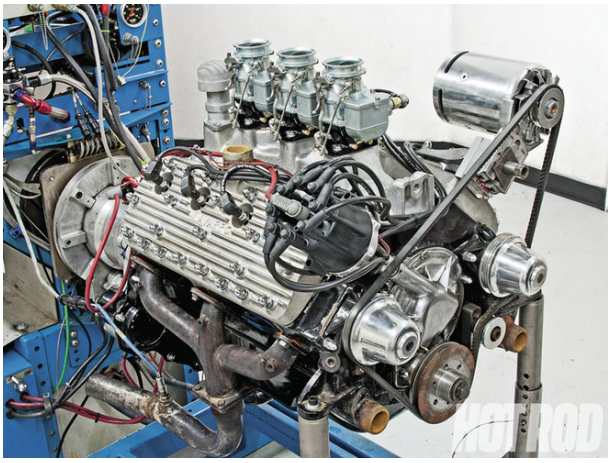
Flathead Ford Intake Manifold Smackdown



We Test 12 Popular Intakes for the Engine that Gave Birth to Hot Rodding As We Know It

Hot Rod may be celebrating its 65th anniversary, but Ford's flathead V8, the engine that birthed the entire hot rod hobby (and, in due course, this magazine) first rolled off the production line 80-plus years ago in 1932. To mark both our anniversary and the flathead's, we decided to do the flathead engine story we've never seen: We dyno'd a dozen vintage-type aftermarket intakes at our favorite test facility, Westech Performance in Mira Loma, California.

H&H Flatheads' Mike Herman showed up with a truckload of intake manifolds that are still in production and commonly available, as well as a custom-built H&H flathead stroker engine (see "The Test Engine" sidebar, pg. 104). H&H has the rights to Navarro Racing Equipment's intakes and heads but also stocks brand-new, high-quality Stromberg 97 carbs and all competitors' heads and intakes. In fact, H&H can be considered your one-stop shop for anything Ford flathead–related, from individual parts to complete custom engine builds. And for you un-Ford guys, H&H also supports other oddball domestic vintage engines.

Only a modern dyno like Westech's SuperFlow 902 can accurately find small torque and power differences in a 160–200hp engine such as H&H's test mule. Westech's Steve Brulé was careful to stabilize the oil and water temp at the same point for all tests. As for the tune, all tests were run with 27 degrees total ignition advance, and the carbs were rejetted as needed to yield a 12.3:1 to 12.8:1 air/fuel at wide-open-throttle. Once each combo was optimized, the best two runs were averaged for the results reported in these pages. What's really interesting was that many of these ancient intakes—designed as they were without access to modern flow benches or airflow technology—perform quite well within the limitations of the flathead's design architecture. Read on to find out "who's on first."

Single Four-Barrel Intakes

We tested three different popular single four-barrel intakes—one each from Edelbrock, Navarro, and Offenhauser. Mounting a modern square-flange carb mandates a spacer, as all the intakes come drilled for the early Carter WCFB carb. In our case, the test carburetor was H&H's recommended Holley model 4160, 390-cfm, vacuum-secondary carb (PN 8007) with the secondaries wired wide open on the dyno.

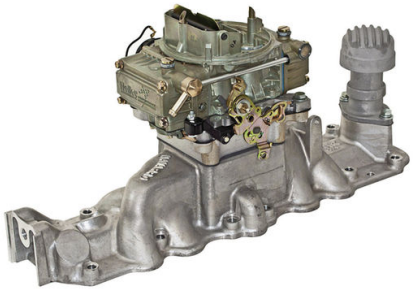
The max peak power difference between all three four-barrel intakes was only 7.3 lb-ft and 4.8 hp at the peaks, with an overall average difference of just 6 lb-ft and 3.9 hp. Offenhauser proved to be the strongest single-quad intake.

On a flathead, it’s hard to design a really effective single four-barrel intake on a par with offerings for modern V8s. The flathead’s narrow-width intake manifold profile compromises equal runner lengths, cylinder-to-cylinder air/fuel distribution, and the runner-to-port angle. Because of these limitations, the single-quad intakes weren’t up to the best “ancient” multicarb Stromberg 97 intakes.

Navarro Four-Barrel

A genius in his day, Barney Navarro made intakes that had the rep of being equal, if not better, than anything the “big names” could put up against them. Although several of Navarro’s dual- and triple-carb offerings made the most power for their respective combos in our tests, the Navarro four-barrel intake was eclipsed by the other two four-barrel intakes tested.

