

JON KAASE

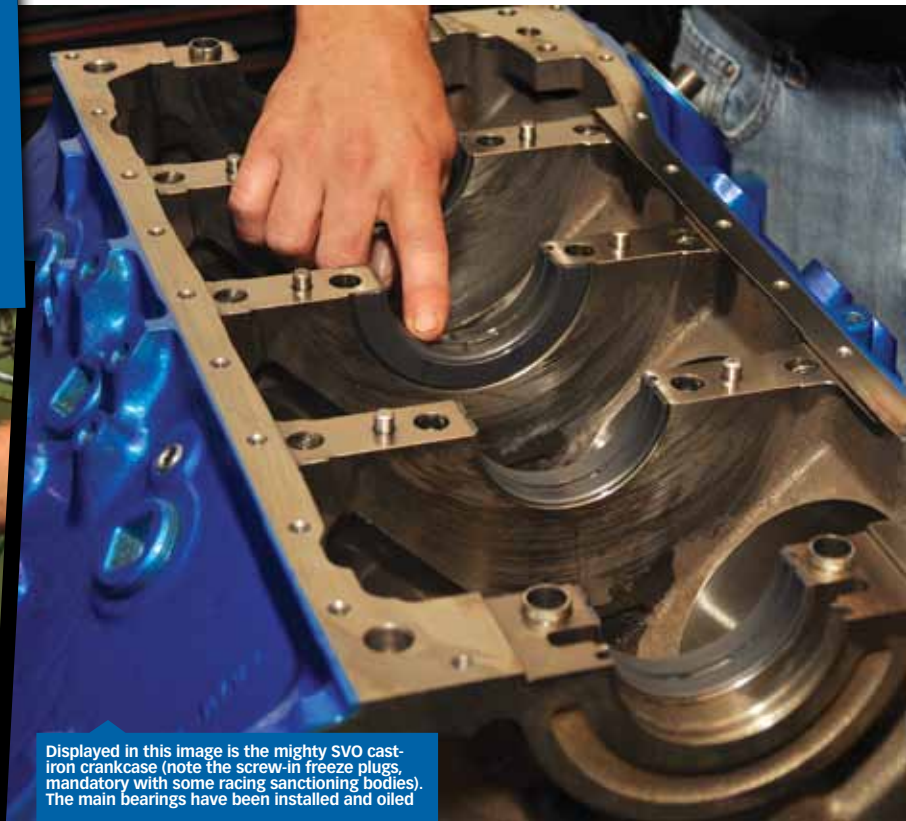
For countless years, Jon Kaase Racing Engines has dominated 820cu in Pro Stock Mountain Motor competition in the States. A quiet, unassuming man, Kaase has a formidable reputation for wringing every pound-foot of torque from a Ford-based big-cube hemi. Based in Winder, Georgia, his specialist firm has claimed a dozen or more IHRA Pro Stock championships, an NHRA Pro Stock championship, and four unprecedented victories in the Engine Masters Challenge, an annual competition held each October in Ohio, where leading

race engine builders compete in a power war against each other. With approximately 6,000 full-service engine shops in the States and around 15,000 engine builders, it is Kaase's name that holds prominence. But his prominence was greatly extended by those four victories in the Engine Masters Challenge; it brought Kaase huge credibility and exposure to the hot rod and street-strip markets, mass markets that Kaase knew little of. Unsurprisingly, news emerged last year that, though the illustrious firm would continue to maintain their Pro



Because cylinder bore dimensions on Boss Nine engines are available from 4.360in and increase to 4.600in, bare block castings arrive with bore sizes usually around 4.340in. Hence the first step in building every Boss Nine engine is boring the engine to almost the designated size. Correct cylinder bore sizes are achieved in the second step, honing

The boring process of each cylinder typically involves eight or nine cutting operations, each cut removing approximately 0.030in of metal. Once all the machining procedures are complete, the block is de-burred, particularly around the bottom of the cylinder bores. If this vital step is missed, the piston, while at bottom-dead-centre, could abrade itself on a burr and suffer severe damage. The oil passages are also checked and deburred, especially in the area of the lifter bores. De-burring the oiling passageways not only protects the engine from the detrimental effects of swarf but also improves oil pressure. The next step involves washing the block, the internal bores, and the galleries with mineral spirits, using long-handled wire brushes. Finally, the block is washed again with hot soapy water then dried with compressed air



Displayed in this image is the mighty SVO cast-iron crankcase (note the screw-in freeze plugs, mandatory with some racing sanctioning bodies). The main bearings have been installed and oiled

THE

Words by Sam Moore
Pics by Moore Good Ink

BOSS NINE



Stock race engine programs, they would not be seeking new customers. Instead they would develop a new range of hot rod and street/strip engines. These engines would be constructed from cast iron or cast aluminium crankcases, they would be 385 series Ford based with standard 10.320in deck height and hemi cylinder heads, they would contain lots of technology gained from a quarter century of racing achievement, and they would be called the Kaase Boss Nine.

