

834hp 429 Boss Ford Engine

Jon Kaase Has Cast A New Boss 429 Hemi Head With Wind Tunnel Airflow That Begged Us To Build An Equally Angry 460 Ford. That Became Our . . .

By [Jeff Smith](#), Photography by [Jeff Smith](#)

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The only way this monster would look better is between the fenders on a hot street car with big tires. This particular engine is going into a real '69 NASCAR Talladega stock car owned by Brad Smith.



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Jon Kaase drank the Ford blue Kool-Aid a long time ago. His association with the Blue Oval goes back to his NHRA Super Stock days with a 428 Cobra Jet Mustang in the early '70s and has progressed through a stint as crew chief for the legendary Dyno Don Nicholson in NHRA Pro Stock. Kaase (pronounced kah-zee) is best known now for his engines that have won an astonishing 12 straight IHRA Pro Stock World Championships. He's also put a hammerlock on the Engine Masters competition, winning that event four times. So it's safe to say that Kaase knows his way around big-block Fords. So in a flash of brilliance he decided what the world needed was a new Boss 429 head.

While it may appear that Kaase came up with the idea and the heads just fell out of the sky a week later, the reality is that the gestation period took the better part of 18 months. To make these heads nestle into the Kaase scheme, they had to bolt on to a standard 429/460 block.

Car Craft was lucky enough to be among the first tier recipients of a set of finished castings. We planned to enlist fellow Ford fan Jim Grubbs, owner of Jim Grubbs Motorsports (JGM) to help us through this buildup, but he volunteered before we had a chance to ask. Except for the funny valve reliefs on the pistons, the short-block could easily be mistaken for a typical wedge buildup. Once we had all the parts, the only real custom work was a little grinding on the block to clear the No. 4 exhaust pushrod.

Once the engine came together, the final result underscored the investment with an amazing dyno session at JGM that had industrial complex neighbors stopping by to ask what race motor was up on the dyno. Unlike most dyno sessions that demand tremendous effort to squeeze that last ounce of power from the engine, once JGM's Jeff Latimer set the timing at 34 degrees, the only effort was to set the hot lash. The Holley Dominator Ultra carb delivered a great fuel curve right out of the box, and the massively cammed Boss Nine beast cranked out an astonishing 834 hp at a singing 7,100 rpm. The best part is that Kaase says with a bigger carb and perhaps some stiffer pushrods, we could easily make a bunch more power. The days of easy horsepower have arrived. It may not be cheap, but it most definitely is easy.



Look closely and you'll notice that our first-choice 4.500-stroke Scat crank pulled virtua

Displacement Lessons

We knew Kaase's heads would be barn burners even before we got the first castings. This meant the massive flow numbers would support a big-inch engine. So right out of the box, we found that Scat builds a 4.50-inch stroke crank that will bolt right into a stock 429/460 block. A quick run through the calculator revealed that we could build a monstrous 545ci motor with bolt-on parts. We packaged this long-arm crank with a set of 6.700-inch Scat rods with a custom Kaase-spec'd Diamond piston but then discovered that the long arm also pulled the

piston almost completely out of the bore at bottom dead center. This clearly wouldn't work, so we had to regroup. With help from Scat owner Tom Lieb, we were able to assemble a 0.200-inch-shorter crank at 4.300 with a 0.100-inch-longer connecting rod at 6.800 and balance the assembly to match the previous system. So instead of a thumpin' 545ci Ford, we ended up with an only slightly smaller 521ci beast. Just for the record, we learned later from Kaase that A460 and Eliminator castings from Ford Racing and later-production '79 (D9 casting number) blocks all have 0.250-inch-longer cylinder sleeves that would easily accommodate the longer 4.500-inch stroke. Next time we'll add the longer arm. It makes you wonder what a 454ci wedge motor with a set of Kaase's P-51 heads would make. Those heads are a bit more affordable and flow 400 cfm at 0.700-inch lift.

DISPLACEMENT	BO
429	4.3
460	4.3
502	4.3
521	4.3
545	4.3
598	4.6



One weak point in the 429/460 Ford engines is the ridiculously narrow stock cam bearings.



With all JGM's excellent machine work completed and the bearing clearances set right around



Kaase spec'd the flat-top 4.390-inch Diamond 2618 alloy pistons with the necessarily deep



Another common Lima motor ailment is the spindly stock oil pump mount that usually cracks.



