

# Intake Inquiry II

**We burn up the dyno cell stressing 460 intakes like a big-block should**

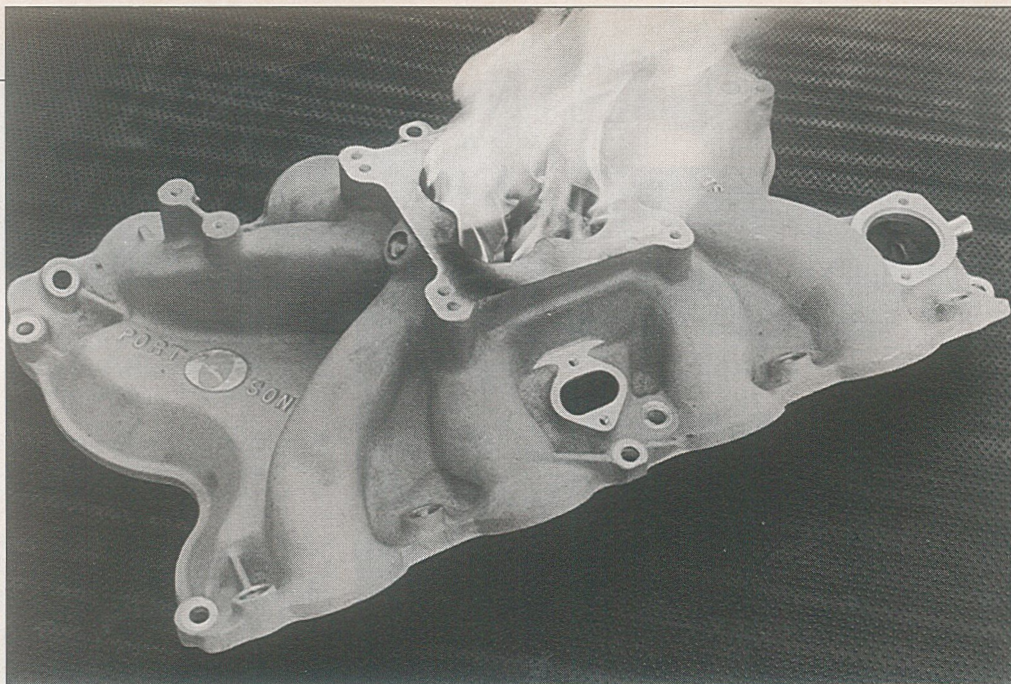
text and photography  
by Earl Davis

When we first squeezed our 460 with J Bittle's Superflow 901 dynamometer, we evaluated five aftermarket intake manifolds for an article called Intake Inquiry (February '93 *Super Ford*). Edelbrock's 3766 Performer emissions legal dual-plane manifold, Blue Thunder/Ford Power Parts' 4250 and 4250B, Weiland's 8012 tall-deck dual-plane and Offenhauser's 6157 Port-O-Sonic single plane manifold were each compared to the factory low-profile cast-iron gas passage network.

The results of that intense dyno session revealed two indisputable facts about our low-po engine. First, even a modest 460 will generate 430 horsepower and 525 ft/lbs of low-rpm torque. That's enough to drag a lightweight car through the quarter mile in under 11 seconds, pull an F-250 dually and trailered race car through the mountains or push a 26-foot pleasure boat over the water at 100 plus mph — and do all of these things with a comfortable margin of reliability and dependability.

