



HOT ROD CARBURETION • CLOTHING & COLLECTIBLES • SERVICE PARTS • LINKAGE & FUEL DELIVERY

Let's build a Stromberg 97 3x2

Three 97s for your small block Chevy

This How-To came out of some posts we made to a Jalopy Journal HAMB thread, 'Let's build a Stromberg 97 3x2'. We felt it was good idea to give our own view on the best way to set your regular 97s up on a Chevy small block motor. Everyone is entitled to their own opinions, of course, and we respect that. These are just ours. This does not apply to the new BIG97s, either. Please see our separate How-To articles on the BIG 97 tri-power.

Primary/Secondary... It is our belief that you cannot regard three Stromberg 97s in the same way as an old muscle-car era, factory Rochester tri-power. They are completely different carburetors, designed originally to be used individual - not as a specialty tri-power. It is far wiser to ask how the 97 can work best for your particular application. Back in the day, people mostly used a direct linkage for 97s on the new Chevy 265 and 283 motors, with all three carbs kept the same, and yes, you can set the carbs up to work like that with great results. What we tend to do now, though, is use a progressive linkage - also with all three carbs the same - rather than the traditional idea of one good primary and two 'dumb' secondary carbs with giant main jets, but no power valves or idle circuits. It's a sort of half-way house solution. We still call them primaries and secondaries, but only in terms of where they sit and which open first.

Looking at your 3x2 progressive then... We recommend you leave all three carbs with WORKING idle circuits in all three so all of the cylinders get even fuel distribution at idle and up the rev range (idle circuits stay on for long than you might think). On those dual-plane Chevy 3x2 intakes, the center carb can supply all eight cylinders, but they're pretty old designs, unchanged since the 1950's, so the better access you can give all cylinders to even fuel/air distribution the better. What you don't need is lean end cylinders. And by the way, leave all the chokes in as 97s need them to ensure reliable vacuum signal at the emulsion tube tips. You can lock them open with our 9537K-L kits if you need (all or just the outer two). And aim for 2.5psi regulated fuel pressure. You can go lower, but not much higher.

Using this exact set-up, we tested a hot 355inch Chevy motor back in late 2010 in Arizona (around 2000ft elevation) on a new Edelbrock 3x2 intake and it made 345hp at around 5000rpm with better fuel efficiency than a Holley 600cfm 4bbl. Those intakes max out at 5000rpm. We found it revved to about 5700 but the power and torque was flat after 5K. Max torque was about 380ft-lbs. We were testing something else at the time so at the end of the session we literally used three 97 carbs out of the box with stock 0.045 jetting and number 65 power valves, and the air/fuel ratio was pretty good from idle to 5K. We did find, however, that you could disconnect the outer carb accelerator pumps and it made almost no difference. You didn't need the outer pumps (squirters) or the extra top end enrichment from the outer carb power valves either (they come in when the accel pumps hits the pin on the top of the power valve at about half throttle).

Some people have talked about filling the outer carb PV holes with epoxy. If you do this, and leave the accelerator pumps linked, you will get some hydraulic pressure in the pump well (which could damage the linkage), even with the little relief valve in the bottom of the pump. Plus you pretty much wreck the carb for alternative use. It's easier to just disconnect the outer carb pump link rods, though we have developed a 'dummy' pump for use in a future project so you can keep the look of your pump and pump link. We did not spend a lot of time on this dyno test and maybe we could have adjusted the tune to keep all three PVs and pumps working.

CFM Requirement... This is one of the main reasons why some people believe that three 97s are not enough for a modern 350inch small block Chevy. But it's too easy to get hung up on cfm requirements. The important thing to remember is that maximum cfm is only important at max revs. The traditional math for cfm requirement might say that three 97s at 162cfm each is not enough air for a 350 inch Chevy, though evidence on the dyno and the road disagrees. And we suspect that's because we all overestimate the volumetric efficiency of our engines. And also because we measure the cfm at 1.5inHg pressure and very few modern OHV motors ever see that much vacuum at wide open throttle. Remember we said that the 355inch dyno results stopped at 5000rpm? That wasn't the carbs. It was the manifold. At idle your Chev could run on a lawnmower carb because the basic requirement is cylinder volume x revs. Low revs = low cfm requirement. And when you get higher up the rpm chart, volumetric efficiency pays a larger part in governing what you really need. We can only quote the dyno test above and remind you that we have many customers running this system including one local buddy who leaves black tyre lines at every local stop light. 345hp in a lightweight '32 Ford can get pretty scary. And they really do rev up quick with the progressive linkages.

Balance/Tuning... Set all three carbs on the manifold with no linkage at idle. Get a vacuum gauge and balance all three carbs so each is set the same and contributing the same air/fuel mix to the overall engine. Aim for the maximum vacuum from all three carbs. You can adjust them using the throttle stop screws on the side of the carbs, and the idle mixture screws on the bases to keep it smooth and not lumpy. It's fiddly and you have to go around and around adjusting. There was a great post on the HAMB about carb balancing a few years ago if you can find it. But you should get a smooth idle at the rpm you want - using all three carbs.

Then you can fix the linkage making sure that it does not disturb the idle balance you have already. You can read how to set the linkage up on this tech center

With a progressive linkage, your outer carbs sit there (feeding a little in through the idle ports) until you hit about half throttle, at which point your centre carb will come onto the power valve and start enriching the mixture just as the outer carbs start opening, adding

more air and gas. The main jets start up literally the moment you open a 97, so they're good to go straight away as the signal is very accurate. It's that smooth progression that makes them work so well. On a Chevy, start them out of the box and then read the plugs or get the gas analysed. You won't be far off at 0.045 main jets and number 65 PVs (the 'out of the box' setting). And try it with the outer accel pump links disabled. Each application will differ slightly with local gas, elevation, cam etc.

Distributor vacuum... The traditional 97 provided no ported vacuum for a distributor advance. But now we do! We're not going to get into the argument over which is best - ported or manifold vacuum. All we will say is that IF your distributor spec sheet says use ported vacuum (ie. vacuum taken from just above the throttle plate) - and most new aftermarket distributors say exactly that - then use the Stromberg 9510A-VP 97 model with vacuum port or swap the 9514-VP base into your current 97. We have instructions on how to use them here on the Tech Center.

Do not connect a distributor that asks for 'ported vacuum' to the manifold as it doesn't like it. It won't idle and throws out black smoke because the distributor is fully advanced at idle. We have seen vacuum taken from the rear plug on the 97 base, but to quote Norm Schenck, our consultant at Competition Fuel Systems in AZ, 'we need the vacuum advance only at light load/part throttle conditions (cruising), and none at idle or full throttle. Only a port on the front of the throttle bore at the same height as the transition fuel port accomplishes this'. That's exactly what our new VP models do.

Linkage and fuel lines.... Stromberg offers a wide range of fuel delivery parts for this application, from straight brass hose ends to banjos - including some with a mechanical fuel pressure gauge port in the end - and also our very cool 9146-BIG 3-into-1 big bore (5/16in tube) fuel line with mounted fuel block. Please note that to use banjos with a progressive linkage you also need our banjo spacers (9086K) to move the fuel line away from the center carburetor linkage lever. For the Chevy, our 9246PRO kit is well proven and comes with two torsion carb return springs. If you want to use a throttle cable, our 9136K Cable Throttle Bracket is designed to hook you right up. We also offer a 9246PRO-KD version that can pull your auto trans kickdown cable.

As with all our Tech articles, we welcome customer feedback and other input. Email us (tech@stromberg-97.com) with your thoughts and if it adds to the debate, we'll add it in. Thanks for listening.



