# The 429 FORD BOSS

## Pioneer of the Modern "Mountain Motor" Jon Kaase Calls it Boss 9

**Story by Ro McGonegal**

Adjunct to any well-heeled boater's schedule is poker run fun. The favored venue is salt water, but others do it with the same vigor in fresh water as well. The whole idea is to cruise and have fun without worrying about how you're going to outsmart or out-power the next fellow. The key is a reliable, flexible power plant, one that idles smooth and civilized at 700-800rpm, seems to have a fondness for chugging about harbor confines, and one that will absolutely lift your wig under maximum throttle and quickly attain plane-out speed.


**John Kasse builds high performance engines for land and sea in his shop in Winder, GA.**

# Kaase's inaugural marine venture, a **528ci** version built from a **Ford Racing SVO cast-iron tall deck.**

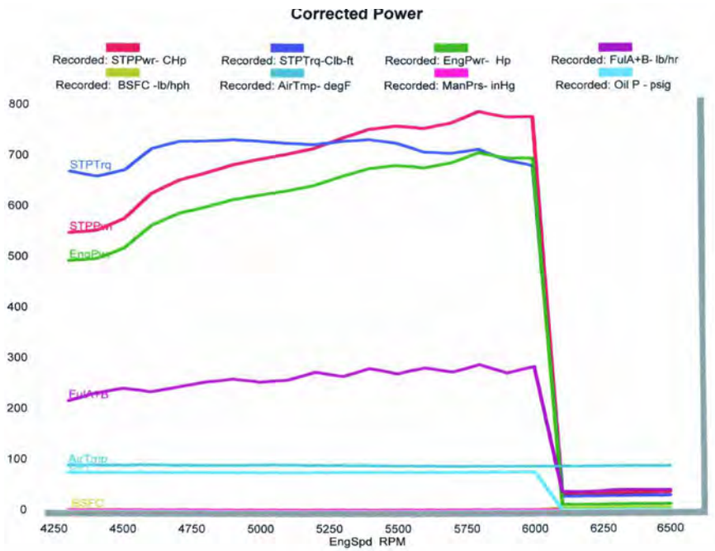
High on the priority list for any performance boater's schedule is poker run fun. The favored venue is salt water, but many boaters enjoy running in fresh water as well. The whole idea is to cruise and have fun without worrying about how you're going to outsmart or out-power the next fellow. The key is a reliable, flexible power plant, one that idles smooth and civilized at 700-800rpm, seems to have a fondness for chugging about harbor confines, and one that will absolutely lift your wig under maximum throttle, quickly attaining plane-out speed.

If Jon Kaase (KAH-zee) Racing Engines of Winder, Georgia, doesn't pop right up in your memory bank, it's probably because Kaase has been involved with highly successful drag race engine-building programs for most of his professional life. He is one of the pioneers of the modern "mountain motor," an engine that produces 1,400 normally-aspirated horsepower from 820 cubic inches. Kaase is a staunch Ford supporter who has recently revived the vaunted Ford Boss 429. Kaase refers to this as the "Boss Nine". Aside from tweaking all the original sins out of existence with a technique unknown in the halcyon days when the Boss 429 ruled the race circuit, Kaase now offers his Boss Nine in displacements ranging from 429 to 605 cubic inches.

The Boss Nine rendition featured here represents Kaase's inaugural marine venture, a 528ci version built from a Ford Racing SVO cast-iron, tall-deck (10.320 inches) cylinder block with a 4.500-inch/4.150-inch bore/stroke combination. It has siamesed cylinders, screw-in freeze plugs, and dry cylinder liners (coolant flows around the aluminum casting, not the liner, thus prohibiting rust). The Boss Nine is available in bore sizes from 4.390 to 4.600 inches and stroke lengths of 3.850, 4.125, 4.250, 4.300, and 4.500 inches. In addition to this range of engines, a stock 385-series can also be pressed into service. Although not as inherently strong as its SVO counterpart, it weighs less; it also costs less (by about $350) and it is readily available.

There is a bit of serendipity at play here - Scat produces a forged crankshaft with a 4.300-inch stroke, that when combined with a 429 block bored 0.030-inch, produces a displacement of 520ci. This combination is undoubtedly the most cost-effective because there are so many of these parts available. While the engine in this article was built with a cast-iron block, an aluminum counterpart (85-100 pounds lighter) is available at a premium price. Note, too, that there is no appreciable power advantage of light-metal over iron.

