

Synchronize Carbs Using Morgan Carbtune

Disclaimer: This guide is meant to familiarize the new mechanic with this procedure. This is not intended to replace any factory or aftermarket documentation. Please see the service manual for your motorcycle before performing these procedures. Read the directions for the Carbtune before using. The writer assumes no responsibilities and is not liable for any outcomes in the use or misuse of this information.

Vacuum synchronizing a bank of 4 carburetors seems like voodoo magic, but it's really not. This bit of maintenance is done so that the butterfly valves in the carburetors are all configured to be open at roughly the same angles to allow the same volume of fuel/air mixture into the carburetors. This way, all cylinders are performing equal work and the engine runs smoothly.

I purchased a [Morgan Carbtune](#) device and I'm quite pleased with it. I also purchased the "[carbtool](#)" that is used to adjust the screw and locknut assemblies that balance #1, #2, and #4 to carburetor #3. (Note: Pre-1980 GS Suzukis use a slightly different procedure. See your manual.)



Morgan Carbtune and carbtool.

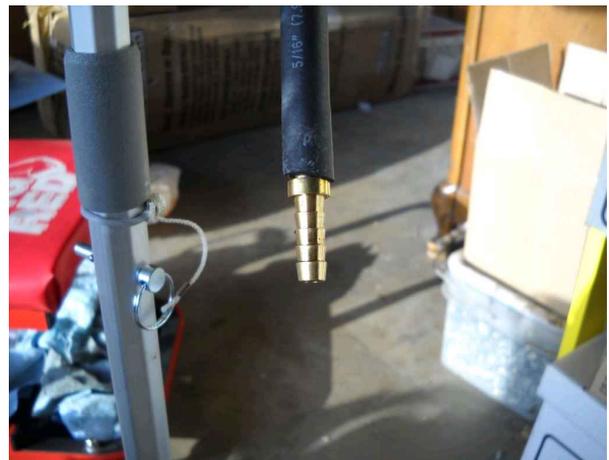
The Morgan Carbtune uses carefully calibrated metal tubes instead of mercury or other liquids. Analog vacuum gauges can also be used. Carefully read the directions that come with the Morgan Carbtune. You will need to place restrictors in the hoses.



This allows the Carbtune to give steadier readings and less bounce when adjusting the carburetors. Materials and instructions are included with the Carbtune.



Now let's prepare the bike. Ensure the valves are adjusted and the air filter is clean. The engine should be completely warmed up. Remove the fuel tank and use a temporary tank. I use a gear oil bottle on an I.V. stand but a lawn mower gas tank or the windshield washer fluid tank from a car will work just as well.



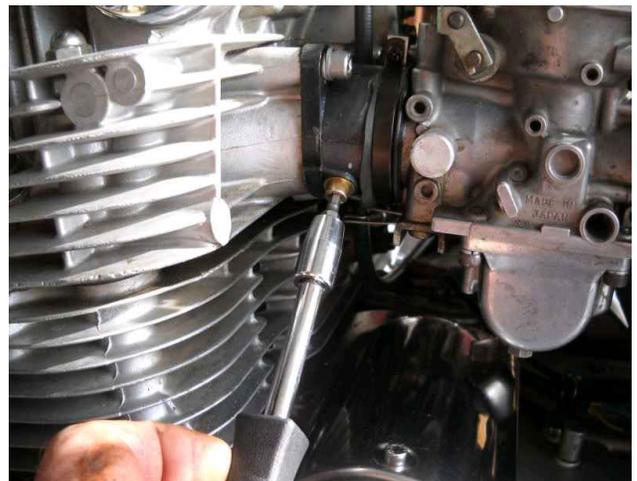
I use a barbed connector to join the temporary tank hose to the fuel line intake to the carbs.

A golf tee works well to plug the vacuum line to the petcock. This must be done to ensure the vacuum gauges work properly. You also see the connection to the temporary fuel tank.



Now we will install the vacuum line adapters for the carb boots. Note that some bikes will have the vacuum ports in the carb boots, some will have them in the head. On my GS850GT they are in the carb boots. This is cylinder #1.

Remove the vacuum port screws, install the vacuum port adapters and push on the vacuum lines from the Carbtune.



Hang your Carbtune from the handlebars or other convenient location.

