Newsletter of the Performance Corvair Group (PCG)

CORVAIR RACER UPDATE

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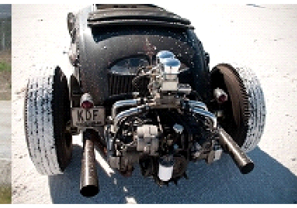
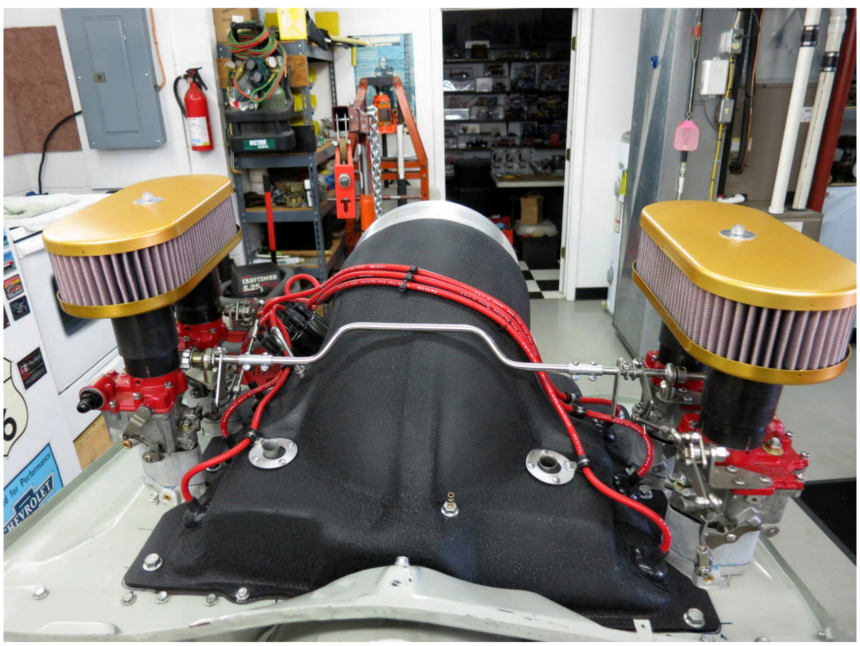



FROM RICK NORRIS' CORVAIR ALLEY

CORVAIR ALLEY



The vertical fan install is all but finished. This is a kit produced and sold by Michael LeVeque. I bought one of the first ones so I've been kind of a Beta tester. I originally wanted to use it at the Mitty but did not get it done. If I do the Pittsburgh Vintage GP it will be the first test for me. Michael and Jeff Rapp have been running one for several races now. It will be nice not to worry about the fan belt flying off at an inopportune time.

The kit is way lighter than all the parts it replaces too. We always like to add lightness. I finished the shroud with VHT's wrinkle paint which works better than any other I have tried especially when you follow the instructions!

Corvair Racer Update is published by the Performance Corvair Group (PCG). We accept articles of interest to Corvair owners who are interested in extracting high performance from their classic Corvair cars and trucks. Classified advertising is available free of charge to all persons. Commercial advertising is also available on a fee basis. For details, email our club President. Email address shown in the Officers section on the back page of this newsletter.

PCG is one of the many regional chapters of the Corvair Society of America (CORSA), a non-profit organization that was incorporated to satisfy the common needs of individuals interested in the preservation, restoration, and operation of the Chevrolet Corvair. Membership is free of charge. To join, please use the handy form on our website: www.corvair.org/chapters/pcg.

Several of the racers were on track this past week end.

Dave Edsinger ran the Jefferson 500 put on by the Vintage Racer Group at Summit Point Raceway. The event ran from Thursday through Sunday. Dave's Stinger runs in Group 1, DP vintage. He qualified 3rd out of 19 on Friday with a 1:31.023 lap time.
Friday was also the Sprint race for Group 1 where Dave finished 4th out of 22 cars with a best time of 1:30.811 beating his qualifying time.

Saturday featured two sprint races, both of which were in the morning for Group 1. In the first race Dave finished 2nd out of 22 and 5th out of 22 cars for the second race with a best lap of 1:30.881 which is the same as his best lap in Friday's race!

Sunday's race was a bit sparse on cars as I'm guessing they left early for home. Dave won the race with a 1st place out of 5 cars timed. A win is a win no matter how you got it. Congrats to Dave Edsinger.

Dave Edsinger and his Yenko Stinger YS-018 at Summit Point Raceway. Dave may have had a secret weapon in the person of Smitty Smith, the world's oldest Corvair Pit Monkey!

