30 HP BOLT-ON FOR 427 FORD WEDGE

FORD MOTOR COMPANY BREATHES NEW LIFE INTO THE OLD WEDGE WITH TUNNEL PORT HEADS

BY ALEX WALORDY

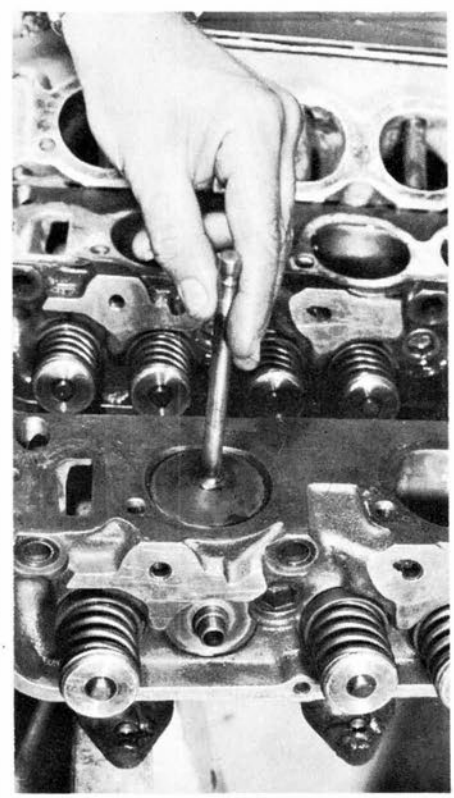
IF YOU HAVE written off the wedge 427 Ford in favor of an overhead cammer, think again, for the sharp Ford engineers have come up with what amounts to a super wedge. The name is Tunnel Ports, and just in case you wish to know where it stands in the power department, figure five to seven percent more horses than the very best of the high risers. This, out of a medium riser manifold with standard sized valves and unchanged exhaust ports.

Originally, the new Ford Tunnel Port Heads were destined for the high-speed circular tracks, but the temptation of seeing an extra 30 horsepower or so was a call the drag strip boys couldn't resist. One of the first to give them a try was Dave Lyall, who normally campaigns a 427 wedge-powered car on the NASCAR circuit. The results, within the first few weeks of running are promising. The current top et is 10.53, just two tenths off the record, and the top speed is 132.6 mph. While his high-riser engine gave the feeling of a long uphill pull after shifting to high gear, this one picks up speed all the way through fourth, and into the lights.

Another indication of the new breathing power is that on the 427 high riser, it didn't make much difference whether Dave used 715 cfm Holleys (cfm, or cubic feet per minute is the measure of a carburetor's potential air flow capacity). Using from 715 to 780 cfm's with the Tunnel Ports produces an immediate increase in action, showing that the extra breathing potential is put to full use.

In a conventional wedge, pairs of intake ports must pass between the push rods. Push rod location is pretty well determined by the position of the valves and the straight rocker arms, and so the ports are squashed in and then raised to make up the necessary cross section area. Since air doesn't like to flow around curves, any change in cross section of the port inevitably reduces the engine's breathing capacity.

Instead of pussyfooting with details or minor improvements, Ford's race-oriented engine men tackled the bull by the horns and ran the ports straight in. And they are not just any ports; they're big D-shaped ports similar to the ones found on the Fomoco SOHC engines. The push rod, of course, wound up right in the middle of the port, in line with the valve, but this didn't cause any problem to the people who wanted the job done and they



Left, Dave Lyall with his Tunnel Port 427 wedge. Engine pulls well past the point where straight wedges die. Above, ports are large enough to swallow intake valve.

