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CALENDAR INSIDE**

**SPECIAL REPORT:
40TH ANNIVERSARY OF THE
COPO CAMARO**



POPULAR **HOT RODDING**

MUSCLE CAR ENGINE SHOOTOUT

**22 MOTORS
DYNO
TESTED!**

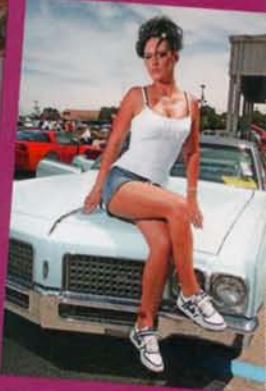


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RAISING



By Steve Dulcich

Photography by the author
and Johnny Hunkins

Going into the 2008 Jegs Engine Masters Challenge, we built on the foundations laid in the 2007 event, looking to refine and improve the previous year's contest. Certainly, the fundamental program remained unchanged—a competition open to any factory OEM bore and stroke engine combination (with a tolerance), using a cubic-inch formula to iron out a head-to-head scoring system for engines of widely varying displacements. The objective here is to find the engine that is inch-for-inch the most powerful of them all, and the builder who can make it happen. Last year's event closed with a classic Ford versus Chevy battle, with the 400 small-block Chevy of Tony Bischoff narrowly edging out the rival 400 Cleveland Ford built by Jon Kaase.

One year gives a person an awful lot of time to contemplate, refine, test, and improve. With the essential rules of the Challenge left unchanged, there was little doubt that the competitors would enter this year's fray ready to unleash power on an unprecedented scale. Sitting at the ready were the two DTS engine dyno test cells at our host venue, the University of Northwestern Ohio (UNOH). These dynos were verified and qualified by DTS technicians prior to the event, running a 502-cube big-block Chevy crate engine from Pace Performance as the certification engine. Crews of capable student assistants were organized from the UNOH High Performance Motorsports program to handle every operation, from uncrating the competition engines, to mounting and dismounting engines on the dyno, and even assisting *PHR* editor Hunkins in the photo studio.

THE BATTLE TO QUALIFY

Thirty competitors are chosen from the many applications we receive, and the Challenge unfolds with four days of qualifying, in which each engine is tested on the dyno to narrow the field to the top six finalists. Scoring for

“The objective here is to find the engine that is inch-for-inch the most powerful of them all, and the builder who can make it happen.”

THE BAR

Kaase's small-block Ford takes victory in the 2008 Jegs Engine Masters Challenge.

JEGS
ENGINE MASTERS CHALLENGE
presented by
POPULAR HOT RODDING



Competition was fierce during the four days of qualifying. The dyno cell comes alive with activity as Power Shop Racing completes preparations on their 302 Chevy entry. The engine ended qualifying on the bump spot at number six, and finished in fifth position.

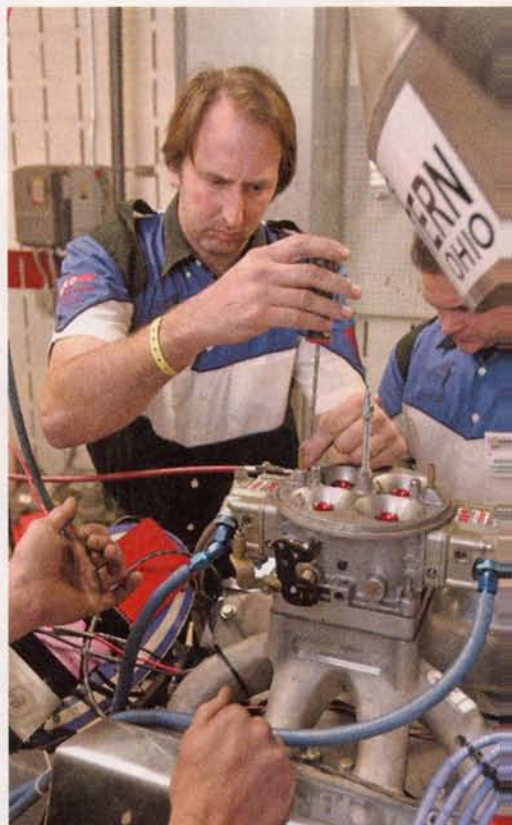
the Challenge is the sum of the average power and torque over an rpm range from 2,500 to 6,500 rpm, divided by the actual cubic inches, times a constant of 1,000. Day one of qualifying saw a diverse lineup, including a pair of 340 Mopars fielded by Hinkle Performance Engines and BH Performance, two Dove Performance teams with 352 and 427 FE Ford big-blocks, a 429 Ford late big-block by RM Competition, and a 455 Buick built by Automotive Performance and Machine. When the dust cleared at the end of the day, the BH 340 Mopar was holding the top spot, with a score of 2,351.7, while the Hinkle Mopar was disqualified on a rules technicality, marking the first of what would be several unfortunate DNFs to come.