Note: The vacuum adapters that are included with the Morgan Carbtune are made of plastic and are not very sturdy or easy to use. I would suggest ordering the [**Vacuum Carb Sync Adapter Kit from Z1 Enterprises.**](#)



Be sure to set up a fan to blow air across your engine while you are synchronizing the carburetors. This will keep the engine cooler and avoid cooking your oil. Keep in mind that as you adjust one carburetor it will affect the others. Unless you are very good or very lucky, you will not be able to adjust them so that they are perfect according to the gauges. In this case, close enough really is close enough. Don't spend an inordinate amount of time trying to get your carbs adjusted as well as the pictures in the manuals.

Here is what the screw and locknut look like between the carbs. This is the screw between the #1 and #2 carb. It adjusts the #1 butterfly valve.

(You also see the idle mixture screw with the cap removed. Use the "[**highest idle method**](#)" to adjust these screws.)

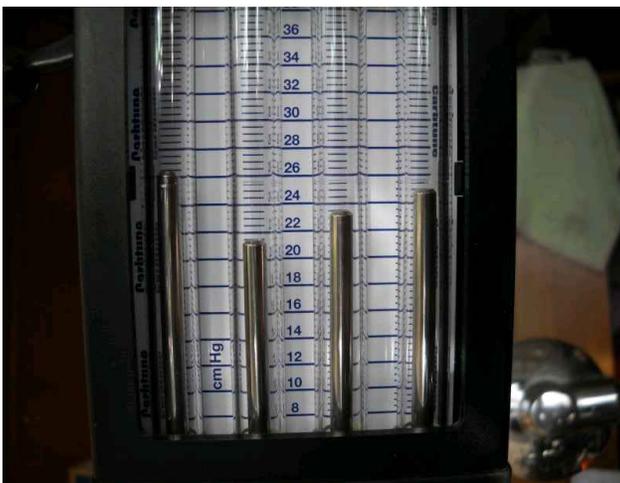
The vacuum adjustment for #2 is between #2 and #3. The vacuum adjustment for #4 is between #3 and #4. The #3 carburetor is the "master" carb and all adjustments are made in reference to it. There is no vacuum adjustment for the #3 carburetor.



Now we have our vacuum lines all hooked up, the fan is blowing, the vacuum line from the petcock is plugged, the external fuel tank is connected, so we are ready to begin. Start your engine and take a look at the Carbtune at idle. This is what mine looked like.

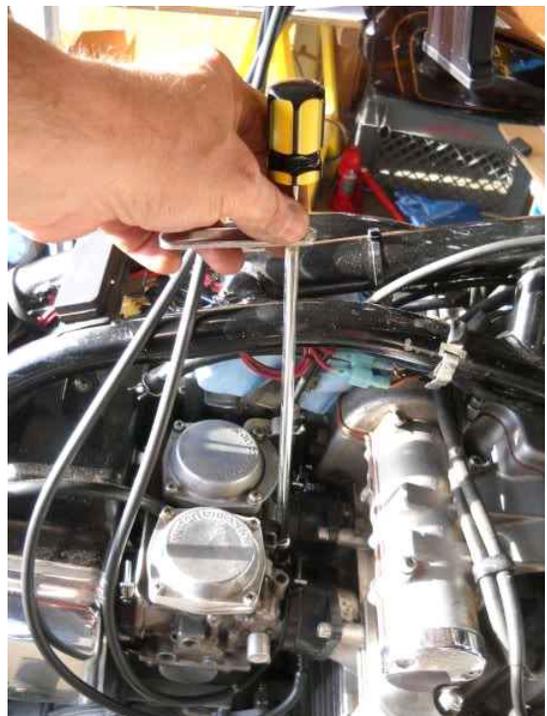


I try to synchronize just off idle at about 2000 rpm. I've been told this is "best practice". (Note: The manual states 1500–2000 rpm.) If you have a helper, they can manipulate the throttle. I use the throttle cable adjustment screw there at the handlebars to raise the idle.



At 2000 rpm, this is what my gauge looked like. Not too bad, but we can do better.

Use the carbtool to adjust #2, #1, then #4. You may have to go back and forth a little because they all affect one another. This is the carbtool adjusting #4.

