind General Motors, Chrysler entered the burgeoning V-8 engine market with a sensational new engine developing no less than 180 bhp. If this sounds like chicken-feed, remember that the highest bhp at that time was Cadillac's rousing 160. That's not so much, perhaps, by today's standards, when Chevrolet offers 340 and Pontiac 370 bhp. But, in 1951, those were real, honest horsepower, unaffected by the needs

of the sales and advertising departments.

The 1951 Chrysler V-8 engine, and its later derivatives for Dodge and DeSoto, featured the racing car engineer's ideal: hemispherical-shaped combustion chambers. Without going into all the ideological theory behind this concept, let us say at this point that the half sphere has certain specific advantages as an efficient combustion chamber, not the least of which is the

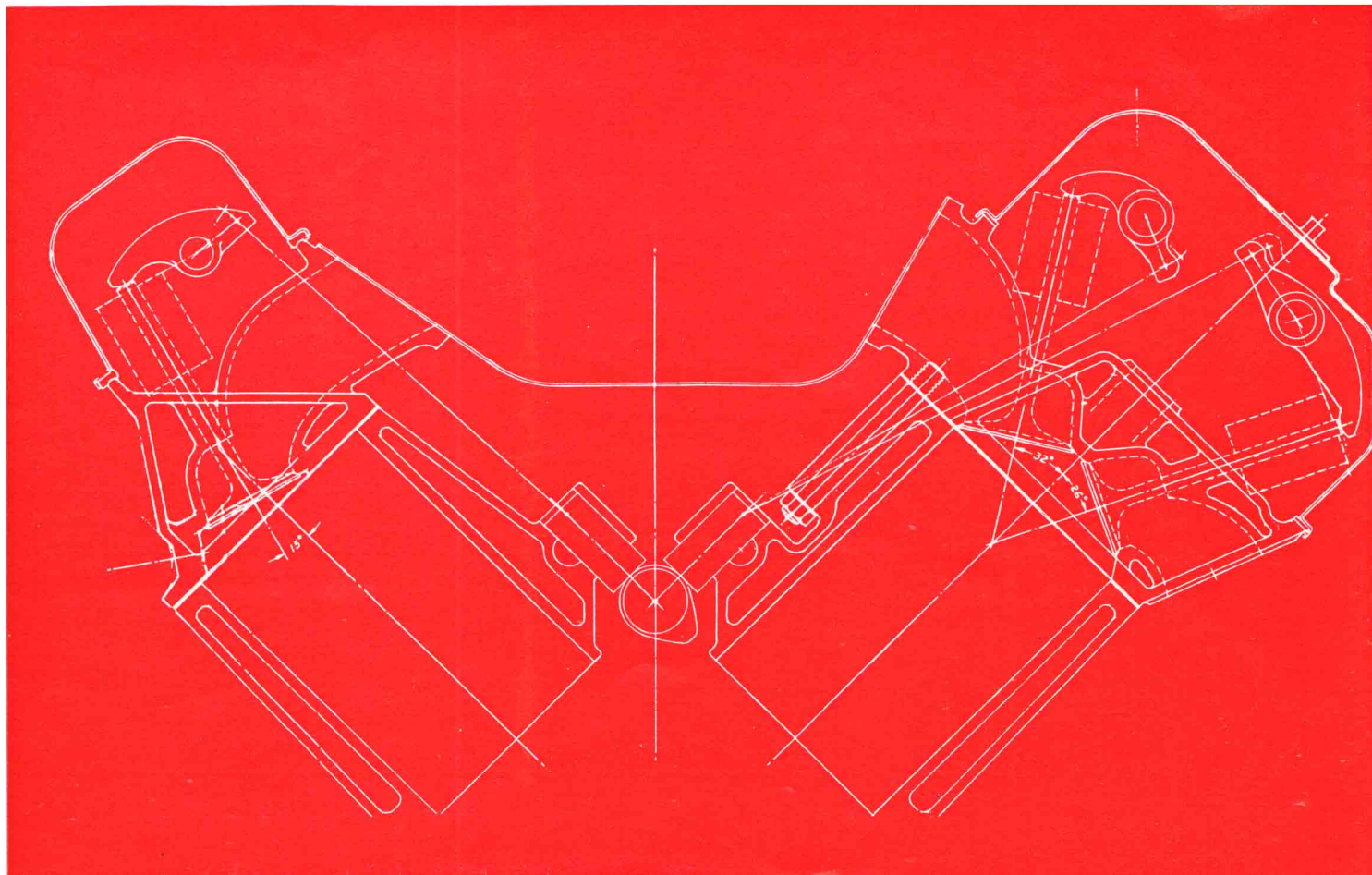
ability to allow very large valves and concomitant port areas. In essence, it's a free-breathing combustion chamber which produces lots of power at the top end—regardless of other problems and drawbacks.