The roster for our second day of qualifying read like the honor roll of muscle car-era powerplants. The most unusual of this pack was the Boss 429 built by Adney Brown of Performance Crankshaft. This Semi-Hemi Ford engine was originally developed at the peak of the muscle car era, and has until recently been virtually extinct due to

rarity. The recently released Boss top-end package for the big-block Ford from Jon Kaase Racing Engines has changed all that. Jon tells us that the decision to reproduce these components was a direct result of his own desire to run such an engine in the Engine Masters Challenge. The rest of Tuesday's field consisted of the Semco Pontiac 400, Weingartner 350 Chevy, Revolutionary Performance's Chevy 327, Survival Motorsports' Ford 427 FE, BTR's Olds 400, DCI's Pontiac 455, and a little 307 Olds from Robinson Analytical.

Obviously, the competition was heating up, with the Boss, Pontiac 400, 327 Chevy, Olds 400, and 427 FE Ford all besting the top performance of the previous day's qualifying. Bill Trovato's Oldsmobile handily took over the top spot, with a score of 2,423.5, marking

“Scoring for the Challenge is the sum of the average power and torque over an rpm range from 2,500 to 6,500 rpm, divided by the actual cubic inches, times a constant of 1,000.”



Within the time constraints, working under pressure while keeping a cool and clear head is a key to success in this event. Here, Mark McKeown works at dialing in the air bleeds of a Dominator carb.

the first competition engine to crest the 2,400-point mark.

We entered the third day of qualifying with a Chevy-heavy field, including the Stine 350, Kauffung 305, Coates 327, Weingartner 400, Porting Dynamics Chevy 302, and another Chevy 302 from



Student personnel are in abundant supply at the Engine Masters' UNOH host facility. We certainly appreciated the many hands on deck, and even more so the ability of the students.



MPG Heads returned with the 400M that showed great potential, but wiped a camshaft in qualifying last year. This time the engine held together, and pulled the points for a fifth qualifying position going into the finals.

Traco. Chevy small-block entries hit a high point on this day, but unfortunately, attrition hit a high point as well, and this too was disproportionately concentrated on the Chevy entries, with the 305, 327, and both 302s falling out of the competition as a result of mechanical problems or rules infractions. Of the six Chevrolets scheduled, only the Stine 350 and Weingartner 400 completed qualifying, though the scores were not enough to threaten the leaders of the previous day. The non-Chevrolet remainder of the field was made up of Fords—a 351 Cleveland from C&J Racing, and a 406 FE from Blair Patrick Racing, which scored an impressive 2,396.3 points to gain Second Place at the end of day three.

We were feeling bruised from the previous day's attrition coming into the final day of qualifying. While the previous day brought out mostly Chevrolets, the roster for our last day had Ford's 400M in four of the seven spots, with engines by MPG Heads, McKeown, School of Automotive Machinists, and Jon Kaase. The Ford 400M is essentially entirely neglected in the general aftermarket world, but by virtue of the fantastic CHI Cleveland cylinder head and intake, it has proven to be extremely powerful in the Engine Masters Challenge. The rest of the qualifying field consisted of last year's championship team: BES Racing with a 400 Chevy, a Chevy



Among the many tasks handled by the students was uncrating the engines and mounting them to the test docking carts, and completing all dyno installations and hook-ups, then rotating engines on and off throughout the competition.