**BOSS NINE DYNO GRAPH**




**Dyno testing - No engine leaves Kaase's house of power without first being proofed by the dynamometer. Both power and torque are vibrant and easily accessible. Note: peak horsepower is 789 at 5,800rpm and peak torque is 733.7lb-ft at 4,900rpm.**

For the most part, the iron unit might have an edge because iron is more stable than aluminum and subject to lower expansion rates. The cast iron block utilizes only two half-inch diameter main bearing cap bolts. Kaase's extensive testing has proven that additional hardware would simply be redundant. The aluminum version has a four-bolt main bearing cap.

Since an abundance of airflow is mandatory for an engine to produce extraordinary power, the Boss Nine cylinder heads have hemispherical combustion chambers and feature 3/4 inch thick deck surface, making them ideal for those wishing to add monster compression or any of the three popular power adders (nitrous oxide, supercharger, or turbochargers). This substantial surface protects the heads from warping or burning.

The problem with the original Boss 429 was the size of the ports. They were too large and couldn't provide enough velocity at any but the highest engine speeds. Kaase determined that the inequity and loss could be ameliorated through auspicious valve timing via cam gear technology not available back in the day. That's one solid reason why the Boss Nine is so attractive for a marine application.

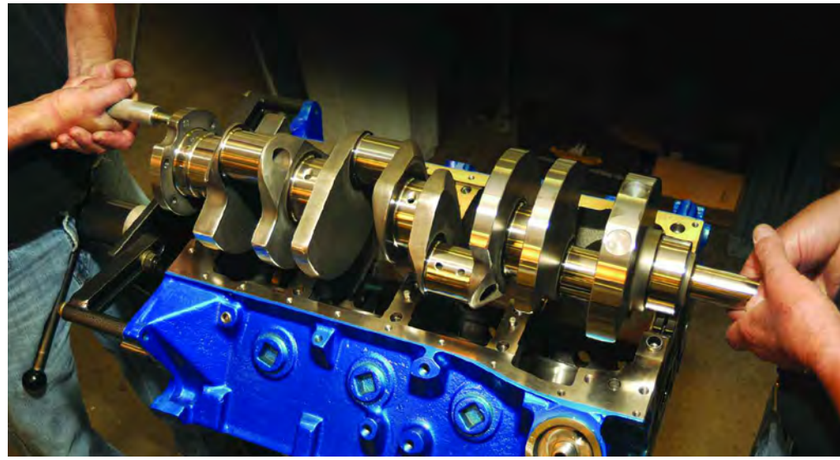
As a hedge against detonation or a load of less than potent petrol, this particular Boss Nine offers a 9.5:1 static compression ratio as achieved with 90cc combustion chambers and valve-notched, dished-dome Diamond forgings. As you can see, the Boss Nine achieves a rather flat torque curve right where it counts.

Now that you know certain advantages of this power plant, read on to see how Kaase and crew assembled and tested their prodigy.

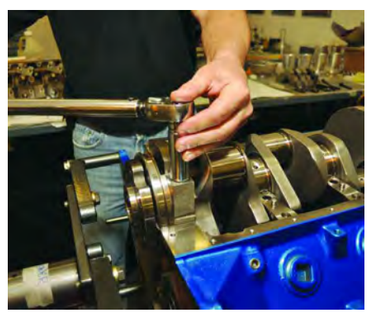
**1. Boring block-gauge - Bare block castings arrive with a 4.340-inch bore size. The first step is to bore it to a few thousandths less than the desired cylinder size. Invariably, boring is a nine-step machining process, each pass removing approximately 0.030in of metal. After each cut the cylinder diameter is checked with a dial-bore gauge**

**2. Honing/prepping block - After the boring operation is concluded, the block is carefully secured in the honing machine. Three sets of honing stones are used: coarse, medium, and fine. The purpose of the fine finish is deposit very fine scratch marks in the cylinder walls that retain oil to lubricate the piston rings and facilitate efficient piston movement. After honing, the block is washed with mineral spirits and oil galleys are scrubbed with a long-handle brush. Finally, the block is washed again with hot, soapy water and dried with compressed air.**

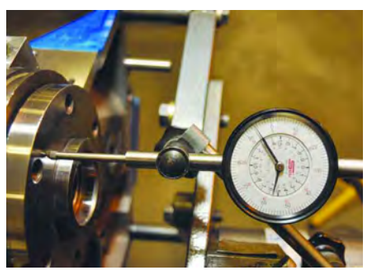
**3. Inserting bearings - High-temp coated main bearing shells are oiled and then pressed into their respective saddles.**