benefits of Tunnel Port setup are improved breathing and more zap

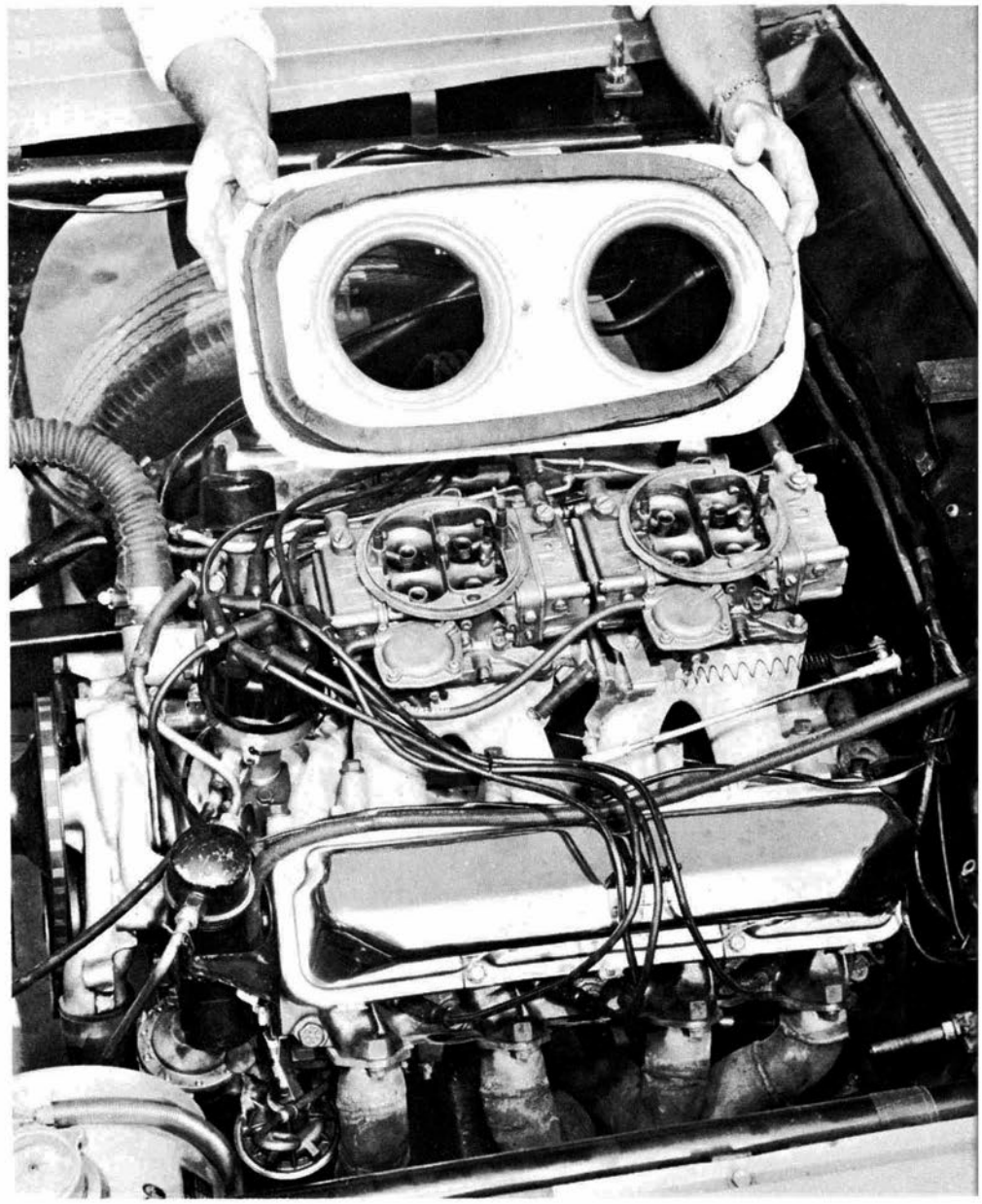
simply proceeded to add small copper tube tunnels right through the middle of the ports. Each copper tube is expanded right into the manifold wall, forming an air- and oil-tight seal which leaves ample passage room for the push rods. Immediately behind them are the valves and valve guides—what breathing experts call a straight shot at the valve. Where the tube passes through the manifold there is a small widening of the port walls to maintain an even cross section.

Lyall finds that he can press out the tubes quite readily with a small shouldered tool which allows him to do a little extra port alignment and finishing. The tube can then be pressed back in. It would probably seal well enough on its own, but Lyall coats them with a little instrument cement that sets up in twenty minutes and provides the added sealing insurance.

Ford has released two new manifolds to go with the Tunnel Port engines—a single- and a dual-plane. In the single-plane manifold, the ports connect directly to the open areas underneath the carburetors on a single level. In the dual-plane manifold, the passages run as in a conventional street engine on two separate floors, with two center cylinders of one bank connecting to the two outer cylinders of the opposite bank and vice versa. This provides a 180-degree spacing of the intake pulses and more low end torque.