302 by Power Shop, and a Boss 429 built by Kaase.

Unlike the previous day, all of the engines finished in qualifying, and finished strong. In fact, every one of the six finalists came from the final day's qualifying field, including Power Shop's 302, MPG's 400M,

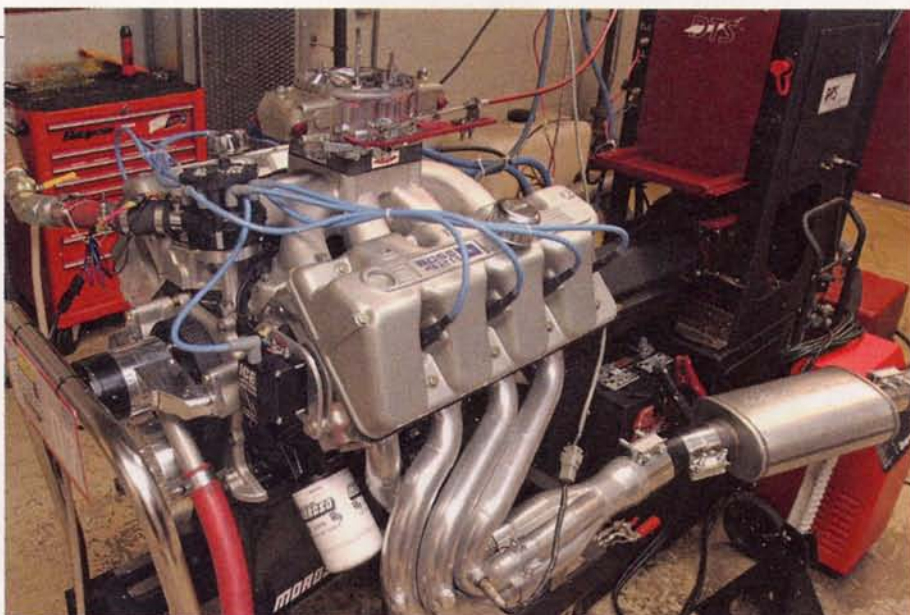
“The roster for our second day of qualifying read like the honor roll of muscle car-era powerplants. The most unusual of this pack was the Boss 429...”

Kaase's Boss 429, SAM's 400M, BES Racing's Chevy 400, and Kaase's 400M. The minimum qualifying score of those who made the cut for the finals was 2,491.3, scored by the Power Shop entry, with the high score coming from Kaase's brutal 400M showing 2,592.1. To catch the performance delivered by the Kaase 400M, the rest of the field would need to spend a sleepless night trying to figure out where to find a substantial chunk of power.

TO THE FINALS

It all came down to the last day of competition, where the top six qualifiers duked it out for standings, and their share of the \$92,000 in total possible contingency dollars. The finals are run in reverse order of qualifying, with the top scoring team running last. In previous years, the scoring was announced as the competition worked through the final field, giving those up the ladder the advantage of knowing the score of the previous competitors, and therefore the top qualifier went in knowing the number to beat. This year, the scoring throughout the finals remained secret until the last competitor's engine was run, meaning there was no holding back.

First in the dyno cell was the sixth-qualifying Power Shop Chevrolet 302. This engine was by far the smallest in the final six, but it had the output to bump many a larger engine in qualifying. Power Shop's Joe Carrol and crew worked smoothly through the final pulls, but the overall score was down fairly significantly compared to qualifying, with a 2,475.6. This would be a reality affecting every one of our competi-