We also need to acknowledge the guys at ARP fasteners who helped us slog through the sever



This -8 AN hose that directs oil from the front of the engine to the rear is a JGM modifc

Comp mechanical roller Cam

	DURATION AT 0.050 (GROSS*)
Intake, TK-series lobe	273
Exhaust, HXL-series lobe	280



1.

Lash is 0.024/0.026-inch intake and exhaust. *Note: Gross lift is before lash. To obtain net lift, subtract lash plus any measured valvetrain deflection. It is not unusual to experience perhaps 0.020 inch of deflection, especially with these long pushrods and rocker arms.

1. Kaase also spec'd the Comp solid roller camshaft, but you'll only find it in the Comp Cams specialty lobe catalog. Kaase chose the TK- and HXL-series intake and exhaust lobes. Comp's description lists the TK series as "intense." These are lobes designed for drag racing, but Kaase thinks they would survive on the street and not be too abusive to the valvesprings.

Boss Nine Heads

This is where it gets fun. Back in 1969, Ford was all about stuffing giant ports into many of its engines. Airflow was king, and engines like the Boss 302, 351 Cleveland 4V, Boss 429, and the Tunnel Port 427 were headliners. While automotive performance history may have shunned those efforts, we think the ports weren't necessarily too big; the engines weren't nearly big enough. With new Boss Nine Kaase heads blessed with tons of airflow, it became a moral imperative to punch up the displacement to 21st century dimensions.

Kaase focused on eliminating all the factory quirks that have always stood in the way of building a reasonable Boss motor. Those factory O-rings had to go, as did the oddball separate oiling passages through the head as opposed to lubing through the pushrods. He also managed to ensure his heads could return most of the oil back to the engine through production channels. Other limitations Kaase faced included maintaining all the factory intake and exhaust port positions along with valve angles and all the classic external visual cues such as the undulating valve covers. Even the combustion chambers are similar to the original semihemispherical shape. That description comes from the twin flats or quench areas found on opposite sides of the chamber that help create turbulence in the chamber, which is something a true Hemi has trouble creating. A better description of the chamber might be more like a wedge with opposing angle valves. Kaase then tweaks the chambers with full CNC machining. The castings also incorporate pedestals for those Mississippi-bridge-like exhaust and intake rocker arms, which defrays some of the cost of the W. W. Engineering 1.75:1 rocker system. If you happen to own a set of original Boss 429 valve covers or intake/exhaust manifolds, those parts will also bolt right up to the new Boss Nines.

Flow Chart

VALVE LIFT	BOSS INTAKE	BOSS EXH
0.100	79	65
0.200	161	128
0.300	244	186
0.400	308	244
0.500	366	272
0.600	409	287
0.700	406	299
0.800	396	306

Here's where massive area delivers huge flow numbers. Partly due to the 2.300- inch intake valve, the intake ports flow some very serious numbers. Yes, the 409 cfm at 0.600-inch lift is impressive, but do not overlook the equally impressive 308 cfm at 0.400-inch lift. Remember, the intake valve resides at max lift only once but achieves midlift numbers twice. Intake port velocity will suffer with a cross-sectional area that is closer to a Pro

Mod drag race engine than for a streeter, but there's no denying the huge flow numbers. The exhaust ports do equally well to deliver a decent exhaust-to-intake (E/I) percentage of 70 percent.



The heads are massively wide, which is necessary to supply sufficient real estate to pack a



Note the use of directional vanes in the intake and exhaust ports that have become in vogue

Makin' Power

During the warm-up, our 521ci Boss just sounded angry. We've heard hundreds of race engines, so the rough idle and shaking on the dyno wasn't unusual. We were standing on the other side of a concrete wall looking through reinforced glass, but the combination of that big cam and sewer-pipe-sized 2 1/4-inch open headers just made this engine sound even more lethal. After a mere seven pulls, we had our peak at 834 hp, and once the euphoria subsided, we investigated the power numbers more closely. Most normally aspirated engines that make really big power tend to be very peaky, meaning the rpm spread between peak torque and peak horsepower is usually very narrow. But Kaase's combo managed to spread the twin peaks by an amazing 2,100 rpm compared with more common spreads of 1,500 rpm.