Jeff Rapp made an appearance at Gingerman Raceway out there in West Haven MI. The weather was cold and rainy but Jeff had a great time and gaining more experience with every turn of the wheel. Also since this was an SCCA Double Regional and Jeff finished both races that satisfied the requirement and earned him his Regional Competition Permit. Congrats to him.

Since the SCCA classification system puts Corvairs in E Production that is where Jeff ran. There was a total 27 cars in the mixed Group 6 and only one other in EP. Jeff qualified 17th out of 26 cars timed. In Saturday's Group 6 race he placed 18th out of 27 and first in

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class.

Sunday was another qualifier in which Jeff managed a 19th place out of 25 cars timed and finished the Group 6 race in 12th place out of 27 cars that made the grid. Also Jeff cut his best lap at 1:50.942 showing he was improving each time out. He beat the other EP car too. We should see some video on the Corvair Racers Facebook page.

Jeff was not alone as he had his crack and cold pit crew in his wife Tammy plus the Leveques in the persons of Tracy and Michael.

I'd say Tracy's expression explains it all. Cold!

Degrees of Separation, Lobe-Separation Angle Tested and Explained

Evan Perkins in HOT ROD, June 2017

If the cylinder heads are the lungs of an engine, the camshaft is the brain. It affects the power band and temperament of a motor more than any other single part, and a slight change can turn a car from a mild-tempered grocery-getter to a downright nasty machine. On the surface, the camshaft's job is simple—open and closes the valves—but beyond that superficial description, it's one of the most mysterious and misunderstood engine components.

A cam card with its myriad numbers, acronyms, and abbreviations is one red-pen stroke away from a failed math test. But to choose the perfect cam, all of that information needs understanding. Every spec is a road map to what the valves are doing, the most common of which are lift, duration, and lobe-separation angle (LSA)—the latter needing the most explanation.

WHAT IS LOBE-SEPARATION ANGLE?

LSA is the distance from the centerline of exhaust lobe. It is the average centerline between both lobes and expressed in degrees ranging from 95 on the extremely narrow/ tight side to upward of 120 on the wide end. LSA is a way of summing up the relative timing of the intake-valve events (intake opening, intake closing) to the exhaust-valve events (exhaust opening, exhaust closing) in relation to each other, and it's a great approximation of how the engine will operate.

To demonstrate changes to lobe separation in action, we ordered three camshafts from Comp Cams, all ground with identical lift (0.541 intakes and 0.537 exhausts) and duration (230 intake and 236 exhaust) but three different LSA's: a 101, a 107, and a 113. We borrowed Westech Performance's shop mule, a 370 ci small-block Chevy dyno and spent a day running each cam back-to-back to gauge its effect on peak horsepower, peak torque, cranking compression, idle vacuum, and the power band as a whole—all the variables that define and engine's character on the street and track.

ON THE DYNO

With the first cam loaded in the engine (the 101 LSA) Westech's Steve Brule' made three dyno pulls, the average of which was saved to compare to the next cam. To further minimize any dyno variations, the engine's oil and water temperatures were kept the same for each pull. The lumpy-idling 101 LSA cam churned out an average of 484.0 hp at 6,100 rpm with 493.9 lb-ft of torque at 4,400 rpm. It had a robust power band with tons of usable torque. However, the plentiful exhaust overlap (31 degrees) meant there was lots of exhaust dilution at low engine speed and high vacuum. Idle quality was rough and the vacuum gauge showed only 9.8 inches of mercury (in-Hg). Brule' spun the engine over with the dyno's starters and recorded 185 psi of cranking compression.

Test 1 was easy. Test 2 and 3 meant dissecting the motor on the dyno to get the old cam out. The valve covers, valvetrain, intake manifold, harmonic balancer, front cover, timing set, and cam were yanked. Brule' slid the 113 LSA cam, the widest of the test, into the engine's heart. After the next three pulls, it was clear the 113 cam was way down on low-end torque. It made 472.4 lb-ft at peak, a 21.5-lb-ft disparity from the 101 cam at 5,400 rpm, picking up 6.5 at peak. On the cranking compression test, Brule' recorded 175 psi drop a 10-psi drop from the 101 cam. Idle vacuum showed a considerable spike to 14.7 in-Hg, likely the difference between being able to run power brakes and a mandatory leg workout.

Once more, the engine came apart to install the third test cam, a 107LSA. This cam split the difference between the 101 and the 113 down the middle and in theory should have walked the line between the results of the last two tests in every way—which it did. The power and torque curve lay directly in between the last two cams as did the peak horse power and torque, 489.7 at 6.200 rpm and 487.1 at 4,600 rpm, respectively. This was science at work, and with the data in tow it was time to crunch the numbers and find out what was going on. The takeaway is simple on the surface: A tighter LSA makes more low-end and peak torque at the expense of just a few top end ponies. If that were the only consideration, the 101 cam is the clear winner. However in application, there is a lot more to consider. Things like the idle vacuum, fuel economy and tuning all factor into picking the right cam.