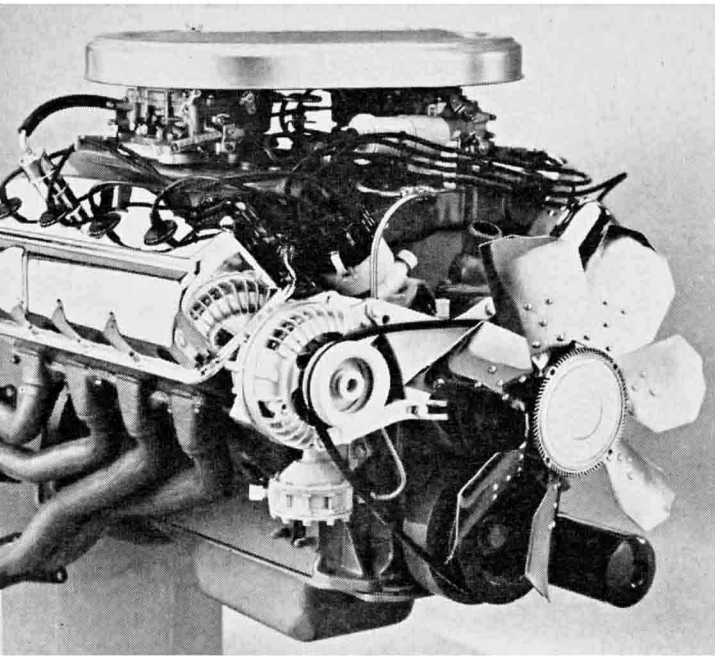
Chrysler called its new engine the "FirePower," while Dodge called it "Red Ram." Regardless of terminology, they gave top performance in terms of bhp per cu. in. of displacement and these engines' popularity today, in dragsters and other maximum performance machines, gives ample evidence of the sound theory behind Chrysler Engineering's thinking.

The only trouble is that Chrysler Engineering then changed its mind. After explaining their reasons for going hemispherical in great detail, Chrysler engineers suddenly "got religion" in 1958, dropped the whole idea and changed over to the GM school of thought. Their brand-new engine of that year featured wedge-type combustion chambers and in-line valves.

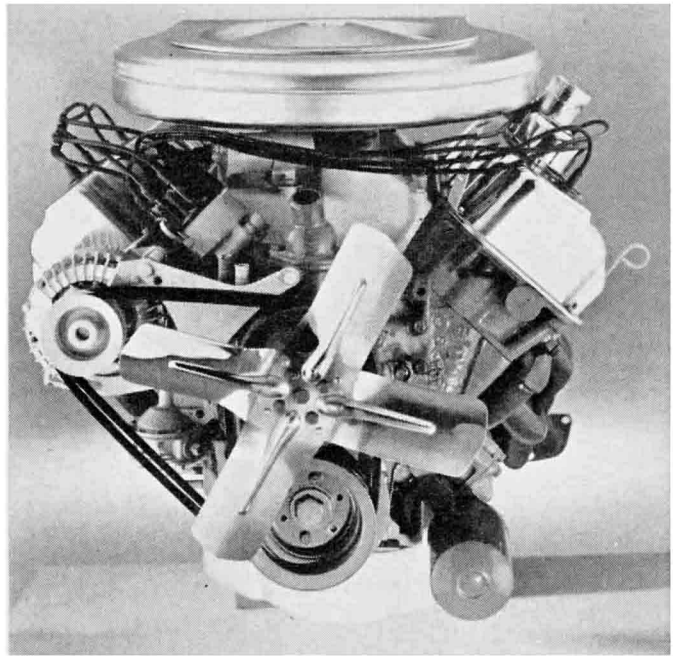
The all-new Chrysler "wedge" engine is with us today, in Chrysler, Plymouth and Dodge variations, with piston displacements of 361, 383, 413 and 426 cu. in. This is the Corporation's B-series engine and the advertised bhp runs from 265 to 425, depending upon bore/stroke variations, cam grind, compression ratio and carburetion. ▶

CROSS-SECTION COMPARISON of the old and the new: Former "Maximum Performance" cylinder head (left bank) featured a conventional wedge-shaped combustion chamber; new MP engine has better-breathing hemispherical chambers, achieved by double rows of rocker arms.