**4. Lowering crankshaft - Rear main bearing seal is installed. For a leak-proof application, one end of it protrudes above the oil pan rail and one end is recessed then both ends are coated with silicone sealer. An extra pair of hands eases installation of the forged crankshaft.**



**5. Tightening caps - Rear main bearing cap is first to be installed. Inside the cap, the offset seal ends are matched to counterpart already installed. Kaase applies assembly lube to the threads and under the head of each 1/2 inch bolt. The rear main is tensioned to 100lb/ft.**

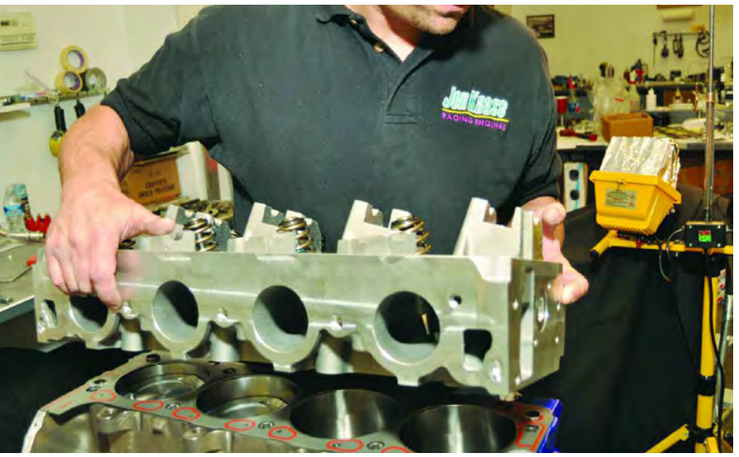


**6. Checking end play - Kaase locks a dial-gauge indicator in place then uses a large screwdriver as a "pry" bar to move the crankshaft back and forth to measure end play. Correct amount falls between 0.004 and 0.007-inch (Kaase found 0.006). Center main cap comes next, followed by cap two, three, and four. Torque value for all is 100lb/ft.**

**7. Assembling piston** - Diamond 2618 forged pistons are outfitted thusly: the lower support rail of the oil control ring (bottom) is installed and followed by the upper support rail, the second ring, and the compression ring (top). The piston pins are made by Trend and hewn from the toughest tool steel H-13.

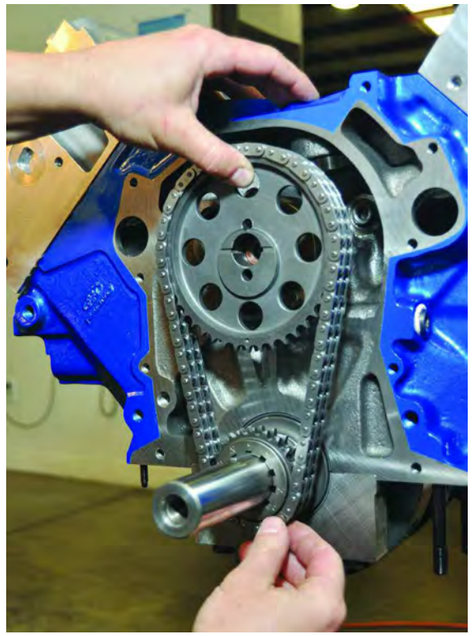
**8. Installing pistons & rods** - As always, a ring compressor and the butt of a mallet are used to carefully tap the oiled piston/rod assembly into the bore. Rubber guards on the rod fasteners keep threads from accidentally damaging crank journals.

**9. Securing rods** - Caps for forged steel Scat connecting rods are secured with 12-point Grade-10 bolts and torqued to 75lb/ft.