Official Product Name	4-Barrel Navarro
Model Years Covered	’38–’53
H&H Price	$400
Peak Power	167.9 hp @ 4,500 rpm
Peak Torque	228.8 lb-ft @ 2,800 rpm
Average Power (overall)	140.3 hp
Average Torque (overall)	214.1 lb-ft
Average Power (2,000–3,400 rpm)	116.2 hp
Average Torque (2,000–3,400 rpm)	225.8 lb-ft
Average Power (3,500–5,000 rpm)	162.9 hp
Average Torque (3,500–5,000 rpm)	203.1 lb-ft



Edelbrock Four-Barrel

A reproduction of the vintage Edelbrock No. 452 two-piece manifold with a new carburetor flange and a tall spacer, this intake’s performance bettered the Navarro by 4.9 lb-ft and 3.2 hp at the peaks and 4.1 lb-ft and 2.6 hp on average.

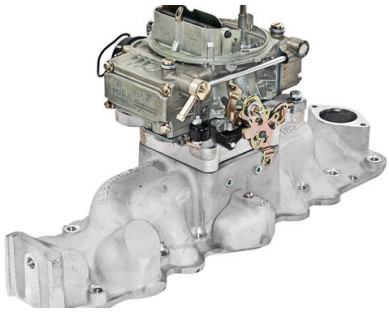
Official Product Name	Ford Flathead 4-Barrel Manifold
Model Years Covered	’49–’53 (PN 1106)
H&H Price	$375
Peak Power	171.1 @ 4,500 rpm
Peak Torque	233.7 lb-ft @ 2,800 rpm
Average Power (overall)	142.9 hp
Average Torque (overall)	218.2 lb-ft
Average Power (2,000–3,400 rpm)	118.6 hp
Average Torque (2,000–3,400 rpm)	230.5 lb-ft
Average Power (3,500–5,000 rpm)	165.7 hp
Average Torque (3,500–5,000 rpm)	206.5 lb-ft

Offenhauser Four-Barrel

Offenhauser did its homework on this one. It edged out the Edelbrock by 2.4 lb-ft and 1.6 hp at the peaks and also slightly bested that intake across the board with a 1.3 hp and 1.9 lb-ft average output increase. It was able to

more than hold its own against several of the twin-carb intakes as well.

Official Product Name	Single Carburetor Four-Throat Manifold
Model Years Covered	’32–’48 (PN 1079), ’49–’53 (PN 1078)
H&H Price	$250
Peak Power	172.7 @ 4,400–4,500 rpm
Peak Torque	236.1 lb-ft @ 2,700 rpm
Average Power (overall)	144.2 hp
Average Torque (overall)	220.0 lb-ft
Average Power (2,000–3,400 rpm)	119.4 hp
Average Torque (2,000–3,400 rpm)	232.1 lb-ft
Average Power (3,500–5,000 rpm)	167.4 hp
Average Torque (3,500–5,000 rpm)	208.7 lb-ft



Using Offy’s preferred four-hole, ½-inch spacer (front; PN 4006, $40 at H&H) in place of the tall Edelbrock spacer (under carb) with a street Holley carb on a ’49–’53 motor would require a manual choke and cut-down throttle linkage.

Twin Stromberg Intakes

H&H says twin Stromberg 97 setups are the most popular choice among flathead traditionalists, and manifolds for them are available in a bunch of configurations. We tested six: a Thickstun, an Offenhauser, an Edelbrock, and three Navarros. Stromberg 97s flow 162 cfm at 1.5 inHg—the same pressure drop used to measure a four-barrel’s airflow—so running them in a twin configuration yields 362 cfm. That’s seemingly lower than a 390-cfm Holley four-barrel used in the single-carb tests, but four out of six twins outperformed the quad intakes in our tests. We feel that’s because the best of the twin intakes develop superior fuel distribution within the confines of the flathead’s narrow intake envelope.

There was a much wider spread between the poorest performing and the strongest dual-carb intakes compared with the four-barrel manifolds. There was also no undisputed winner in the twin category. The Edelbrock Slingshot and Navarro Racing manifolds are both very good units. However, at the opposite end of the scale, two of the manifolds—the 2×2 Thickstun and the 2×2 Navarro regular—did not match the performance of the best single four-barrel intakes.

Thickstun 2×2 PM-7

The tunnel-ram–like Thickstun twin intake sure looks like it’s ready to kick ass and take names. Sadly, it was not to be. Weaker upstairs than the four-barrel intakes, it gave away 13.2 hp to the Offy, 11.6 hp to the Edelbrock, and even 8.4 hp to the Navarro. It was no great shakes in torque output, either. We have to say there are other, better choices out there unless you’re just into profilin’.