These engines are specifically constructed to produce the power output, the displacement, and the characteristics that appeal most to the customer. Hot rodders, for example, usually prefer 500 to 700bhp on pump fuel with hydraulic roller camshafts and street drivability. In contrast, street-strip users might prefer more power and boat racers are likely to demand in excess of 2,000bhp.

Here are the first pictures of Boss Nine motors being prepared and assembled. Though there are three different types of crankcase employed (the standard cast-iron 385 series, the latest Ford Racing SVO cast-iron, and the cast aluminium),

most of the photographs depict the Ford Racing SVO block.

The advantage of the SVO cast-iron crankcase over the standard 385-series Ford cast-iron crankcase is strength. The SVO is enormously robust and fitted with screw-in freeze plugs to prevent any water leaks on track. It is designed to transmit over 2,500 horsepower. The advantages of the standard 385-series crankcase over the SVO option are numerous. It is lighter in weight, it is readily available, and it costs much less to acquire (typically US\$350). Incidentally, the 385-series nomenclature was originally adopted by Ford because of its stroke length which measured 3.850 inches. The advantage of the cast aluminium block is obvious, it is 85 to 105 pounds lighter than its cast-iron counterparts and is ideally suited for track-day cars like the AC Cobra. At the other end of the power spectrum the aluminium block has the strength to transmit 2,500 horsepower, but it is the most expensive of the three options. However, it has no discernible power advantage over its cast iron options. In fact, the structure of the two cast iron versions might be a little



The rear main bearing seal is installed. For a leak-proof seal one end is protruding, one end is recessed and both ends daubed with silicone sealer. A forged crank is lowered into position (also note that the journals should be coated with assembly lube)



The lower support rail of the oil control ring is installed on the Diamond piston which is followed by the upper support rail, the second ring, and finally the top ring



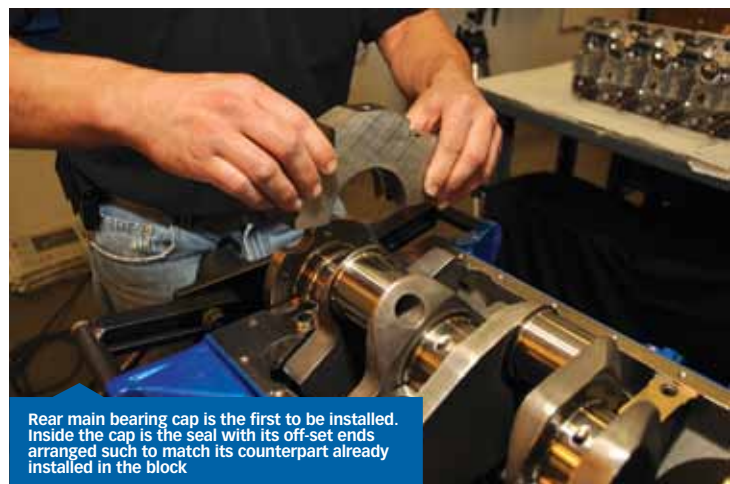
Here the connecting rods have already been assembled in the pistons with Trend H13 tool steel piston pins and set out for installation



The bores are first cleaned with a lacquer thinners and then oiled with engine assembly lubricant



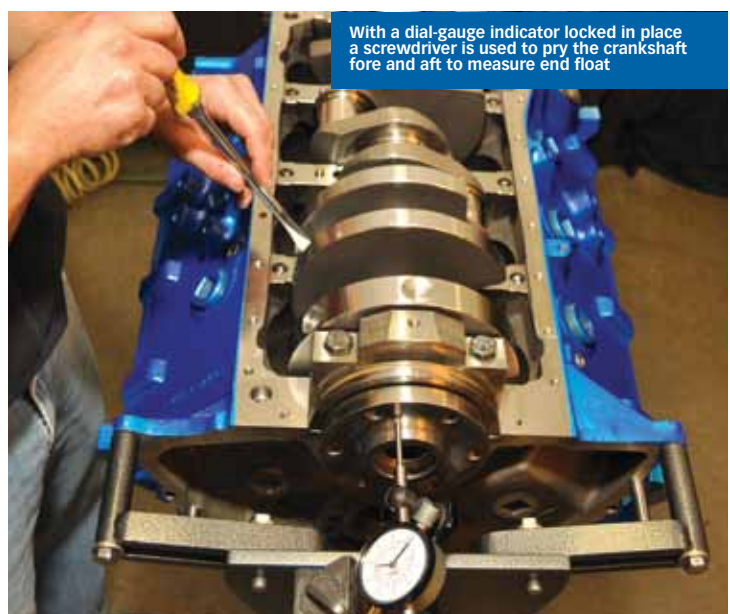
With the parts oiled and using a piston ring compressor, the rods and pistons are submerged in the bores