It would have been fun to see how much a larger 1,150-cfm Dominator carburetor would have worked. Plus, keep in mind that these heads and the intake manifold are right out of the box. Even really good castings can benefit from mild tune-ups, so we don't doubt that with a few tweaks, our Kaase Boss could easily reach the 900hp mark. For us, 834 is a personal best for a normally aspirated engine generating an impressive 1.6 hp per cubic inch. If nothing else, all this power will make for an outstanding top-end charge on the dragstrip.



The dyno session was performed with a set of Kaase-supplied 2 1/4-inch dyno headers that w



Kaase did warn us that you should remove the small pipe plug at either end of both valve c



It doesn't get much simpler than bolting on a Holley 1050 three-circuit Dominator Ultra ca

Power Numbers

RPM	TQ	HP
4,000	550	419
4,200	554	443
4,400	575	482
4,600	651	570
4,800	661	604
5,000	674	641
5,200	667	669
5,400	667	686
5,600	667	711
5,800	657	726
6,000	656	749
6,200	651	768
6,400	643	783
6,600	637	801
6,800	631	817
7,000	623	830
7,100	617	834
7,200	606	831

PARTS LIST

DESCRIPTION	PN
ARP main studs, 9/16	AQ5250-1LB
ARP main studs, nuts	300-8638
ARP head studs, washers	200-8535
Kaase cam bearings, coated	Call
Diamond forged piston	Call
Kaase Boss Nine heads, complete	Call
Kaase/W.W. Eng. Rocker arm set	Call
Kaase Boss Nine valve covers	Call
Kaase Boss Nine intake (4500)	Call
Kaase oil pump, front sump	Call
Danny Bee bronze cam thrust plate	Call
Kaase Boss Nine intake gaskets	Call
Kaase Boss valve cover gaskets	Call
Kaase Boss Nine header flanges	Call
Kaase Boss Nine spark plug wires	Call
Kaase Boss Nine ARP intake bolt	Call
Kaase Boss ARP valve cover bolt	Call
Comp custom mech. roller cam	Call
Manley valvesprings, dual	221443-16
Comp retainers	741-16
Comp valve locks	611-16
Used 429, two-bolt main block	N/A
Scat forged 4.300 steel crank	44604300
Scat forged 6.800 rods	6680022
Federal-Mogul main bearings	4907M
Federal-Mogul rod bearings	7185CH
Comp roller lifters, mechanical	841-16
Comp pushrods, eight intake	7934-1
Comp pushrods, eight exhaust	8710-1
Manley intake valve, 2.300	11878-8
Manley exhaust valve, 1.900	11847-8
Ford Motorsport timing chain	M-6268-A460

Holley 1050-cfm Dominator	0-8896-2BK
Canton road race front sump pan	15-764
Canton main cap support	21-066
Canton windage tray	20-966
Summit timing chain cover	5-80-04-201
Fel-Pro head gasket	1018
Fel-Pro oil pan gasket	1812
Fel-Pro R.A.C.E. set	2712
Fel-Pro rear main	2948
MSD billet distributor, w/o gear	8580
MSD bronze gear, 429/460	8581
MSD 6-AL box	6420
Autolite spark plug set	3933
ARP valve cover, bolts	622-2000
ARP carb studs, Dominator	200-2416
ARP oil pan kit	434-1802
ARP oil pump drive	154-7903
ARP header bolts	400-1102
ARP balancer bolt	150-2501

SOURCES

Fel-Pro/Federal Mogul

Detroit
MI
800-560-1400
www.federalmogul.com

Federal-Mogul Corporation

26555 Northwestern Hwy.
Southfield
MI 48033
248-354-7700
www.federal-mogul.com

Comp Cams Inc.

3406 Democrat Road
Memphis
TN 38118
800-999-0853
www.compcams.com

Scat Enterprises Inc.

Redondo Beach

Holley Performance Products

1801 Russellville Rd.
Bowling Green
KY 42101
270-781-9741
www.holley.com

Diamond Racing

23003 Diamond Drive
Clinton Township
MI 48035
596-792-6620
www.diamondracing.net

Automotive Racing Products

1863 Eastman Avenue
Ventura
CA 93003
800-826-3045
www.arp-bolts.com

Canton Racing Products

232 Branford Road

CA
310-370-5501
www.scaterankshafts.com

Manley Performance Products
1960 Swarthmore Avenue
Lakewood
NJ 08701
732-905-3366
www.manleyperformance.com

Jim Grubbs Motorsports
28130 Avenue Crocker
331
Valencia
CA 91355
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www.cantonracingproducts.com

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www.jonkaaseracingengines.com

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