Setting-up Dual Carbs

So you have finally made the decision to purchase a set of dual carburetors, congratulations. Despite what you may have heard or what others have told you, dual carbs don't need a witch doctor to make them perform reliably as long as you have a basic understanding of how they work. One of the most important things to consider when getting dual carbs is making sure it has quality linkage. Dual carbs do not mysteriously come out of sync. Most problems people associate with synchronization, such as backfires and stumbling during acceleration are often caused by clogged or incorrect sized idle jets. I prefer dual throat carburetors such as the Dellorto DRLA, Weber IDF or IDA over single throat carbs like the Solex Kadrons or Weber ICTs. With dual throat carburetors each cylinder can be tuned in to meet the demands of the engine giving the tuner the ultimate adjustability. There are many people out there that love their single throat carburetors, but in my opinion only because they haven't had a good set of dual throats. With single throat carburetors, one barrel is being shared between two cylinders which causes the engine to drop cylinders at an idle. Don't believe me? Pull a spark plug wire off one cylinder at a time and witness that two cylinders are much more responsive than the other two. This can cause the engine to fail the idle portion of emissions testing because essentially the motor is acting like it has two fouled plugs. I always hear people say it's because the cam is too big and the engine will never pass emissions. FALSE. Replace the single throats with a set of dual throats and the car will fly through emissions. I have had 2332 with an Engle FK89 and a set of 51's pass with no problems whatsoever. Now that I have expressed my discontent with single throats carburetors, I will leave the in's and outs of how to set up those carbs up to the other vendors in the industry.

The Setup

Let's get down to setting up real dual carburetors. First off let's make sure that the car you are installing the carburetors on is in a good state of tune so that we are not associating any other symptoms with the carbs. This includes properly adjusted valves, timing, good spark plug wires, and fresh set of points if so equipped, no exhaust leaks, properly torque heads, etc. Once we have a good baseline to work with then we can focus on how the engine is responding the addition of the carburetors. Second, we can pre-jet the carbs to get them in the ballpark before we blindly bolt them on.

Venturi Size

Let's determine what venturis size you should be using for your engine. A general rule of thumb is to stay 3-4 sizes smaller that the engines intake valve size for daily driven motors and about the same size as the intake for drag race engines. Smaller venturies give better throttle response, better drivability and better fuel economy, with a slight loss in peak power but for an everyday driver the loss is negligible. This is does have its limitations, don't try to stuff 28mm venturies into a 2-liter that has huge heads and stopping cam. The air-speed through the carburetors will be so great that it will bypass the idle circuit and pull fuel from the main jets due to the high vacuum in the carbs. Generally I like to use a set of dual 40's for engine up to a 2 liter

and 44's or bigger for engine with displacements over 2 liters. A 1600 works well with 26-28 vents, 1776-1915 28-32 vents, 2000+ 34 and larger vents. The Weber tech manual has an RPM vs Engine Displacement chart to help determine venturi size but I have found it to be out of touch when it comes to dealing with air-cooled VW's that are driven daily. Now that you have determined the venturi size let's move onto the main jet size. Main jet size is primarily dependent on the size of the venturi NOT the engine displacement or cam size etc.

The following formula will be one of the most helpful formulas that you will ever run across when dealing with dual carburetors:

Venturi size X 4.1 to 4.3 = main jet size. Example: 32mm X 4.1 = 131.2 on the low end or 32mm X 4.3 = 137.6 on the high end.

With this information pick a main jet that falls within that range such as 135. Now that we have the expensive part out of the way lets discuss the idle jets. Idle jets are primarily what you do most of your cruising on and can affect your gas mileage tremendously. Most engines will use a 50-55 idle but it is dependent on compression, timing and head design. The higher the compression and smaller the squish in the heads the smaller the idle jet….within reason of course. A higher compression engine is more efficient at igniting fuel therefore you can use a smaller idle jet. I have heard some analogies like my 1776 daily driver uses a 60 idle jet therefore my 2332 weekend cruiser will require a larger idle jet….wrong. More than likely the 2332 is running higher compression has better designed heads and is overall more efficient. A quick way to check if the idle jets are in the ball park is to adjust the mixture screws. The mixture screws should be about 2 turns out from being seated in the carburetor body. If they are out farther than that then the idle jet is too small. If the mixture screw is barely adjusted out or it does not make the engine stumble when turned all the way in the idle jet is too large. The proper way to tune mixture screws are to turn them in until the engine stumbles and then start backing them ½ turn at a time until the engine reaches ***best lean idle.*** Best lean idle is the point where the engine idles the fastest and smoothest. Once this point is reached turn the mixture screw out an additional ½ turn. This will allow the mixture some wiggle room for temperature/ air density changes throughout the day. Most engines will run OK on an idle jet that is too large but it will absolutely kill fuel mileage not to mention washing out the cylinders; so pay attention to how the engine reacts to the mixture screws.