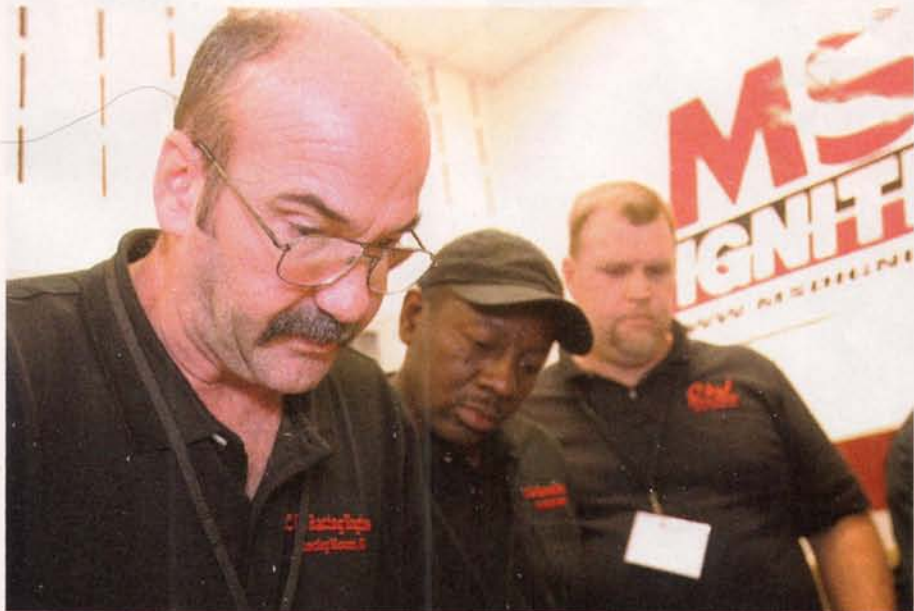


Rare iron isn't so unusual at the Engine Masters Challenge. This Boss 429 was one of two such engines entered in this year's contest, thanks to Jon Kaase Racing recently introducing Boss retrofit cylinder heads.

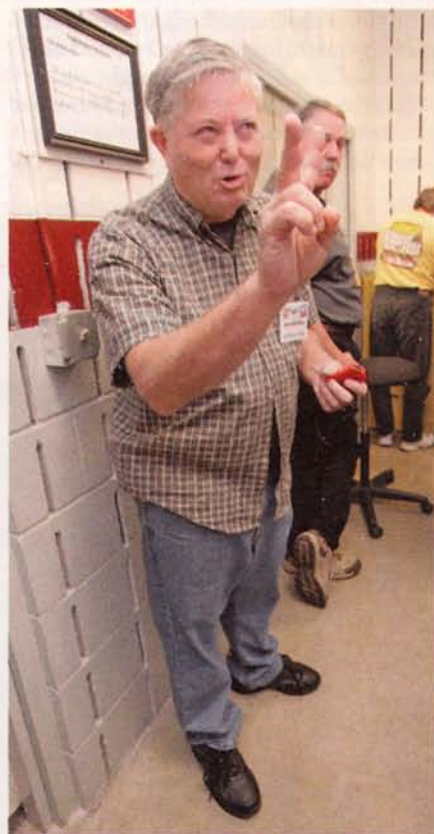
tors in the finals, but since the new rules kept competitors in the dark about the scores as they unfolded, no one knew whether they were the only one down on power.

MPG Heads was next to the cell, with a refined version of the 400M Ford that brought a heart-breaking DNF in last year's event due to a camshaft failure. As with the Power Shop engine, the MPG engine was also softer in the finals than in qualifying, but the point loss was just slightly greater than that of Power Shop, and the team finished with a score of 2,475.5, just one tenth of one point behind the little Chevrolet. Kaase's Boss 429 entry was next. This engine had actually caught fire in qualifying, due to

oil mist escaping the breather and igniting on the header. Fortunately for Kaase, the up-top spark plug wire position of the Boss meant the engine was not damaged, and was able to complete the qualifying pulls, one of which while it was ablaze! (What, no photo, Steve? I thought engines on fire were your spe-



It's pretty much a given that the action is hot when team members are attending to an engine in the dyno cell, but just as important is careful study of the dyno sheets looking for opportunities to improve power. Here, the crew from C&J Racing intensely scrutinize the dyno sheets as quick as they roll out of the printer.



Competition Coordinator Wes Roberson kept the clock for the various time requirements, in addition to his rule enforcement duties. Here he is sounding the two-minute warning as a competitor's 15-minute tune-up period draws to a close.