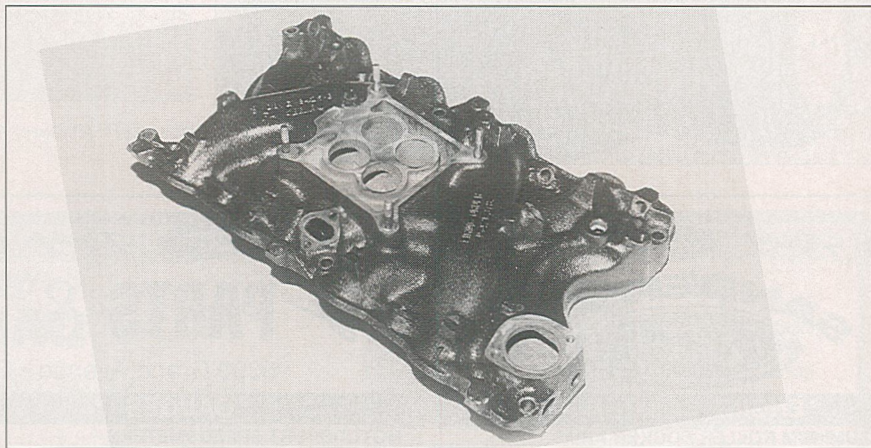
The second thing we learned was our stout big-block did not have enough cylinder head or camshaft to fully challenge the four serious intake manifolds in the lineup. The engine simply did not breathe enough air to challenge the three high-rise dual-planes manufactured by Blue Thunder and Weiland — as well as the only single-plane manifold in the exercise, manufactured by Offenhauser.

Our 460 was originally designed to generate maximum power well under 6000 rpm mainly because low-speed engines last longer and are generally more dependable. High-revving ground pounders are considerably stronger on the top end, but they tend to be somewhat hand grenade-like in that they get the job done quickly — but they're not reusable once they blow.

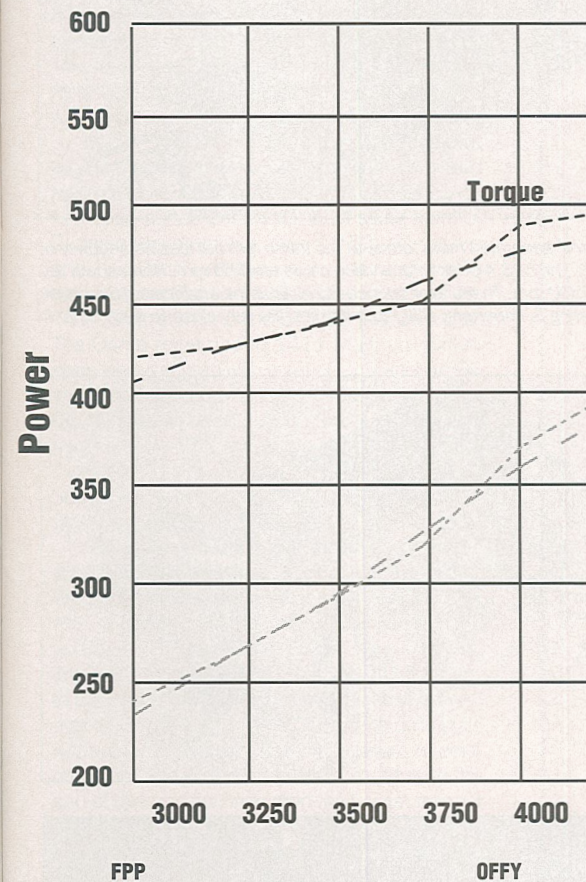
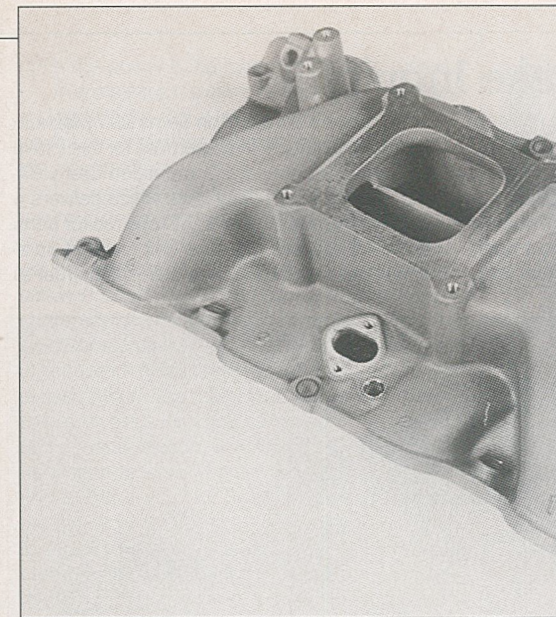
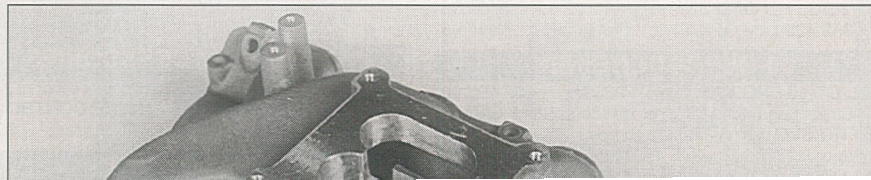