At short tracks, the Fords have dual-plane manifolds, simply because a wider torque range is needed. On the other hand, for the big, high-speed tracks like Daytona, the engine is set up with a single-plane manifold because low end doesn't matter while the extra 30 horsepower at the top end is mighty welcome. Coming out of the gate without the benefit of low end torque is summed up in a word by Dave Lyall: "Ferocious." Below 5000 rpm there is a hole in the torque curve, and so he comes out on the wood with the accelerator pushed into the gas stand.

The total port length from the valve to the end of the manifold runner is just 12 inches, approximately half of which is the manifold. And this again spells tuning for top rpm. A small balance passage connects the open areas between the two four-barrels, apparently to smooth out the idle.



Homemade adapter plate with two air horns improves air flow into the carburetors.

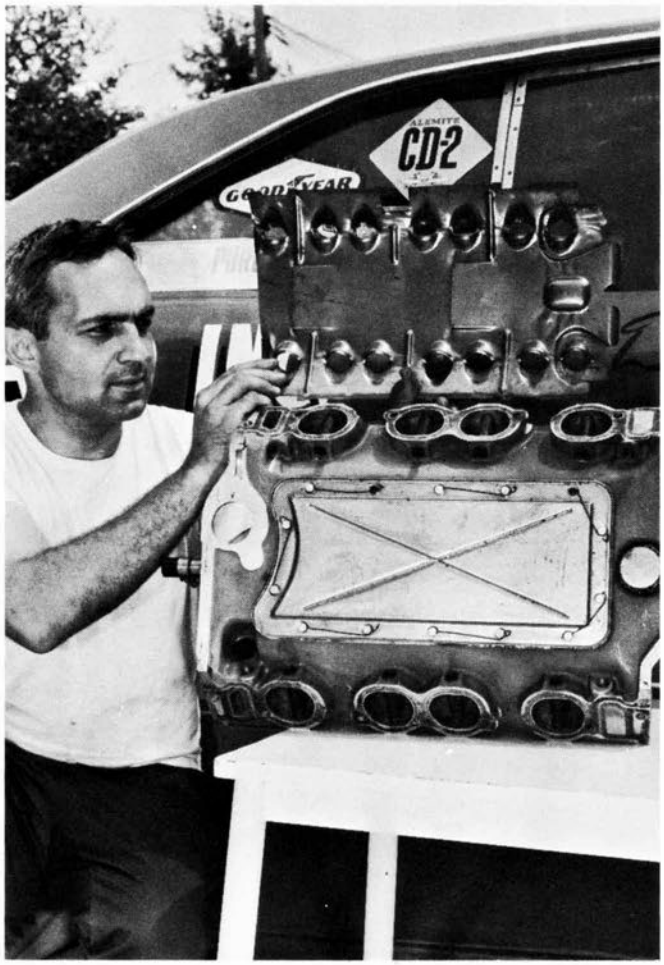
Larger balance passages were tested but didn't seem to do much for the top end. Well-rounded runner inlets, as well as rounded dividers between the ports suggest considerable flow study.

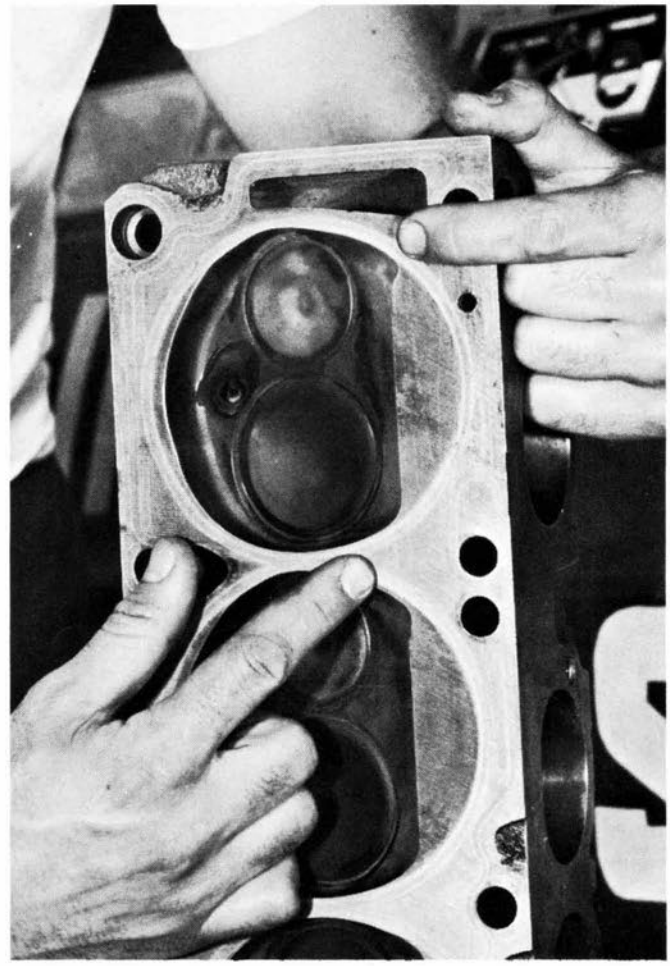
Carburetor spacing is the same as on the medium riser manifold, but both carburetors were pulled back to clear the distributor and this in turn leads to slightly uneven runner lengths. A rounded manifold floor slopes down toward the runners to eliminate fuel padding.

