"Tune-Up" Tips

Your first step is to make sure you have all the proper pieces to do the job. A jet assortment, (AED has jet boxes, jet plates w/ jets, and specific tune-up kits) gaskets, power valves, squirters and pump cams. AED kits 6055 & 6056 should do. Most Holley's out of the box should have a fairly close fuel curve for street cars w/ closed exhaust if you selected the correct carburetor for your application. We have covered the idle & transition circuits now we can move to the main. The main jet controls most cruise & W.O.T. fuel metering. The main jet under cruise conditions supplies most of the fuel and this circuit is easiest to tune. If @ steady speeds (2200-4000 rpm) the engine surges it is too lean. You can usually lean the main jets down till you get this surge & then richen up the mains by 2 jets #'s to be safe. Once you have this worked out it's time for full throttle tuning. When you accelerate from cruise to W.O.T. manifold vacuum drops to almost 0" and the power valve opens increasing fuel flow to the main well and boosters. This additional fuel is needed for high demand situations (full throttle) and the power valve restriction channels are the way to tune it (2 channels that are visible when you remove the power valve). If the engine doesn't respond correctly or surges you're restriction channels may be too small. Enlarge these a couple of thousands @ a time till you have adequate fuel and proper acceleration. If this procedure is more than you want to do you can just add more main jet for best acceleration. For all out drag cars this is the easiest way since part throttle operation means nothing. For race cars I would start w/ jetting about 2 to 3 #'s richer than factory settings to be safe & learn how to read spark plugs to make sure you're not hurting anything! Jet the carb. up for best MPH until it slows up then reduce jetting to your last setup.

Always choose a power valve that is below your lowest manifold vacuum attained while idling in gear, but not so low that you might build enough manifold vacuum in high gear to close it leaning the carb. Your AED kit should contain the correct power valve except in an unusual situation. Thanks for purchasing the best!

Notes:

"Troubleshooting" Tips

Off Idle Hesitation: Is one the most common problems w/carbs especially when used on modified engines. If you experience an off idle stumble as soon as you accelerate from part throttle or idle check the distributor first for correct initial timing & a proper mechanical advance curve. (inadequate timing will also cause a backfire through the carb under acceleration). First check the pump circuit to make sure that the squirter produces fuel as soon as you move the throttle. If not make sure your linkage is set properly (there should be no play between pump arm and pump linkage at idle), then if you have no pump shot trace the pump circuit back to locate the problem. Then check front & rear float levels for proper setting (too low of a fuel level in bowl will delay main circuit startup). Next move to the carb idle circuit. Most of these type stumbles occur because of a lean idle & transition circuit especially w/ large manifolds, lots of cam timing, and little or no manifold vacuum. First check to make sure the primary throttle plates @ curb idle aren't too far up into the transition slot reducing fuel enrichment when you fan the throttle. If the throttle blades are more than about .04" into the transition slot either open the secondary throttles to put more air in the motor or drill a hole in each primary throttle plate on the bowl side to increase idle air. Start w/ about .09" holes in the plates. If you still have a stumble adjust the idle mixture screws about 1 turn richer from best idle & see if this cures the problem. If this helps you can bet the idle circuit is too lean. A good indication of a lean idle is if your idle mixture screws are out @ best idle over 2 turns, or you can just bump the accelerator pump arm @ idle & the idle smoothes out. In some cases richening the main jets by a couple of #'s will richen the idle enough since the idle circuit pulls fuel from the main circuit. If your main circuit is already tuned this can be a mistake. If you need to richen the idle circuit the best method is to increase the idle feed restriction about .002" @ a time. This should remedy the situation or reduce the idle air bleeds by about .005" at a time.