The three serious manifolds in question originally included in our first test are designed to complement a 7000-7500 rpm engine. So to

finish the job, we returned to JBP's dyno cell with the 460, a pair of Cobra Jet aluminum heads from Ford SVO, a solid lifter Competition



In our original test performed a year ago, the stock intake manifold, all 50 lbs, 10 oz of it, generated 520.2 ft/lbs of torque at 3250 rpm and 409.4 horsepower at 5000 rpm with a medium-sized hydraulic camshaft, exhaust-ported iron heads and Shorty EPA-legal truck headers. Impressive numbers considering the size and shape of the piece. But in this test, the low-rise stocker or the Edelbrock Performer runners won't even cover the ports in the CJ aluminum heads, which is just as well since neither intake was engineered for high-rpm, high-horsepower applications.

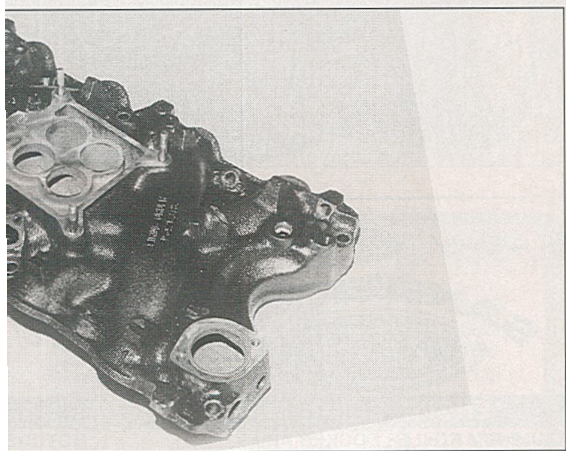


FPP

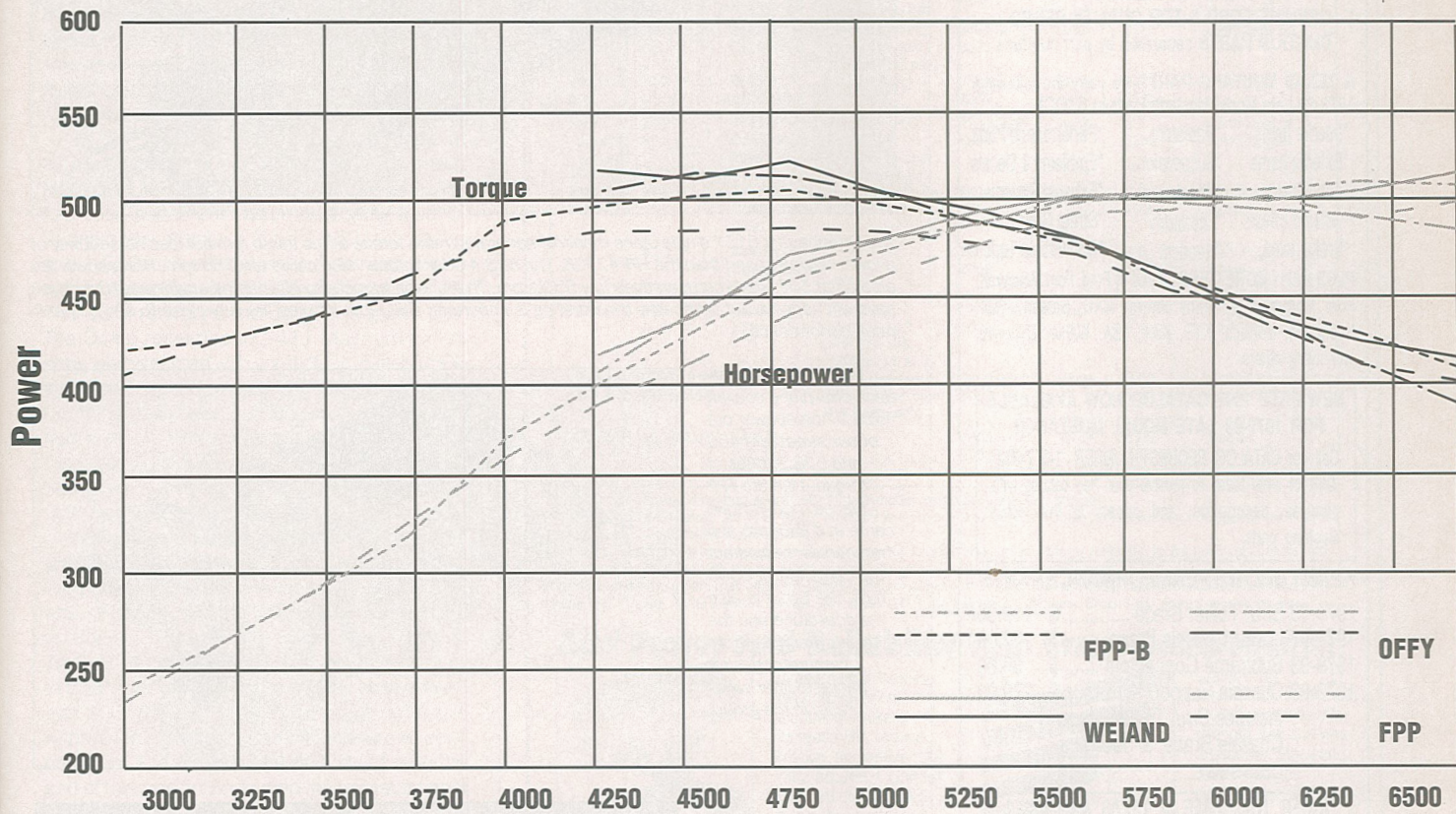
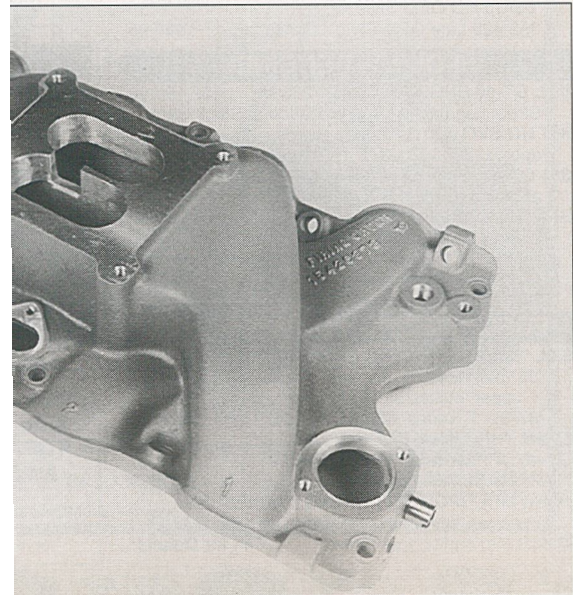
OFFY