Power was still not quitting at 7800 rpm and Dave didn't want to exceed 8000 rpm for engine durability reasons. The answer was to advance the cam and gain low end torque at the expense of top rpm. He now operates in the 7000 to 7200 rpm range, with the cam on the split overlap. The engine never ran out of rpm or showed signs of valve float, which certainly speaks well of the cam design.

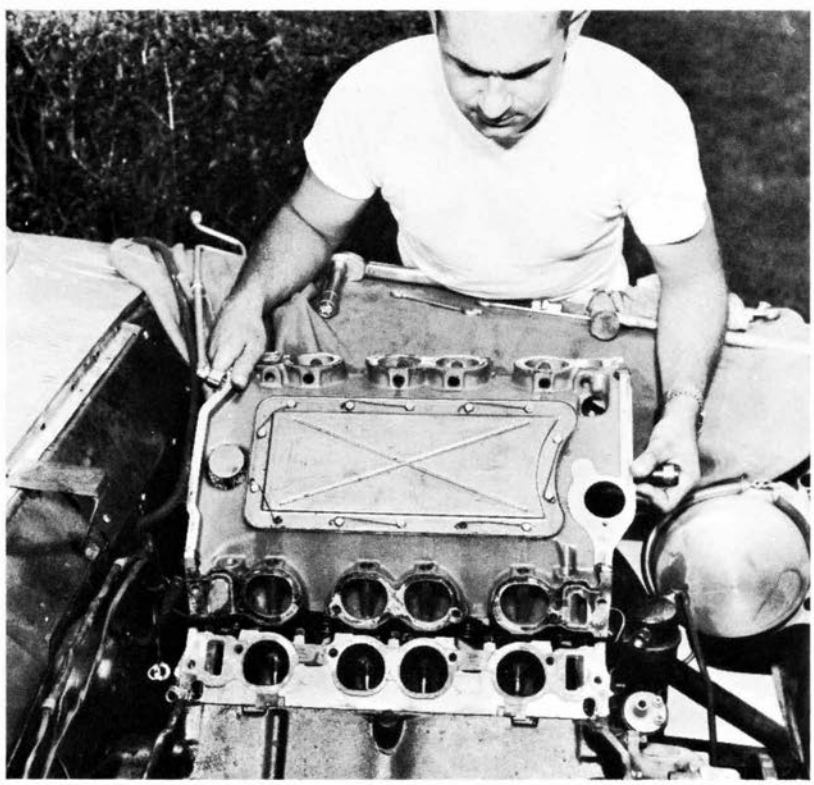
The bottom end of the block is blueprinted, and runs with wedge-type aluminum rods. No less than six different planes were machined on the Forged-true pistons to gain extra valve clearance without losing too much compression. The engine runs with a .040-inch deck clearance, with the flat outer portion of the piston .040-inches below the block deck at top dead center. An added .030 inches of piston clearance

(Continued on Page 76)