Full Throttle Hesitation: You should now have your idle & transition circuits tuned up and should proceed with the pump circuit if under hard launches you get a stumble. In most cases your not supplying enough fuel when you whack the throttle & manifold vacuum drops before you can start the main circuit. This causes a lean spot you need to cover up w/ the pump circuit. Usually going up on squirter size a few thousands will cure the problem. When you go above .035" squirter size you should install high flow pump screws so you don't limit fuel flow (AED #5550) If you fix the initial stumble and then after the car moves alittle, it becomes lazy you are running out of pump shot too early. You can change pump cams to a higher lift cam (AED #5560) or you'll have to add a 50cc pump kit (AED #5565). This is especially helpful when you are using a large carb that has a slow starting main circuit, or have a heavy car, or a tight converter. One thing to remember is that you only want enough pump shot to cover the lean hole in the fuel delivery curve, any more can make the car lazy. Another major problem on hard accelerating drag cars is when the car gets out almost through low gear & then noses over. This is caused by fuel rushing to the back of the rear bowl under high G forces uncovering the rear jets. The purchase of our #5895 stainless jet extension kit will solve this problem. We also offer special machined and weighted floats for additional protection with our custom brass jet extensions included. (AED #5896).

Flooding & Hard Starting Hot: When you have fuel dripping out of the boosters or a very rich condition @ idle, first check front & rear float levels. Remove both sight plugs (AED #5170) clear sight plugs are safer,easier, & inexpensive w/ motor off & make sure fuel in the bowls is even with or 1/3 up from the bottom of sight hole. If too high adjust down (clockwise) w/ needle & seat nut and recheck. If you still can't get the float level down check for heavy float or trash in needle & seat. Holley carbs hate trash & water! With floats set if you still experience flooding tighten fuel bowls (incorrect seal between metering block and main body can cause booster pull-over) or check for mainbody and metering block flatness. We are assuming you have checked fuel pressure (AED gauge #6100) and it's less than 8 psi running. If you still have a problem a blown power valve will cause an excessively rich idle, vacuum check it or replace. Always use a carb heat shield or insulated carburetor spacer if you have an aluminum intake because of the excessive heat bled off to the float bowls. This will cause fuel bowl over, percolation, & vapor lock resulting in hard starting & spongy throttle response. We manufacture a complete line of heat insulating Birchwood Spacers in 1/2" and 1" (#'s 6150 thru 6173) for all applications.

*** Special note about metering block gaskets since about midway 2004. The gasket material has been changed from the original Holley material used for decades! Some are harder & some are softer. Always re-tighten bowl screws after initial use as the mating surface between the metering block & main body surface is critical in proper carburetor operation! I would not reuse metering block gaskets, they are inexpensive so just replace them. If you have a strange problem with idle or cruise your first step should be to replace the metering gaskets. We have seen allot of this in the past year with virtually everyone's gaskets. Are latest gaskets (as of March 2005) are the best out there, but I would still replace them on any carburetor disassembly.

FAQ'S:

1) How to pick the right Carburetor size for your car & engine combination?

This is paramount in being successful whether you're a professional racer or just want the right carburetor for you're street machine. There are 3 main parameters that correctly determine your baseline selection. From there you need additional information to fine tune that selection. Let's start with the big 3.