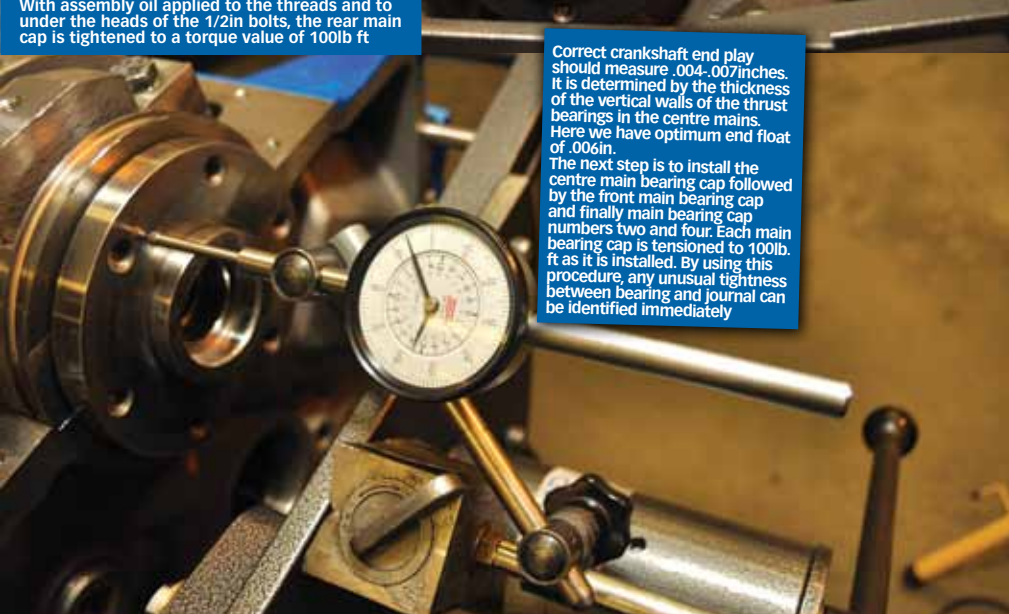
Rear main bearing cap is the first to be installed. Inside the cap is the seal with its off-set ends arranged such to match its counterpart already installed in the block



The rod bearing caps are fitted and secured with 12-point Grade-10 bolts and tensioned to 75lb.ft



With a dial-gauge indicator locked in place a screwdriver is used to pry the crankshaft fore and aft to measure end float



With assembly oil applied to the threads and to under the heads of the 1/2in bolts, the rear main cap is tightened to a torque value of 100lb ft

Correct crankshaft end play should measure .004-.007inches. It is determined by the thickness of the vertical walls of the thrust bearings in the centre mains. Here we have optimum end float of .006in. The next step is to install the centre main bearing cap followed by the front main bearing cap and finally main bearing cap numbers two and four. Each main bearing cap is tensioned to 100lb. ft as it is installed. By using this procedure, any unusual tightness between bearing and journal can be identified immediately





Silicone sealer is applied on both sides and on both ends of the cylinder head gaskets around the oil drain-back holes to ensure a leak-proof seal. Then the cylinder heads are installed

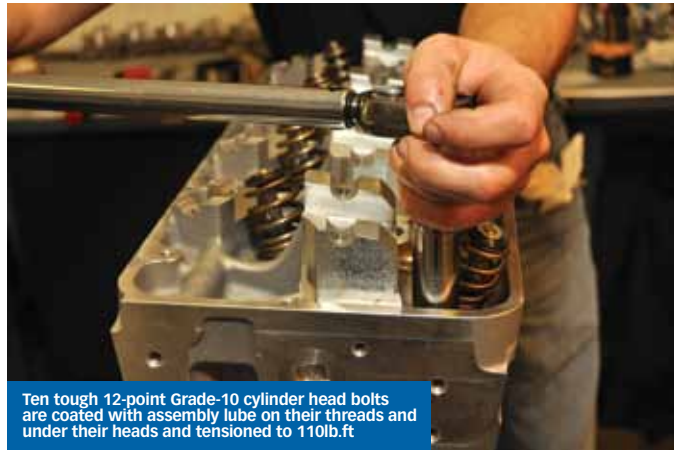
more stable as they are subject to lower expansion rates.