Official Product Name	Thickstun 2×2 PM-7
Model Years Covered	’38–’53
H&H Price	$650
Peak Power	159.5 hp @ 4,300–4,500 rpm
Peak Torque	233.6 lb-ft @ 2,800 rpm
Average Power (overall)	138.0 hp
Average Torque (overall)	212.3 lb-ft
Average Power (2,000–3,400 rpm)	118.3 hp
Average Torque (2,000–3,400 rpm)	230.3 lb-ft
Average Power (3,500–5,000 rpm)	156.4 hp
Average Torque (3,500–5,000 rpm)	195.4 lb-ft

2×2 Navarro Regular

The Navarro Regular’s closely spaced carbs clear the stock generator but forsake optimum fuel distribution in doing so. It makes about the same average power and torque numbers as the Offy four-barrel; at the peaks, it developed 2.7 more lb-ft, but 3 less horsepower. Overall, Offy’s four-barrel intake was stronger on top. Compared with the Thickstun twin, there is no comparison: The Navarro Regular was worth 5.2 lb-ft and 10.9 hp at the peaks and 7.8 lb-ft and 6.0 hp on average.

Official Product Name	2×2 Navarro Regular Dual
Model Years Covered	’38–’53
H&H Price	$400
Peak Power	170.4 hp @ 4,500 rpm
Peak Torque	238.8 lb-ft @ 3,000 rpm
Average Power (overall)	144.0 hp
Average Torque (overall)	220.1 lb-ft
Average Power (2,000–3,400 rpm)	120.6 hp
Average Torque (2,000–3,400 rpm)	234.1 lb-ft
Average Power (3,500–5,000 rpm)	165.9 hp
Average Torque (3,500–5,000 rpm)	206.9 lb-ft

2×2 Offenhauser Regular Dual

Superficially, Offy’s layout appears similar to the Navarro Regular. However, the version we tested (PN 1075) was specifically designed to fit ’49–’53 models, which allowed Offy to move the carbs 1-inch further forward compared to the Navarro regular. This relocation was worth 2.8 more peak horsepower over the Navarro Regular but at the cost of 1.2 lb-ft less torque. Overall, the Offy had slightly better overall average power and torque numbers. The Navarro’s numbers were better from 3,200 rpm and down; the Offy was better from 3,300 on up. And, yes, this twin made better numbers than Offy’s single four-barrel intake.

Official Product Name	Regular Dual Manifold
Model Years Covered	’32–’48 (PN 1090), ’49–’53 (PN 1075)
H&H Price	$225.00
Peak Power	173.2 hp @ 4,500 rpm

Peak Torque	237.6 lb-ft @ 2,900 rpm
Average Power (overall)	145.6 hp
Average Torque (overall)	222.2 lb-ft
Average Power (2,000-3,400 rpm)	120.8 hp
Average Torque (2,000-3,400 rpm)	234.7 lb-ft
Average Power (3,500-5,000 rpm)	168.8 hp
Average Torque (3,500-5,000 rpm)	210.5 lb-ft

"These tests tell us that the Navarro 2×2 Racing and 3×2 intakes make the most top-end power." — Mike Herman, H&H Flatheads

2×2 Navarro Universal

Compared with the Navarro Regular, the Navarro Universal widens the carb spacing for a more direct shot to the ports. The Universal is stronger than the Regular from 3,600 rpm on up and is worth 8.1 peak horsepower on the top end. However, the Regular makes 5.9 lb-ft more torque. Similarly, at the peaks the Universal makes 5.3 more horsepower than the Offenhauser Regular Dual but gives away 5.8 lb-ft—yet overall average output compared with the Offy is nearly a wash. It's a classic case of shorter runner lengths skewing the curve higher.

Official Product Name	2×2 Navarro Universal Model
Model Years Covered	'38–'53
H&H Price	$400
Peak Power	178.5 hp @ 4,600-4,700 rpm
Peak Torque	233.4 lb-ft @ 3,100 rpm
Average Power (overall)	145.6 hp
Average Torque (overall)	221.1 lb-ft
Average Power (2,000–3,400 rpm)	118.2 hp
Average Torque (2,000–3,400 rpm)	229.5 lb-ft
Average Power (3,500–5,000 rpm)	171.4 hp
Average Torque (3,500–5,000 rpm)	213.3 lb-ft

It's not every day that Westech runs a Ford flathead. Linking it to the dyno's absorber is courtesy of a Wilcap adapter that connects a '49–'54 Ford Flathead 8BA block bellhousing to Westech's existing hookup plate with its GM Muncie/Saginaw-style manual-trans bolt pattern and pilot.