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FPP			OFFY			WEIAND			FPP-B		
RPM	Torque	Horsepower	RPM	Torque	Horsepower	RPM	Torque	Horsepower	RPM	Torque	Horsepower
3000	411.5	235.1	4250	510.2	412.9	4250	521.6	422.1	3000	424.7	242.6
3250	430.0	266.1	4500	520.1	445.6	4500	517.0	443.0	3250	430.3	266.3
3500	442.9	295.2	4750	518.4	468.8	4750	526.3	476.0	3500	441.9	294.5
3750	464.9	331.9	5000	508.7	484.3	5000	509.3	484.9	3750	454.4	324.4
4000	480.9	366.3	5250	492.5	492.3	5250	499.5	499.3	4000	494.6	376.7
4250	488.7	395.5	5500	484.4	507.3	5500	484.6	507.5	4250	502.2	406.4
4500	488.8	418.8	5750	460.1	503.7	5750	464.7	508.8	4500	507.7	435.0
4750	490.3	443.4	6000	437.7	500.0	6000	441.8	504.7	4750	510.8	462.0
5000	488.1	464.7	6250	417.3	496.6	6250	428.8	510.3	5000	502.3	478.2
5250	481.6	481.4	6500	395.2	489.1	6500	420.1	519.9	5250	493.3	493.1
5500	475.7	498.2							5500	480.9	503.6
5750	456.3	499.6							5750	465.7	509.9
6000	444.1	507.3							6000	447.1	510.8
6250	416.3	495.4							6250	432.9	515.2
6500	407.3	504.1							6500	414.7	513.2