ACCELERATION VERSION of Chrysler MP engine will have two 4-barrel Carter AFBs on short ram manifolds.

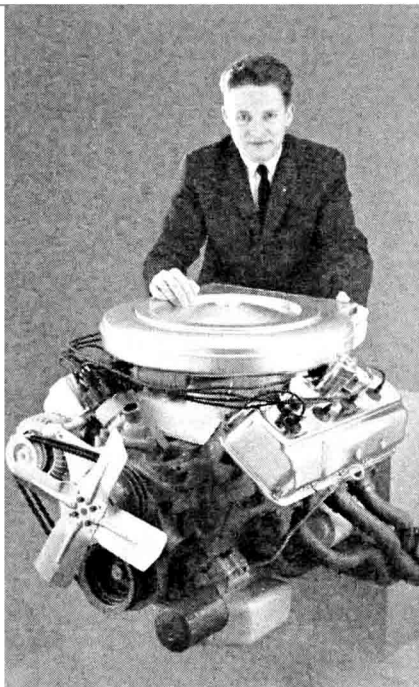


ROUND-TRACK engine will have only one 4-barrel carburetor because of NASCAR restrictions, but still produces 400 bhp.

HEMI-HEAD CHRYSLERS

In retrospect, the B engine makes a great deal of sense for Chrysler. It weighs about 75 lb. less, is smoother

MANAGER of Special Vehicles Jack Charipar shows his big new "baby."



running, has a lower octane fuel requirement and, most important, costs a lot less to manufacture than the hemi-head FirePowers.

But now, in another one of those seemingly inexplicable changes of mood, Chrysler Engineers have suddenly decided that their pet theories of 1951 were right after all. Whether we, or anyone else, believe all this or not, the latest switch from the industry's self-acknowledged engineering leaders is back to hemispherical combustion chambers, at least for competition activity.

In other words, Chrysler has a new engine—although it's not really so new at all. Take the B-type engine of 1958, bore it out to last year's top displacement of 426 cu. in., strengthen the bottom end with cross-bolted main bearing caps *à la* Ford, dig out the 1951 blueprints for cylinder heads and what do you have?

You have a new "Maximum Performance" option—according to Chrysler. Instead of 400 bhp at 5600 rpm (wedge chamber, 11.0:1 compression) you get 400 bhp at 5600 (hemispherical chambers, 12.5:1).

The new engine ratings are identical to the previous wedge chamber high-

output engines. This was done so that the new jobs will not be penalized by being moved up in the category at the drag strips. Obviously the hemispherical heads will give much more power than before, but Chrysler isn't saying whether the old ratings were optimistic, the new ones honest, or the new ones an understatement.

The block is the B-type with raised deck as used with production 413 and 426 cu. in. versions. Castings are poured with the proper cores so that the cylinder bore can be machined to a diameter of 4.25 in. Necessary pattern changes are made to accommodate the cross-bolt feature and to allow a slightly revised head bolt pattern.

Other changes include stronger connecting rods with increased length to reduce piston inertia forces, a higher lift camshaft and new dome-head pistons. A special double-roller-type timing chain has been developed, said to be much more durable than the usual inverted-tooth "silent" type of timing chain.