Edelbrock Slingshot

Among the first ever hot rod parts, the famous Edelbrock Slingshot still ranks among the best flathead intakes out there. Although the Navarro 2×2 Universal and Navarro 2×2 Racing dual made slightly more top-end power, the venerable Edelbrock produced more peak torque, as well as more overall average power and torque. The Edelbrock is the best dual-carb intake we tested through 3,900 rpm—and it also clears the stock generator. At the lower half of the test rpm range, the Edelbrock would also go on to outperform two out of the three triple-carb intakes.

Official Product Name	Slingshot Manifold
Model Years Covered	’32–’48 (PN 1103)
H&H Price	$400
Peak Power	177.4 hp @ 4,600 rpm
Peak Torque	244.7 lb-ft @ 3,000 rpm
Average Power (overall)	148.6 hp
Average Torque (overall)	226.7 lb-ft
Average Power (2,000–3,400 rpm)	123.5 hp
Average Torque (2,000–3,400 rpm)	239.7 lb-ft
Average Power (3,500–5,000 rpm)	172.1 hp
Average Torque (3,500–5,000 rpm)	214.6 lb-ft

2×2 Navarro Racing

If you want max top-end power with dual Strombergs, don’t care if the stock generator fits, and aren’t concerned about quick warm-ups (there’s no heat-riser provision), this is the one you want. It made more top-end power and torque from 4,000 rpm on up than any of the other duals and had the best peak power numbers. The race unit’s flat, top-end power curve generated more than 180 hp from 4,400 through 4,700 rpm. Compared with the Navarro 2×2 Universal—which has the same wide carb spacing and runner layout plus a street-friendly heat riser—the race version is worth 2.2 hp and 3.7 lb-ft at the peaks and 1.9 hp and 2.8 lb-ft on average. The Navarro pounded out 21.2 more horsepower than the Thickstun twin. It also gained 8.0 hp over Offy’s four-barrel intake.

Official Product Name	2×2 Navarro Racing Manifold
Model Years Covered	’38–’53
H&H Price	$400
Peak Power	180.7 hp @ 4,500 rpm
Peak Torque	237.1 @ 3,100 rpm
Average Power (overall)	147.5 hp
Average Torque (overall)	223.9 lb-ft
Average Power (2,000–3,400 rpm)	119.7 hp
Average Torque (2,000–3,400 rpm)	232.2 lb-ft
Average Power (3,500–5,000 rpm)	173.6 hp
Average Torque (3,500–5,000 rpm)	216.2 lb-ft

Triple Stromberg Intakes

Two Strombergs not enough? Try three, for 486 cfm of flow plus a more direct shot to the cylinders. We tested

three of them: an Edelbrock, an Offenhauser, and a Navarro. All made more peak power than the Navarro Racing twin. The best triple—the 3×2 Navarro—gained 13.8 peak horsepower and 4.1 hp over the 2×2 Navarro Racing. The Edelbrock Slingshot's low-end numbers still reigned supreme, however. In general, the tri-power combos shifted the torque and power peaks slightly higher. From the lowest to the strongest triple combo—Edelbrock versus Navarro—the peak spread was 13.0 hp and 5.5 lb-ft. All carbs were run wide open on the dyno, but for street driving they can be set up with optional progressive linkage. An adapter bracket is needed if any of these intakes will be run with a stock generator.

New Stromberg carbs are once again being made. Several companies offer Stromberg lookalikes, but H&H says the best, most reliable, and least troublesome are the real Strombergs made by the re-formed company, now from England. H&H stocks only the real McCoy.

3×2 Edelbrock

Edelbrock's repop of its vintage triple Stromberg intake proved a tad stronger than the Navarro 2×2 Racing, but Big E's own Slingshot actually outperformed it on average down-low as well as in max-torque output. Still, the 3×2 Edelbrock exceeded 180 hp from 4,400 rpm through 4,900 rpm.

Official Product Name	Triple Deuce Manifold
Model Years Covered	'38–'48 (PN 1108), '49–'53 (PN 1109)
H&H Price	$300
Peak Power	181.5 hp @ 4,500–4,600 rpm
Peak Torque	237.9 lb-ft @ 3,100 rpm
Average Power (overall)	148.4 hp
Average Torque (overall)	225.3 lb-ft
Average Power (2,000–3,400 rpm)	120.5 hp
Average Torque (2,000–3,400 rpm)	233.8 lb-ft
Average Power (3,500–5,000 rpm)	174.5 hp
Average Torque (3,500–5,000 rpm)	213.3 lb-ft

3×2 Offenhauser

Offy's triple-deuce intake gained 4.5 hp and 2.6 lb-ft at the peaks and 2.2 hp and 2.8 lb-ft on average over the Edelbrock 3×2. The power peaks occurred 100 to 200-rpm higher. It was superior to every previously tested intake except in the case of the Slingshot's low-end numbers. There are different versions; order by the engine's model year. All include generator adapter brackets.