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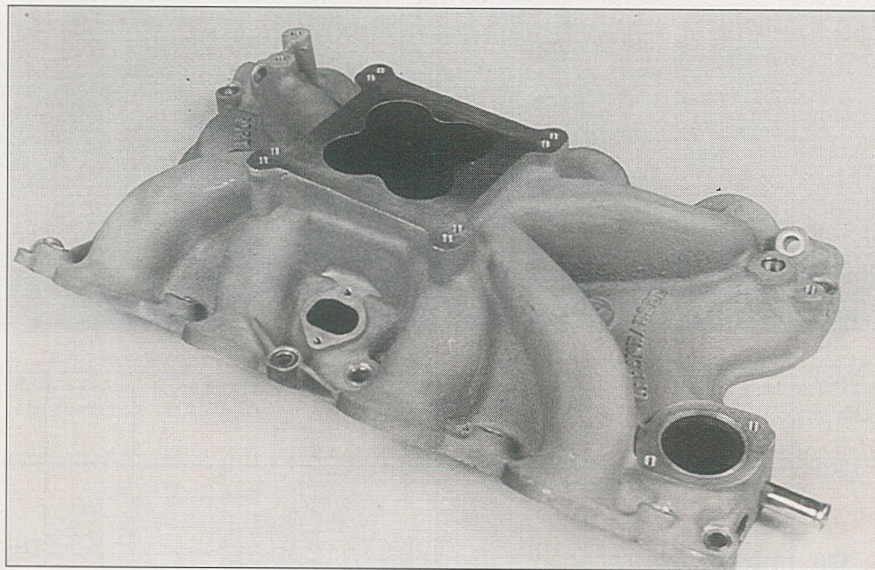
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## Intake Inquiry II

Cams camshaft and a box full of Fel Pro gaskets. The results of the subsequent article called CJs Maxed, which ran in last month's issue, describes in detail the OE-replacement aluminum Cobra Jet heads, their application, how they respond to modification and their net worth in terms of performance gained. For that test,

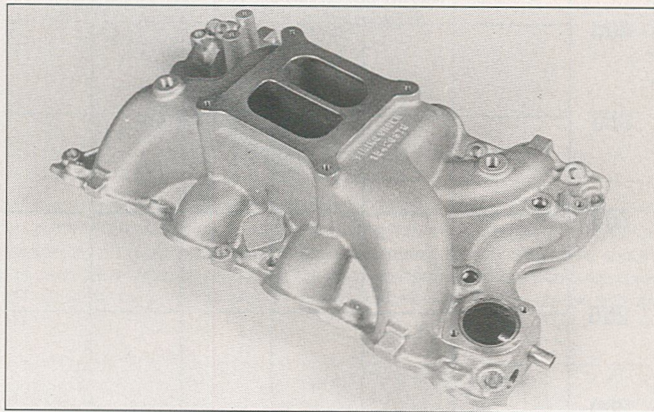
we installed a Competition Cams 292 Magnum hydraulic camshaft. In preparation for this intake test, we switched to a Competition Cams 34-324-4 solid lifter timing stick which delivers a .605-inch gross lift with 1.72 ratio rocker arms and 248 degrees of intake and exhaust duration beginning at .050-inch valve lift in order to



The Offenhauser 6157 single plane manifold generated more torque at the same rpm but less horsepower at a lower engine speed than the FPP4250B. The 518.4 peak torque value came at 4750 rpm. Horsepower leveled off at 507.3 at a comparatively low 5500 rpm. That's exactly opposite of what the engineering handbook says will happen, but that's why dyno testing is important. Still, both intakes are very close to each other in peak performance.