Fellow competitors, students, and sponsors were among the crowd watching the action in the racer's lounge adjacent to the test-cell area. A video screen displayed the action in the dyno cell, while another screen offered a real-time view of the dyno console display.

cialty. —Ed.) The Boss was substantial in output, scoring 2,506.1, putting it in the lead with three more engines to run.

The final three included the SAM's 400M, Bischoff's Chevy 400, and Kaase's 400M. In qualifying, the Kaase Ford was substantially ahead of the pack, and going into the finals the SAM team had Kaase's qualifying number in mind as the score needed for an outright win. What the SAM's team did not know due to our silent scoring through the finals was that all of the engines run so far

were down compared to qualifying. The team, like the others, saw their numbers down in the warm-up pulls, and worked to make up the ground during the tuning period. In the end, SAM's Ford engine pulled a 2,502.8 score, just a few

points behind the Kaase Boss.

It came down to the last two competitors, both two-time former Engine Masters Challenge winners—last year's champ, Bischoff with a 400 Chevy, and Kaase with his CHI-headed 400M Ford.

“It all came down to the last day of competition, where the top six qualifiers duked it out for standings, and their share of the \$92,000 in total possible contingency dollars.”



This year's event brought just two Mopars, both 340 small-blocks. The stout-looking Hinkle entry was disqualified due to a rules technicality, while the first-time entry from BH Performance was short of making it into the finals.



Each test cell was equipped with a well-stocked Snap-On tool cabinet. Here, SAM's student Ryan Fischer takes advantage of the selection of combination wrenches on hand for a timing adjustment.



Oldsmobile was represented by two entries, with the 400 from BTR being the stronger of these. Here BTR's Bill Trovato signals the dyno operator for rpm, while Dave Arsenault from DTS and Paul Higgins of UNOH look on.



There is plenty of heavy lifting at an event featuring 30 engines, so we were pleased that the UNOH shop was equipped with a Kundel Snap-Trac lifting system. Kundel graciously awards the event winner with a unit just like this one.

Bischoff entered the finals a fair amount behind Kaase in qualifying score, but this wily racer can never be counted out. Bischoff was concerned when the score rolling off the dyno during warm-ups showed a loss of score compared to his qualifying effort. The team went in effectively during the early part of the allotted 15-minute tuning period, and then decided to let the engine cool for the remainder. With a score of 2,550.4, Bischoff was handily in the lead position, with only Kaase left to run.

Of all the final competitors, you could feel that Jon Kaase could taste victory, and wasn't about to let it get away. In qualifying, this 400M was convincingly ahead of the pack, with incredible power across the board. We saw this Ford deliver an insane 515 lb-ft of torque right at the bottom of the power

pull at only 2,500 rpm. That is torque you'd expect from a diesel tractor, not a pump-gas performance engine. Low-end power is important for making the big averages in the Engine Masters Challenge, but what it does from there is every bit as important. What Kaase's Ford did as the rpm piled on was swing the torque needle on the dyno readout like it came unhinged. The engine peaked at 618 lb-ft. Consider that at 401 cubic inches, that's a specific torque of 1.54 lb-ft per cube. Frankly, you just don't see that kind of output from 400 inches of single four-barrel, 10.5:1 compression, flat-tappet street engine, but there it was, making 654 horsepower at

only 6,200 rpm.

As the final pulls rolled off the final engine of the 2008 Challenge, Kaase had it clinched. A score of 2,587 sealed the deal, interestingly showing the least drop in score from qualifying of any of the engines in the finals. In fact, looking back, the winning Kaase engine is inch-for-inch the most powerful engine we have seen in eight years of EMC competition, even when compared to previous events where compression ratio was unlimited and roller cams were allowed.



The students from the School of Automotive Machinists brought a healthy 400M Ford topped with the CHI head and intake combination, and completed qualifying with third position going into the finals.



Reigning champion Tony Bischoff and his BES Racing team returned with a 400 Chevy, and everyone knew he would be a tough competitor. Using expert teamwork while wrenching in the cell, BES gained a Second Place finish in qualifying, and held on to a second in the finals.