A) **Cubic Inches:**

Simple parameter for total cubic inches including any additional bore & stroke

B) **Total RPM Range:**

This is both minimum & maximum rpm. Minimum rpm is just as critical or even more so than maximum rpm. You need to be concerned with the minimum rpm that you need to accelerate from. Several additional pieces of information come into play here such as transmission type, converter flash rpm etc. For example the exact same engine in a car with a 3500 converter will need less carburetor than one with a 5500 converter. Remember it's all about acceleration. A larger carburetor that might make more torque & power on the dyno will usually run slower ET's or lap times if the engine can't accelerate properly from that minimum rpm. Remember engines are not too happy running below max torque rpm! Ideally the correct converter should flash to roughly 200 rpm above max torque rpm. Gear ratio also plays a role in this calculation as does car weight. The heavier the car or higher the gear will affect time spent in different rpm bands & in this case would require a carburetor sized smaller than a lighter car with more rear end gear (numerically higher). Camshaft & cylinder head (intake port volume) also play a key role in rpm range. In most cases the camshaft & cylinder head dictates rpm range. Here's where you can get thrown a curve. In many cases the bigger the cylinder head is the less carburetor the engine wants. We are assuming 2 similar engines with the same rpm range. A good example is a standard small block Ford & small block Chevrolet. The Ford factory head volume being smaller usually requires more carburetor than a typical Chevy. We have proven this over & over through dyno (engine & chassis dyno as we have both in house) & racetrack testing. It gets down to port velocity & choke points which is a topic for another discussion. As you can see this isn't easy determining correct carburetor selection. It's really part science, part knowledge, & part experience. There is no real formula for absolute carburetor size. I've worked on a spreadsheet for years that won't always work. The proliferation of all the new cylinder heads & manifolds makes selection even tougher. Bottom line is always get good knowledgeable help when selecting carburetion, just like a good camshaft they can tie you're whole program together properly & make a big difference in performance. It's always less expensive to do it right the first time.

C) **Power Level:**

The third major consideration is Horsepower. A lot of the previous questions go into trying to figure out how much power an engine makes & at what rpm. Your engine needs X amount of airflow to reach a certain power level efficiently. The formula for CFM consumed is (CFM = CID x RPM x VE ÷ 3456). Here CID = Cubic Inches; & VE = Volumetric Efficiency. This is just a rough estimate as VE number is the basic efficiency or cylinder filling of the engine. Let's take a typical small block chevy 383ci stroker engine at 6500 rpm assuming 100% VE. Plug in the numbers & you get a CFM requirement of 720. Street motors might be 90% & a good race engine might be 125%. This can be figured out simply but it's just a piece of the puzzle & all of the previous observations are equally as important. I will explain the CFM myths in more depth in the next topic. I hope this helps in getting a better handle on the important things to consider when choosing the right carburetor.

2) Real Carburetor Airflow Numbers:

Years ago the Society of Automotive Engineers provided a standard for Airflow that's still used today. For 4-barrel carburetors that number is measured airflow at 1.5" pressure drop, or used on a flowbench is 20.4" water. For example a 750cfm carburetor should flow 750 (cubic feet per minute) at this pressure drop. A carburetor has fuel flowing through it which actually displaces some airflow (usually around 8%), so this should actually be flowed with fuel or wetflowed. When we first started we built our own custom "Wetflow-Bench" to properly measure carburetor airflow & fuel flow. We couldn't understand how you could be in the carburetor business & not be able to properly measure these parameters. We can measure CFM, pressure drop, Air/Fuel Ratio, pounds of air, pounds of fuel, & correct for weather conditions. We can also wetflow the carburetor through the entire rpm range. The big advantage is we can actually measure A/F ratio throughout the rpm range to set the fuel curve properly.

The problem comes when some carburetor folks do not use SAE numbers. We've had many carburetors through the years claiming to be one number & some would be well over 100cfm less. Some carb folks would use 28" of water to flow carburetors & hence the totally unrealistic claims. We decided not to play the airflow games as we feel it's a real disservice.

Now as far as airflow goes we've found that it takes rougly 1 cfm to make between .7 & .8 horsepower. If you take the SAE numbers of 1.5" of depression to get you're cfm then on our previous example with the 383 Chevy then you need a 720cfm carburetor roughly without considering the other factors. We have found that you actually would be better off using a carburetor that flows this amount of air at a lower pressure drop (less restriction) like 1.2" to 1.3" as this usually makes more power. For example in our theoretical 383 engine if we used 1.2"-1.3" it would require a carburetor close to 800cfm for best power. Don't forget all the other factors that go into carburetor selection mentioned above. If we can be of any help we have a great tech department that can supply the correct AED Performance carburetor for your specific application.