Weiland's 8012 tall-deck dual-plane coaxial 519.9 horsepower out of our streetable 460 and 526.3 ft/lbs of torque. Like the FPP pieces, peak torque came at 4750 rpm and horsepower maxed out the camshaft at 6500 rpm. The 8012 is also a dual-plane and the tallest manifold (from carburetor gasket flange to lifter valley rails) in the group.

This is why we call them tall deck manifolds. The stock iron piece positions the carburetor



push the power band higher in the rpm range.

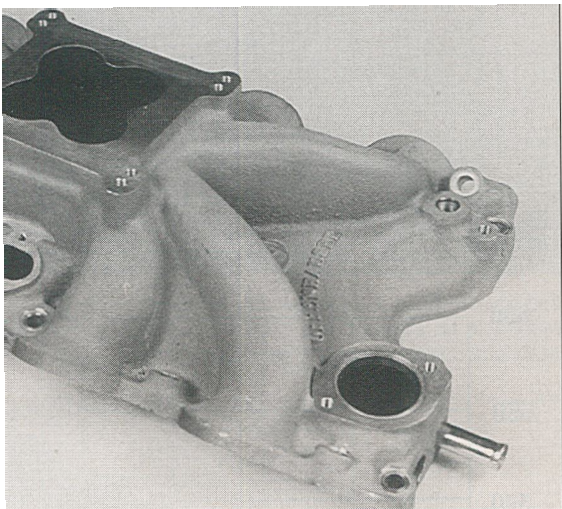
After inserting the camshaft, porting the heads and installing a pair of long-tube Hooker headers, we felt the engine was potent enough to take on the big manifolds.

The modified buildup is assembled around a balanced and blueprint shortblock. Once extracted from a full-size 1970 Mercury station (ary) wagon, the stock 429 cid engine block was Magnafluxed, squared and decked. Each cylinder was centered, bored and trued with a pair of solid-steel torque plates bolted to the deck surfaces to simulate the stresses present when the engine is assembled. The main bearing caps were also torqued in place throughout the machining process for the same reason. Stock 6.605-inch long connecting rods were Magnafluxed, beam ground and outfitted with ARP 3/8-inch rod bolts before the big ends were resized. TRW dished L2404F forged pistons were attached with pressed fit pins then equipped with a set of file-fit Speed Pro Plasma Moly rings. Installing a 460 crankshaft with its .26-inch longer stroke in place of the stock 3.59-inch stroke 429 crank gave us an additional 31 cubic inches (37 if you included the .030-inch overbored cylinders) at very little additional cost. The stock crank was deburred, Magnafluxed and its oil holes were chamfered before it was turned .010-inch under and then balanced.

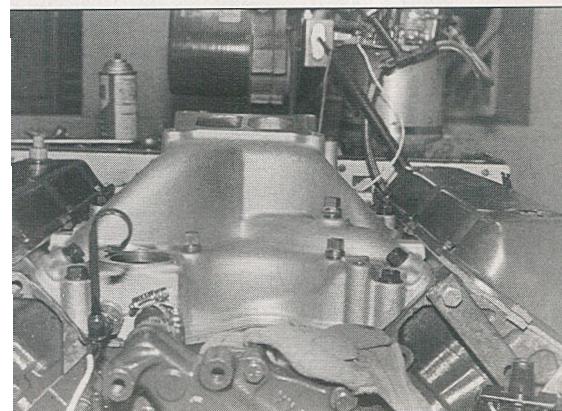
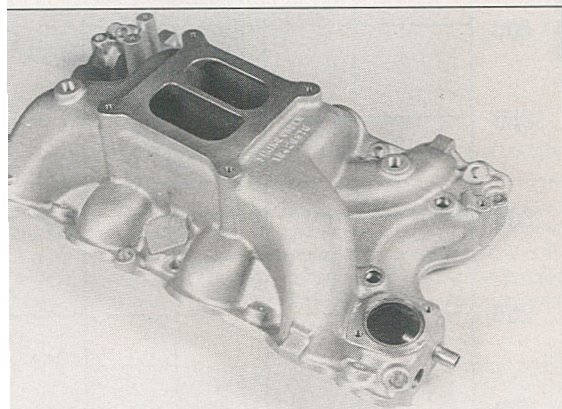
By the time the manifold test had made its way to the top of our work sheet, the aluminum Motorsport M-6049-A429 Cobra Jet cylinder heads had been ported and assembled using a set of SI one-piece stainless steel 2.150-inch intake and 1.650-inch exhaust valves secured with a set of Competition Cams 924 dual valve springs, 741 steel retainers and 611 10-degree locks. The Comp roller-tipped 1411 Magnum rocker arms were secured with a set of 7/16-inch 4506 studs and aligned with eight 4838 guide plates. Combining the head's 70cc combustion chambers with the TRW everyday pistons produced a manageable 9.8 compression ratio. Aluminum heads will successfully handle more compression because they dissipate heat so quickly.