Though engine displacements are available from 429 to 600 cubic inches, the most popular displacement is 520ci because the parts are readily available. It is the most cost-effective Boss Nine to build. Finally, these engines bristle with advanced features, not least their high-flowing hemispherical cylinder

heads. Kaase's production director, Cliff Moore, comments, "The Boss Nine heads feature three-quarter-inch-thick decks, which are indispensable if you have high compression or if you're using a power adder (nitrous oxide, turbo, or blower). Substantial deck surfaces protect cylinder heads from warping or burning."

Stacey David, TV host of the popular US hot rodding show, Gearz, says, "The

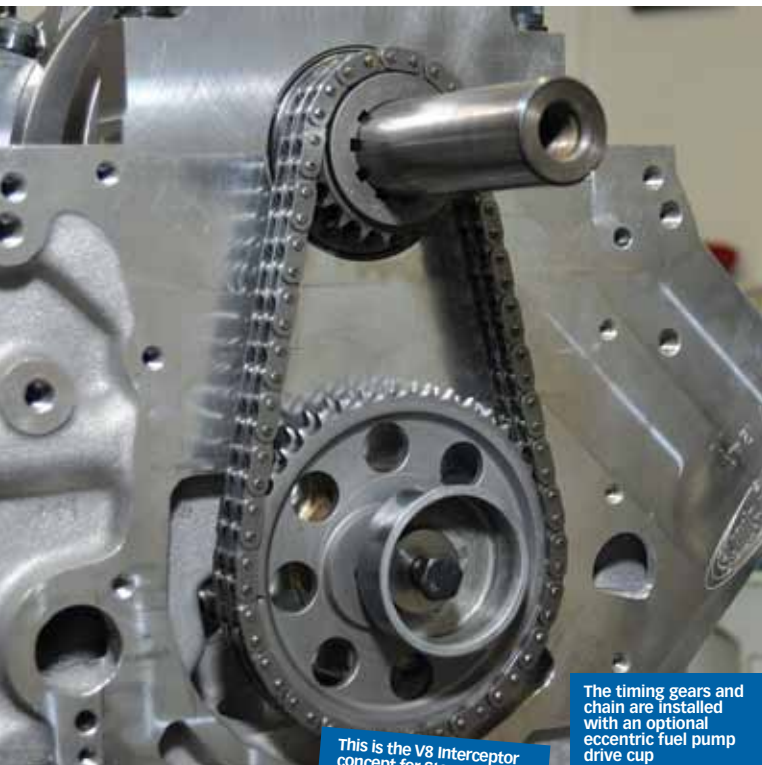
Boss Nine is going to blow people's minds when it hits the air waves. Installed in a '67 Cougar, our project is called the V8 Interceptor. Its theme is based on the movie Mad Max." Stacey is quick to explain, "This is not a clone, but it is the flavour of a Mad Max car, the 'baddest' machine on the road! And the Boss Nine fits the bill better than anything I know." 🏁



Ten tough 12-point Grade-10 cylinder head bolts are coated with assembly lube on their threads and under their heads and tensioned to 110lb.ft



Camshaft specifications vary. Most hot rodders use a hydraulic roller while the racers use a solid roller. For supercharged applications a camshaft is chosen that invariably eliminates jerking and bucking at off-idle and part throttle in the lower gears. For Boss Nine-powered boats a camshaft with wide lobe separation is necessary to ensure a low idle speed. This feature enables easy dock manoeuvring and trailer loading. Note: Aluminium Boss Nine crankcase pictured



The timing gears and chain are installed with an optional eccentric fuel pump drive cup



With hydraulic roller lifters, Trend pushrods, and rockers in place, gaskets are positioned for the installation of the intake manifold

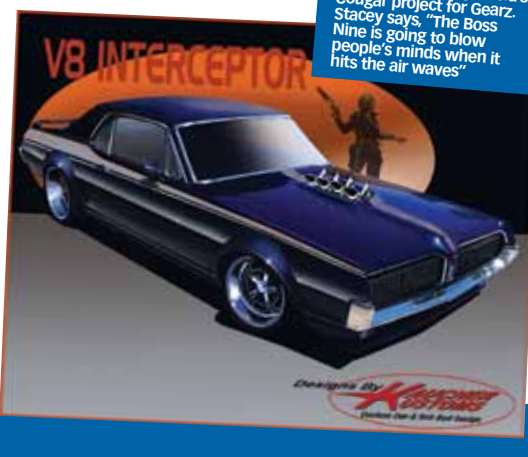


Five types of intake manifold are available for the Kaase Boss Nine: 4150 or 4500 or Tunnel Ram-style carburetors, Keith Wilson's EFI conversion, or Hilborn stack injection