TIGHT LSA CAMS (101-108)

Tight LSA cams make excellent low-end torque and have a beautiful power curve. But nothing comes without a cost, and idle vacuum suffers as LSA shrinks. This causes the engine's street manners and tuning to become fickle. A cam with a tighter LSA will require a looser converter and my not be able to run vacuum-assisted brakes, and doesn't play nice with fuel injection. The lopey idle that's universally loved (and part of the allure of a tight LSA cam) is actually misfire caused from a combination dilution in the intake manifold and poor cylinder filling at idle. It creates an unsteady manifold vacuum condition that, on a fuel-injected engine, confuses manifold air pressure (MAP) sensors, making it hard for them to regulate fueling. The Idle air control valve (IAC), which regulates idle speed, also works overtime attempting to "catch" the idle, but usually shoots high or low. The issues can often be work through by an advanced tuner, but always present a challenge and compromise in tuning strategy.

WIDE LSA CAMS (113-120)

The world of fuel injection is where side LSA cams like the 113 really shine. With minimal overlap and a steady manifold vacuum signal, they work great with fuel-injection systems and are the norm on modern pushrod engines, such as the LS and Gen III hemi. If you're an OEM automaker looking for a steady idle, good fuel economy, and passing tailpipe emissions, this is the cam of choice. Wide LSA cams are also applicable in forced-induction applications where less exhaust overlap is required.

MIDDLE-OF-THE-ROAD CAMS (109-112)

If you look at any given cam catalog, you will find the majority of street-oriented cams fall in this range. This is no accident. A cam in the 110-112 LSA range provides the necessary idle lope to appease gearhead ears with acceptable manifold vacuum to run vacuum-operated accessories. The balance of midrange torque and top-end horsepower lends this LSA range to be the majority of street/strip engines. Around 70% of muscle-car performance cams fall into this range.

AIR FLOW AND LSA

Cylinder-head flow and LSA are directly related: as a rule of thumb, the better the head flows, the wider the LSA can be. A wider LSA moves intake- and exhaust valve events farther apart and creates less overlap, which hurts intake-wave tuning. "When you've properly tuned a performance motor, you create high-and low-pressure waves in the intake and exhaust that help cylinder filling", said Comp Cam's Billy Godbold. "When the low-pressure wave in the exhaust reflects into the intake, the pressure delta actually helps pull air and fuel into the cylinder". Without overlap, wave tuning can be negatively affected and cylinder filling and evacuation become more dependent on intake-and exhaust port flow. "A tighter LSA is always going to have more overlap, which allows the exhaust and intake system—if they are tuned well—to work together", Godbold said.

LSA AT A GLANCE

Narrower LSA	Wider LSA
Moves torque to lower rpm	Raises torque to higher rpm
Increases maximum torque	Reduces maximum torque
Narrow powerband	Broadens powerband
Increased chance of engine knock	Decreased chance of engine knock
Increase cranking compression	Decrease cranking compression
Idle vacuum and quality is reduced	Idle vacuum and quality is improved
Valve overlap increases	Valve overlap decreases
Decreases piston-to-valve clearance	Increases piston-to-valve clearance

This wave tuning is what helps performance engines achieve volumetric efficiencies of more than 100 %. To overcome this inherent problem in wide LSA camshafts, you simply need higher flowing intake ports. This is why the LS series, and many other modern engines, make great power on top and bottom with wide LSA camshafts and why a plethora of factory cylinder heads flow like the race heads of yore.

WHICH CAM IS RIGHT FOR ME?

Pinning the tail on the perfect cam can certainly be a difficult task. Ultimately, it comes down to how you want the engine to run, the car's intended purpose, and what you are willing to tolerate. Armed with more information on camshaft theory, what will you build?

MYTHS ABOUT CRANKING COMPRESSION

LSA	INTAKE CLOSES	CRANKING COMPRESSION
101	36 ABDC	185 psi
107	42 ABDC	180 psi
113	44 ABDC	175 psi

A commonly held misconception is that intake/exhaust overlap contributes to lower cranking compression. That notion is completely false. "Ninety-nine percent of cranking compression is dictated by static compression ratio and intake-valve closing point," said Comp Cams' Billy Godbold. As you can see in the graph, the 101 LSA cam actually had the highest cranking compression of the batch: 185 psi. Only once the intake valve has closed can compression begin to build. Because the lobes are closer together on the 101 LSA cam, the intake closing point is advanced (closes earlier) and the piston has more time to build compression—exactly what the gauge showed. The graph above compares intake valve closing points of the three cams used in the test.