All machine work and final assembly of the shortblock was performed in part by John Bridges, Greg Grosset, John Elderherst and Greg McCarthy who, under the direction of Bob Thompson, make up Engine Systems, Inc. ESI is J Bittle Racing Engines' in-house machine shop. As testimony to their work, our 460 test mule has survived well over 100 wide-open throttle, full power dyno pulls without losing an ounce of oil pressure or compression. A leak down test performed near the end of this session indicated the lowest cylinder giving up just 8 percent to blowby.

With the test well under way, it's hard not to be impressed by the numbers. A wide open throttle stab at slightly under 2000 rpm will unleash



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With the test well under way, it's hard not to be impressed by the numbers. A wide open throttle stab at slightly under 2000 rpm will unleash over 350 ft./lbs of tire-frying torque — instantaneously. That's peak for a well-built small-block but business as usual for this bad boy. The big engine easily maintains over 400 ft./lbs of torque through a 4000 rpm span. Horsepower climbs steadily from approximately 300 at 3500 rpm and peaks at over 500 at 6500 rpm when the camshaft can do no more. All of that equates to lots of usable power when and where you need it in virtually any application.

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Nitrous Oxide						Supercharged	
Type Nitrous System	Comp. Ratio	Camshaft Pt. No.	Engine Make, Yr., Cu. In.	Cruise RPM & Max RPM	Trans Stall RPM	Max. Comp. Ratio Max Boost	Supercharger Type
Plate	8.75-10.5:1	363941+ HMV-272-2	Ford 289-302, '62-93, V-8, Non-H.O. or EFI	2600-3000 5500	Stock	8.5:1 8 lbs.	Centrifugal or Small Rootes
Plate or Manifold	9.5-11.0:1	364551 CCH-286-2	(340 cu. in. and larger use next more radical cam for best perf.)	3400-3800 6000	2500+	8.5:1 10 lbs.	Centrifugal or Rootes
Manifold	10.0-11.5:1	364561 CCH-296-2		3800-4200 7000	3000+	8.0:1 15 lbs.	Rootes
Note: Special Systems For SEFI Applications	9.2:1	444112*+ CompuCam 2020	Ford 5.0L H.O., 85-93, V-8, (340 cu. in. and larger use next more radical cam for best perf.)	2200-2600 5000	Stock	9.2:1 8 lbs.	Centrifugal or Small Rootes
	9.2:1	444122*+ CompuCam 2030		2400-2800 5500	2500+	8.5:1 10 lbs.	Centrifugal or Rootes
	9.2:1	444132*+ CompuCam 2040		2600-3000 6000	3000+	8.0:1 15 lbs.	Centrifugal or Rootes
Plate	8.75-10.5:1	443941+ HMV-272-2	Ford 351W, 69-93, non EFI, V-8, (370 cu. in. and larger use next more radical cam for best perf.)	2600-3000 5500	Stock	8.5:1 8 lbs.	Centrifugal or Small Rootes
Plate or Manifold	9.5-11.0:1	444551 CCH-286-2		3400-3800 6000	2500+	8.5:1 10 lbs.	Centrifugal or Rootes
Manifold	10.5-12.0:1	440661 H-238/ 3347-2-10		3800-4200 7000	3000+	8.0:1 15 lbs.	Rootes

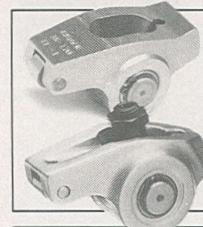
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+50 states emissions legal. C.A.R.B. "E.O." numbers issued for these cams. All other cams listed are not legal for sale or use in pollution controlled motor vehicles.