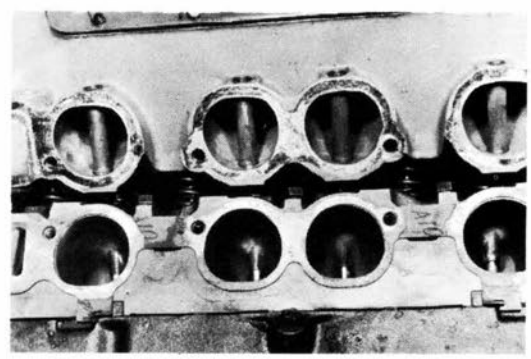


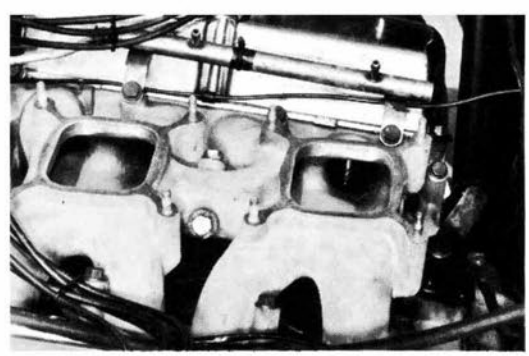


Left, Lyall made up special oil shield which keeps manifold cool. Right, sides of combustion chambers are opened up to improve breathing.

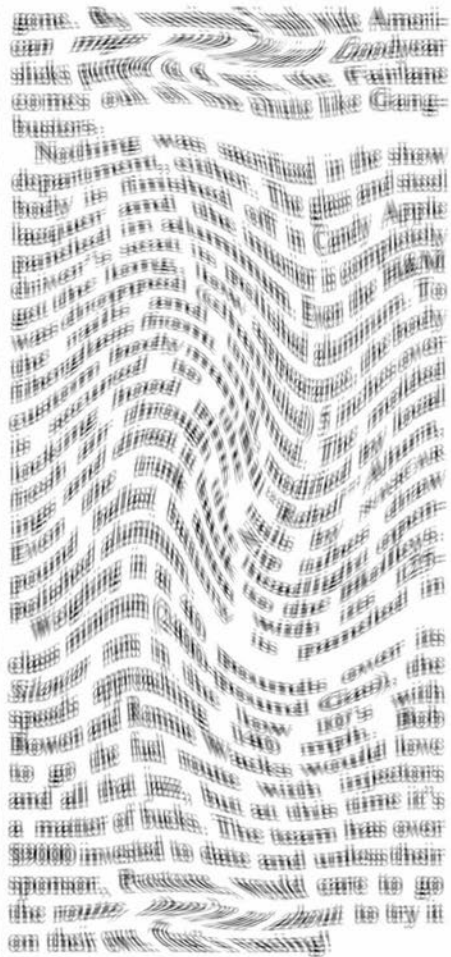


The pushrods are routed through small copper tubes mounted in the ports.





Top, inserts in the manifold ports may be pressed out to make room for finish grinding. Above, this is about the only engine where the valves may be viewed through carb flange.



TUNNEL PORT continued

comes from the cylinder head gasket, yet with this total .070 clearance you can still see a little shiny spot where the piston makes contact during engine running. Thus you have a .070-inch combination of rod stretch, expansion growth in the rod and piston, plus various deflections, and probably some piston rods as well. Dave went through some fast arithmetic for us, figuring out the effect that this .070 inches had on compression. It's enough to vary the cc's from 90.5 to 63.5 and the compression from 12-to-1 all the way to 14.78-to-1 with the actual ratio somewhere between these extremes.

Remachining the heads and block changed the push rod alignment in the manifold tunnels cutting the bottom of the manifold then recentered the push rods so that any scrape marks on the sides will show up immediately. The manifold, incidentally, requires nearly double the bolt torque of a medium riser—45 foot/pounds instead of 22.

There is no exhaust heat supplied to the underside of the tunnel ports and a small sheet metal cover prevents hot engine oil from reaching the area under the carburetors. To supplement this heat barrier, Lyall also uses the oil splash shield normally run on a 427 wedge, keeping that much more oil away from the manifold casting. Talking about volumetric efficiency, packing the bottom of the manifold with ice means an instant mile per hour.

Quite a bit of carburetor work has been done, such as removing the choke, weakening the vacuum diaphragm valve spring and removing the ball check from the secondary throttle opening area to get a quicker action. Because of the engine rpm range, Dave is also planning to work with mechanical secondary throttle opening. The Venturi boosters (small auxiliary venturis inside the carburetor) were shortened to tailor the fuel flow.

As Lyall puts it, "It's nice to bolt on 30 extra horses, but you have to coax them a little."

(Continued on page 78)