Manifolds are also entirely new because less space is available between the intake-port gasket faces. As before, there are two types of manifold; a short ram with two 4-barrel carbure-

Chrysler Engine Comparison

Year	1958	'63/64	'63/64	1964	1964	1964
Model	300-D	race	drag	race	drag	drag
Displacement, cu. in.	392	426	426	426	426	426
Compression ratio	10.0	11.0	12.5	12.5	11.0	12.5
Combustion chamber	hemi.	wedge	wedge	hemi.	hemi.	hemi.
bhp @ rpm	380 @ 5200	400 @ 5600	425 @ 5600	400 @ 5600	415 @ 6000	425 @ 6000
torque @ rpm	435 @ 3600	465 @ 3800	480 @ 4400	465 @ 3800	470 @ 4600	480 @ 4600
Int. valve dia.	2.00	2.08	2.08	2.25	2.25	2.25
Exh. valve dia.	1.75	1.88	1.88	1.94	1.94	1.94

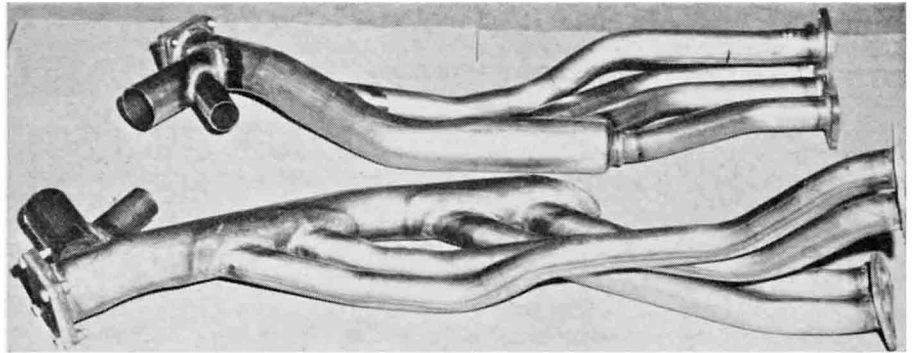
tors and a 2-level manifold for the NASCAR one 4-barrel requirement. Both manifolds have larger passages to complement the larger valves and ports in the heads. Ignition retains the double-breaker distributor, but now has a transistor circuit to increase voltage at the spark plugs. The exhaust headers are new and feature a unique weight-saving feature. The port gasket face is covered by a one-piece steel casting (not iron) which provides short exhaust stacks. Steel tubes are welded to the stacks, arranged to give the best possible lengths for tuning effect.

Of course, the cylinder heads are the principal new feature. The historic Chrysler hemispherical design is retained, including angled pushrods with short rocker arms for the intake valves and very long rockers for the exhausts. However, the new design rotates the lateral valve assembly inboard by about 3°, as compared to the FirePower heads, in order to compact the overall package size. This also makes the exhaust valve rocker somewhat smaller than before. Because of the lateral disposition of valves in each chamber, the valves proper are very large—the largest in the industry. As compared to the old 426 Ramcharger, intake valves have been enlarged from 2.08 to 2.25 in.; exhaust valves are 1.94 in. as compared to 1.88 in. In order to reduce valve weight the valve stems are about 0.060-in. smaller than formerly, i.e., $\frac{7}{16}$ instead of $\frac{3}{8}$, in nominal figures.

The new heads are so designed that water jacket volume is at an absolute minimum and the intake ports, which require no cooling, are well exposed. Although nearly an inch longer, these heads do not weigh nearly as much as the old FirePower castings. Chrysler's current production B engines all use a very neat trick to save weight in the cylinder head castings, a compact triangle-shaped water section. The new hemi-heads use a similar idea.

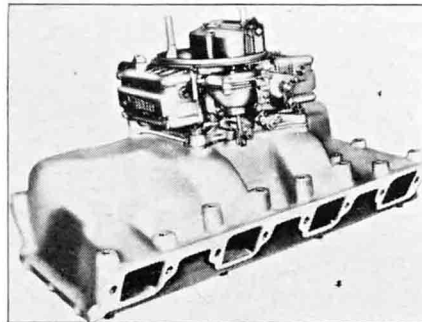
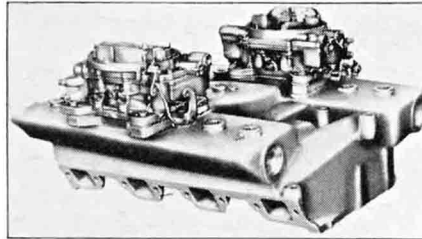
Such enormous valves and port areas mean that this engine can really breathe and the net result is that bhp is very high, even if rpm may be somewhat limited by the heavy exhaust valve rocker arms. In other words, bhp/cu. in./1000 rpm is undoubtedly the best in the industry.