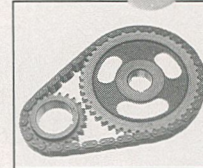
Many cams listed above are available in Cam & Lifter Kit. Crane lifters, valve springs, retainers, locks, timing chain sets and pushrods must be used with nitrous oxide or superchargers. See catalog for applications.

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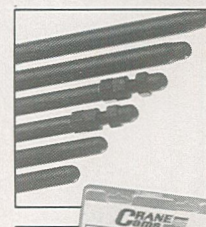
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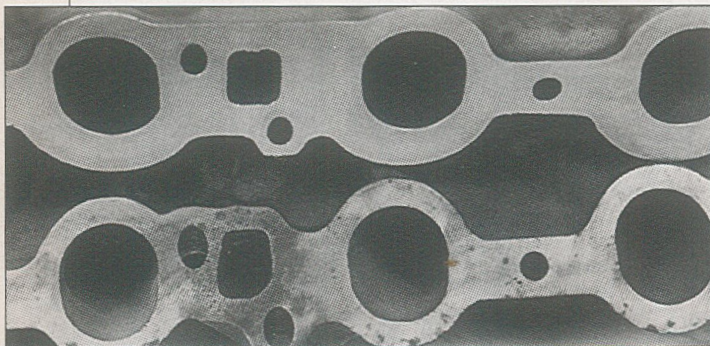
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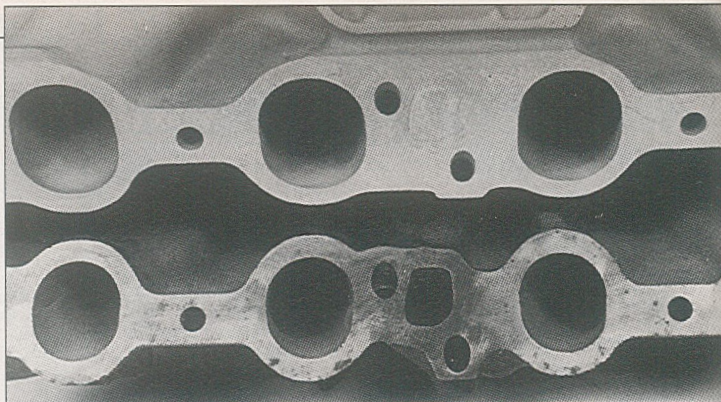
## Intake Inquiry II

continued from page 30

Both FPP pieces and the Weiland manifold have large passages to accommodate the CJ head's equally large runners. The stock Ford manifold's small-diameter runners (bottom) promote high velocity, which generate big low-rpm torque numbers, and limit high-rpm horsepower values.



Although its spiked horsepower curve is representative, the Offy's power did not fall off sharply after the peak like a traditional single plane manifold. We suspect its comparatively smaller cross-sectional runner area helps maintain a higher air velocity which also improves low-end throttle response. In fact, the Offy's nearly straight runners (top) are actually smaller than the stock iron manifold's.



### Sources:

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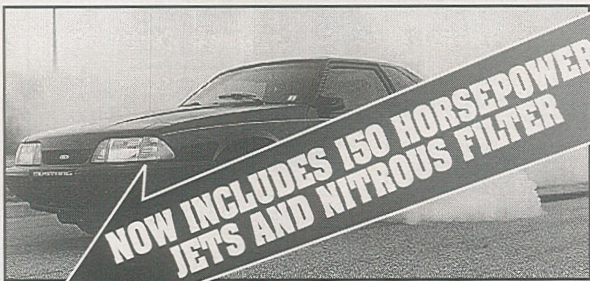
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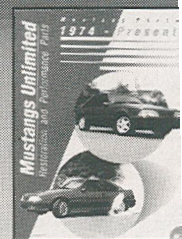


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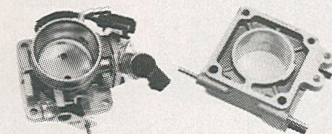


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Mustangs

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Rear shocks

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Front struts (

Rear shocks

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