Official Product Name	Triple Manifold
Model Years Covered	'32–'41 (PN 1072), '42-'48 (PN 1073),'49–'53 (PN 1076)

H&H Price	$300 (PN 1072, 1073),$325 (PN 1076)
Peak Power	186.0 hp @ 4,800 rpm
Peak Torque	240.5 lb-ft @ 3,300-3,400 rpm
Average Power (overall)	150.6 hp
Average Torque (overall)	228.1 lb-ft
Average Power (2,000–3,400 rpm)	121.0 hp
Average Torque (2,000–3,400 rpm)	234.6 lb-ft
Average Power (3,500–5,000 rpm)	178.4 hp
Average Torque (3,500–5,000 rpm)	222.0 lb-ft

Winner: 3×2 Navarro

There are those who claim Barney Navarro broke the mold when he made this intake, and the numbers we saw back that claim up. The 3×2 Navarro is the overall best intake out of the 12 we tested. It made the best peak numbers, the best overall average numbers, and the best average numbers upstairs, being eclipsed only by the Edelbrock Slingshot dual on the low end. The 3×2 Navarro proved to be worth 8.5 hp and 4.7 lb-ft over the Offy triple, 13 hp and 5.5 lb-ft over the Edelbrock triple, and 13.8 hp and 8.1 lb-ft over the 2×2 Navarro racing manifold.

Official Product Name	3×2 Navarro Manifold
Model Years Covered	’38–’53
H&H Price	$400
Peak Power	194.5 hp @ 4,600 rpm
Peak Torque	245.2 lb-ft @ 3,700 rpm
Average Power (overall)	154.7 hp
Average Torque (overall)	233.6 lb-ft
Average Power (2,000–3,400 rpm)	122.5 hp
Average Torque (2,000–3,400 rpm)	237.6 lb-ft
Average Power (3,500–5,000 rpm)	184.9 hp
Average Torque (3,500–5,000 rpm)	229.9 lb-ft

Who’s on First?

The best overall intake—Navarro’s 3×2 triple—proved to be worth 16.4 lb-ft over the Navarro four-barrel intake. The Thickstun dual had the lowest peak power and the lowest average torque and power numbers; compared to it, the 3×2 Navarro gained 35 peak horsepower and 21.4 lb-ft in overall average torque, and 16.7 in overall average horsepower. In percentage terms, the 3×2 Navarro’s 194.5 peak horsepower output represents

about a 22 percent power gain compared with the Thickstun. However, if you're looking for great low-end performance with a broad overall power curve, the vintage Edelbrock Slingshot still kicks butt.

Best Single Four-Barrel Intake: Offenhauser Single Carburetor Four-Throat
Best Dual Carb Intake (Tie): Edelbrock Slingshot (broadest powerband) or 2×2 Navarro Racing (most top-end power)
Best Triple Carb Intake and Best Overall: 3×2 Navarro

The Test Engine

The test mule was H&H's most popular Ford flathead engine combo—a 1⁄8-inch-over, 1⁄8-inch-stroker that, with its 3.313-inch bore x 4.125-inch stroke, displaced 284 ci. The engine was stuffed with good internals, including Ross forged pistons, Scat forged H-beam rods, and a Scat cast crank held in place by steel main caps. With 280 degrees advertised duration, 0.380-inch lift, and a 111-degree lobe-separation angle, H&H's custom solid cam was plugged in straight-up, actuating 1.5/1.5-inch Manley Pro-Flow stainless valves via hollow-body adjustable lifters and Isky springs. The valves close against unleaded fuel–compatible, hardened, replaceable seats and ride in one-piece valve guides. With H&H's own Navarro 65cc, high-compression aluminum heads, compression comes in around 8.8:1. An MSD ready-to-run, all-electronic distributor fires the plugs. Center-dump Red's Headers exhaust the spent mixture. A Melling standard oil-pump and stock-truck 5-quart oil pan filled with Valvoline VR1 Racing 20W-50 oil keeps everything alive.

With the best intake—the 3×2 Navarro—the H&H 284 test mule came up just 5 hp shy of cracking the 200hp mark on Westech's dyno. The generator is nonfunctional here, merely serving as a belt tensioner. Compared with the more familiar overhead valve engines, intake swaps on the flattie took only minutes.

http://www.hotrod.com/articles/hrdp-1301-flathead-ford-intake-manifold-smackdown/