The old FirePower engine weighed about 750 lb., the B series weighed 638 lb. in the 361-cu. in. version and about 650-660 lb. in the current 413 and 426 cu. in. models. The latter are a raised-deck design and have larger diameter main bearings. The new hemi-head engine weighs 725 lb. in NASCAR form (without headers). That's not much less than the old FirePower, but a worthwhile improvement considering the heavier block and crank of the new engine. ■

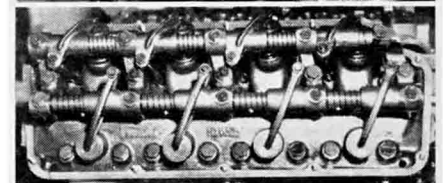
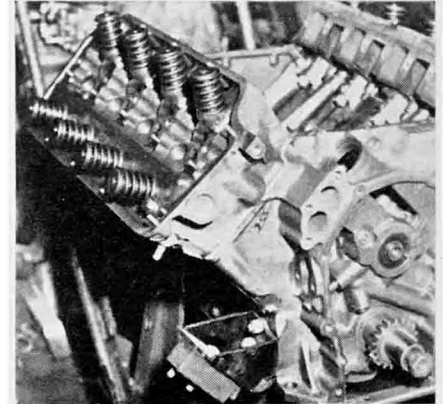


HEADER EXTENSIONS welded up from steel tubing form major part of exhaust system. Cast steel flanges with tube extensions attach to heads, connect these pipes.

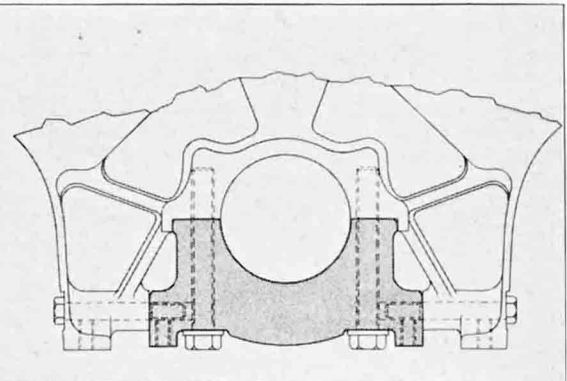
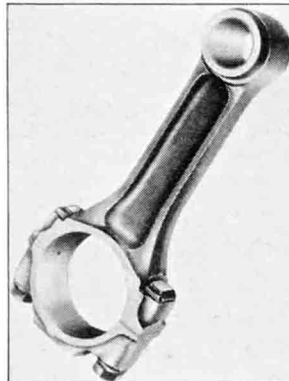
TWIN 4-barrel AFBs have 1.69-in. bores, are opened by progressive linkage.



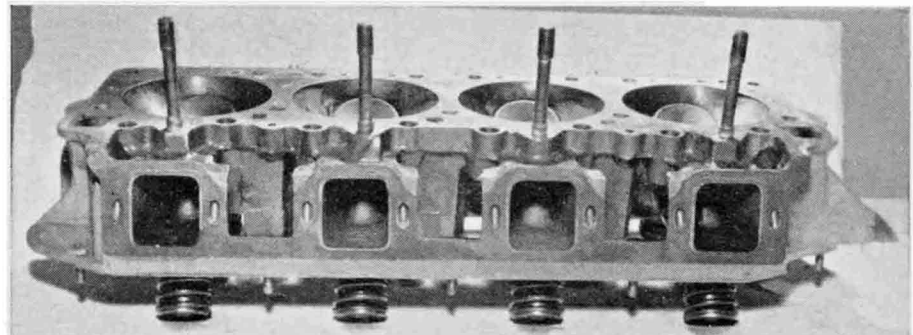
SINGLE HOLLEY mounts on 2-level manifold with no exhaust cross-over passage.



VALVE ARRANGEMENT for the hemi-heads; exhaust valves have longest rockers.



STRONGER CONNECTING rod has stiffer large end with 7/16 in. cap bolts. Cross-bolted main bearings follow Ford pattern, add to block rigidity.



HUGE INTAKE PORTS are apparent in this view of new cylinder head. Down-pointed studs were necessitated by change in valve arrangement, interfering ports.