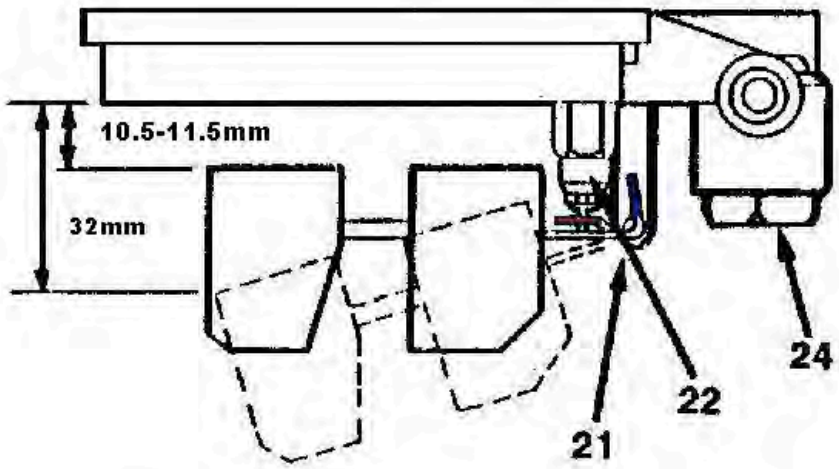
Air Jets

Next up are the air jets which more than likely will be in the 180-220 range. I usually start out at 200. The air jet is a high speed jet so about 3500+ RPM's it can however, affect how early the main jet starts to become effective. The larger the air jet the more airflow into the emulsion tubes, which translates into quicker mixing of fuel and air. This is really helpful when the main jet is the correct size but the motor still has a slight hesitation when transferring from idle jet to main jet circuit. If you are using 200 airs and the main an idle are correct, try a 220 air jet it may be just what the engine was wanting. This was confusing for me at first because the engine was hesitating due to a lean condition and adding a larger air jet seemed to be going in the wrong

direction BUT the motor was fine at higher RPM's so the larger air jet allowed the main to come on sooner correcting the lean condition from idle to main jet circuit.

Emulsion Tubes

Last but not least are emulsion tubes. For a Weber based carburetor, F11's are used for dual carbs and F7's are used on single applications. Oops, I almost forgot about checking the float height. When carburetors have been handled roughly IE shipping, the floats may have moved from factory settings. Float level affects how the fuel is being mixed in the emulsion tubes. The float bowl level directly corresponds to the fuel level in the emulsion tubes. Weber style carbs call out for a 10mm float setting and Dellorto use 12mm. When making adjustments to the float be sure to take your measurements BEFORE the spring loaded ball in the needle and seat has been depressed.The diagram bellow helps illustrate where this measurement is taken. Remember everything you do to these carburetors will have an effect on how the car transitions from one jet circuit to another, float levels are no exception.



Float settings for Weber 40-44-48IDF

Alright, I know that seemed like a lot of info to digest but it will get easier the more time you spend making adjustments and becoming familiar with the cause and effect of each jet change.

Next issue we will discuss is setting up the linkage and syncing the carbs. I'm only going to discuss the most common X-bar linkage but you will be able to apply the same principles to other types. I prefer to use the "snail" style syncrometer over "uni sync" but to each their own. When setting up the linkage for the first time, you can preset everything so that it is close and the engine will start and idle while you get ready to make adjustments. First, disconnect one side of the linkage so that it will not effect the other carb as you make adjustments. Next, back off the throttle plate screw until it just starts to touch the linkage arm and then turn it in 2 full turns. It may idle high but at least you are not trying to keep it running as you make adjustments. Using the syncrometer, adjust both carbs so that they are pulling equal vacuum and the engine is idling

about 1000-1200 rpm. Now lets do the first round of adjusting mixture screws. After you have done this the engine maybe idling too high and you'll need to use the syncrometer to adjust the carbs to reach your desired idle. Once you reach the desired idle adjust the mixture screws again and if needed adjust the idle speed again. The reason for doing this procedure multiple times is to insure the mixture screws are properly adjusted to the engine idle rpm As you will experience the 1st time around gets everything close but not perfect. If one of the barrels on the carb are pulling more vacuum than the other, you maybe able to adjust it so that is the same by using the air bypass screw normally located next to fuel mixture screw. Turn it in to decrease the vacuum reading or out to increase it. If you cannot get both barrels to read the same then most likely the throttle shafts are bent.

Now that everything is adjusted, its time to reconnect the linkage arm. Adjust the arm so that the hiem joint stud or whatever your linkage has attaches without pulling or pushing on the X-bar. This will insure you do not disturb the synchronization. The angle of the down rods are critical to keep synchronization as the throttle is applied. If they are not the same one carb will open sooner and will cause the car to hesitate. Adjust the angle of each down rod so that it matches the other. The angle should be the same forward to aft as well as side to side, use washers, threaded stand offs, etc to help achieve this. If the linkage is top notch and everything is new you are most likely done, but 95% of the time this is not true. As your linkage wears and/or flexes it may need to be preloaded to eliminate the slop as the throttle cable pulls on the center of the X-bar. To see if your linkage needs additional adjustment, actuate the throttle by pressing or pulling where the throttle cable attaches to the linkage. Do not "support" the hex bar with your pointer and middle finger while using your thumb to depress the linkage. The linkage needs to flex as it would if only the throttle cable were pulling on it. While you are doing this observe the linkage and watch the throttle stops come off the screws as the linkage is opened up. If one side is leading the other side, then you need to adjust the length of one of the down rods to eliminate the slop or flex that is causing this. This step takes some time to get it just right but is well worth the effort. Make sure to watch the opposite side as you make adjustments because whatever you on one side will affect the other side. It's a balancing or a *synchronization* act.