On this Boss Nine a 4150-style four-barrel carburetor sits atop a Wilson Manifolds spacer on a single-plane intake

This is the V8 Interceptor concept for Stacey David's Cougar project for Gearz. Stacey says, "The Boss Nine is going to blow people's minds when it hits the air waves"



Here you can see the trial fitment of the Boss Nine in the 1967 Cougar's engine bay. The project even has its own page on Stacey's website, www.staceydavid.com/projects/cougar.htm

Listing on memory only
Channel Group: Connected Power Page 1 of 2
Printed on Mar 30, 2010 at 09:41:30
Test Descriptions: Accel. Test = 300 rpm/second

Eng/yr	STP/yr	STP/yr	Eng/yr	FIL/yr	BSPC	Air/Tsp	Wash/yr
RPM	Chp	Clb-ft	Sp	In/hr	In/hph	degf	lph
** 2900	278.9	505.1	253.5	154.7	0.418	77	0.0
3000	282.6	494.7	256.6	151.1	0.389	73	0.0
3100	299.7	507.7	272.2	157.2	0.578	77	0.0
3200	325.9	534.9	298.1	163.4	0.945	77	0.0
3300	349.1	587.4	335.7	187.9	0.700	77	0.0
3400	373.9	571.5	339.9	186.7	0.532	77	0.0
3500	394.0	591.2	357.7	187.2	0.467	78	0.0
3600	417.3	609.1	379.6	199.4	0.420	77	0.0
3700	434.4	616.7	395.4	189.3	0.428	76	0.0
3800	449.4	625.1	408.9	178.3	0.436	76	0.0
3900	456.4	614.9	413.2	184.8	0.430	76	0.0
4000	456.0	596.7	414.4	199.0	0.480	76	0.0
4100	460.9	590.5	418.7	195.6	0.467	76	0.0
4200	473.1	591.6	429.8	191.4	0.460	76	0.0
4300	493.0	604.6	449.5	194.7	0.442	76	0.0
4400	513.7	613.2	466.5	197.9	0.424	76	0.0
4500	532.8	621.9	483.8	198.4	0.410	76	0.0
4600	546.4	647.3	511.3	202.4	0.475	76	0.0
4700	593.2	662.9	558.9	247.0	0.458	76	0.0
4800	607.7	664.9	502.6	245.9	0.445	75	0.0
4900	639.3	685.2	541.4	255.1	0.439	75	0.0
5000	674.1	690.6	589.0	262.0	0.430	75	0.0
5100	652.6	672.1	582.8	279.2	0.471	75	0.0
5200	646.0	674.7	605.9	289.7	0.478	76	0.0
5300	697.7	691.4	632.8	292.4	0.462	76	0.0
5400	701.3	682.1	635.7	307.9	0.483	76	0.0
5500	699.6	669.1	633.7	311.3	0.492	76	0.0
5600	696.6	656.2	632.2	309.4	0.489	76	0.0
5700	719.2	662.7	651.4	320.0	0.491	75	0.0
5800	734.0	664.7	664.5	310.9	0.468	75	0.0
5900	741.1	659.7	670.4	332.1	0.495	75	0.0
6000	741.5	649.1	670.1	334.9	0.500	75	0.0
6100	741.1	639.1	669.9	317.6	0.474	74	0.0
6200	740.2	631.3	672.3	327.9	0.487	74	0.0
6300	729.2	607.9	656.7	325.5	0.486	75	0.0
6400	707.1	580.3	635.6	326.2	0.513	75	0.0
6500	713.4	574.4	640.7	341.4	0.533	75	0.0

**Range: 2900 RPM - 3700 RPM
AVG: 3300 352.9 539.3 320.7 143.4 0.520 77 0.0

Report from WinDyn Software
Here a dyno sheet reveals the performance of a typical 520cu in engine running hydraulic rollers on pump fuel. Like most Boss Nine engines they are not used in race cars but are used in hot rods and driven most weekends with enthusiasm

SOURCE

Jon Kaase Racing Engines, Inc.
735 West Winder Ind. Parkway,
Winder, GA 30680, USA
(770) 307-0241
www.JonKaaseRacingEngines.com