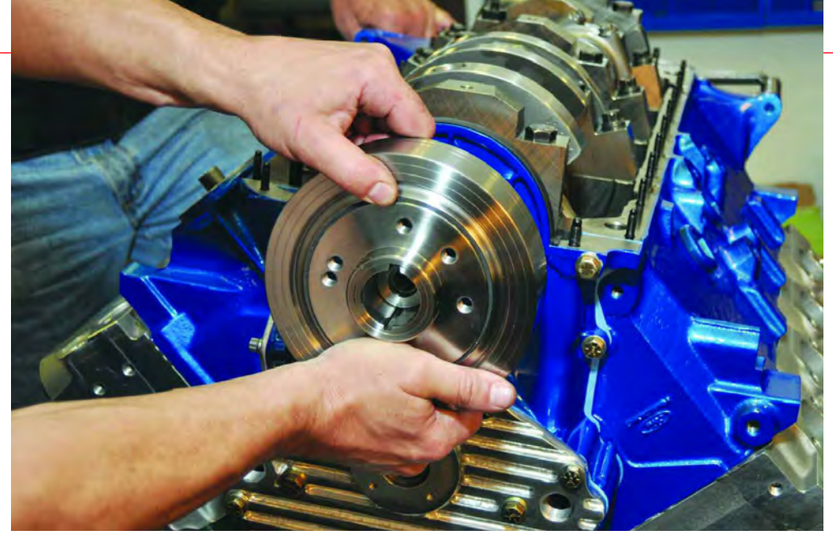
**10. Adding heads** - Before the cylinder head is installed, silicone sealer is added to both sides and on the ends of the gaskets around the oil drain-back holes. Assembly lube coats the threads and beneath the heads of the 12-point Grade-10 bolts that are torqued to a value of 110lb/ft. Testing has determined that Kaase's Boss Nine heads are worth at least 100hp over the original design.

**11. Inserting camshaft** -Temporary "handle" aids easing the lubed-up camshaft through the galley taking care not to nick the cam bearings with the lobes of the camshaft.



**12. Timing chain** - Kaase uses nothing less than a double roller timing chain and gears to link camshaft with crankshaft. Note: timing wheel (and camshaft) have been drilled and reamed to accommodate additional dowel to transmit greater valve train loadings reliably.

**13. Installing WP cover** - Kaase builds redundancy in this Boss Nine. The front cover encloses timing gear and chain and an optional eccentric fuel pump drive (as requested by owner). The ribbed alloy cover provides mountings for a cam-driven Magnaflow water pump.



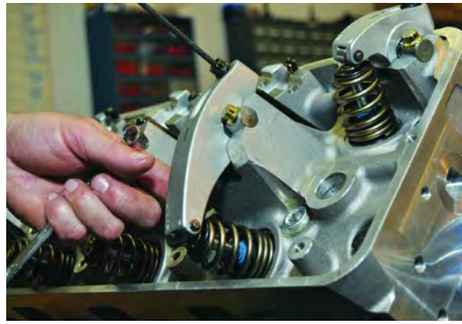
**14. Installing harmonic balancer** - Internal engine parts when in motion become out of balance and induce vibration. The harmonic balancer is an SFI approved weight (not a pulley) that attaches to the front end of the crankshaft and absorbs vibrations. For a tight fit on the crankshaft Kaase installs it with the power of a hydraulic ram.

**15. Adding oil pan gaskets** - Oil pan rail gaskets are installed in anticipation of the sump.

**16. Installing oil pan** - Boss Nine engines are equally adaptable to either dry- or wet-sump oiling. This wet sump application uses a Moroso 7-quart pan featuring three main components: a one-way mesh screen bolted to the sump, a 3/4 inch wide metal scraper that runs the length of the pan and is mounted at the top of the mesh screen, and two one-way trap doors in the pan itself. The traps act as a check valve, in that they allow oil to enter the lower regions of the pan but not readily escape. A Kaase oil pump (blueprinted, welded pick-up, etc.) replaces the stock unit that inevitably fails under duress.

**17. Installing cam** - Installing cam-driven Magnaflow water pump.

**19. Adding the manifold** - There are several intake adaptations for the Boss Nine, a single 4150 or 4500 Holley on a single-plane intake manifold, tunnel ram with twin 4150 or 4500 carburetors, Hilborn stack fuel injection, a BDS supercharger set-up, or a Wilson four-barrel EFI system that offers 1388cfm. The Boss Nine is also available with a 1-inch Wilson spacer beneath a Dominator- style carb that improves airflow by 130cfm.



**18. Rockers** - The majority of all Pro Stock engines (500ci NHRA and 820ci IHRA) employ WW rocker arms derived from proprietary aluminum billet and activated by Trend pushrods. Notice beehive valve springs.

**20. Carburetors** - At the owner's request, this 528ci engine does swell with a tunnel-ram intake manifold and twin 4500 carburetors.

**Kaase** offers his **Boss Nine** in displacements ranging from 429 to 605 cubic inches – check out the details at www.jonkaaseracingengines.com