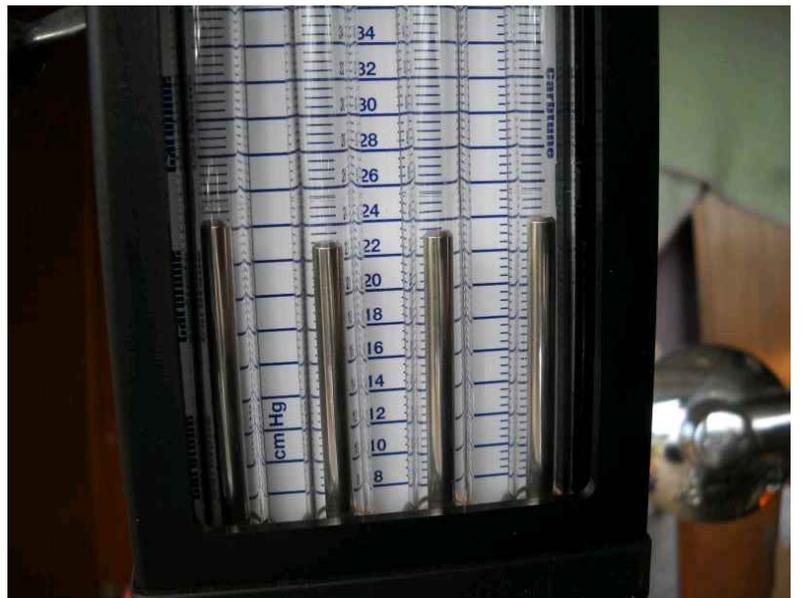


Here is a close-up of the carbtool on the adjustment screw and locknut. This is the carb #4 adjustment, between carbs #3 and #4.



Use the socket part of the carbtool to loosen the lock nut while you use the screwdriver part to adjust the vacuum setting. The vacuum settings will affect the idle so you may have to adjust the idle as you are adjusting the carburetors. Feel free to experiment just a little and watch the indicators go up and down as you tighten and loosen the vacuum adjustment screw. You can get a feel for how much adjustment causes the rise and fall of the indicators on the Carbtune.

Here is a shot of the Carbtune when I was done. You see #1 and #4 at about 24 on the scale and #2 and #3 at about 23 on the scale. This is due to the crossover on my exhaust system. If you have straight pipes, all four indicators should be level.



Here are a couple of clips from the GS850G manual to help explain the term "well balanced".

This is for those bikes with straight pipes, 4-into-1 exhausts, or stock exhaust systems without the "pre-muffler" crossover between the #2 and #3 pipe. Notice that all levels are the same.

- The four steel balls in the carburetor balancer should line up, indicating that the four carburetors are well balanced.

NOTE:

If adjustment is required, it is suggested that the fuel tank and the carburetors top covers be removed beforehand.

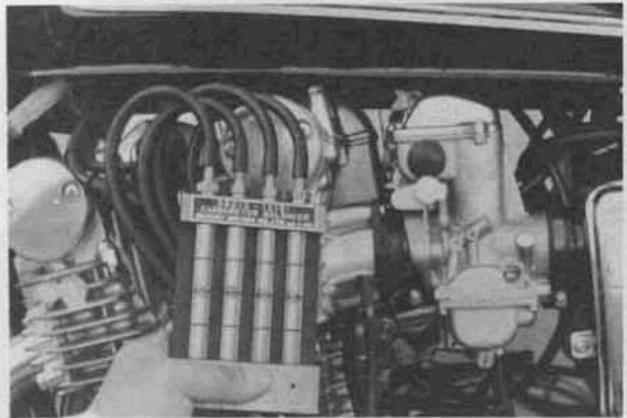
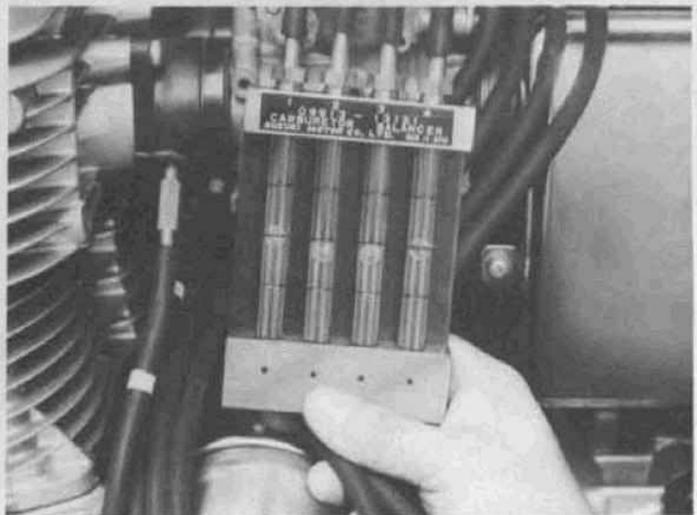


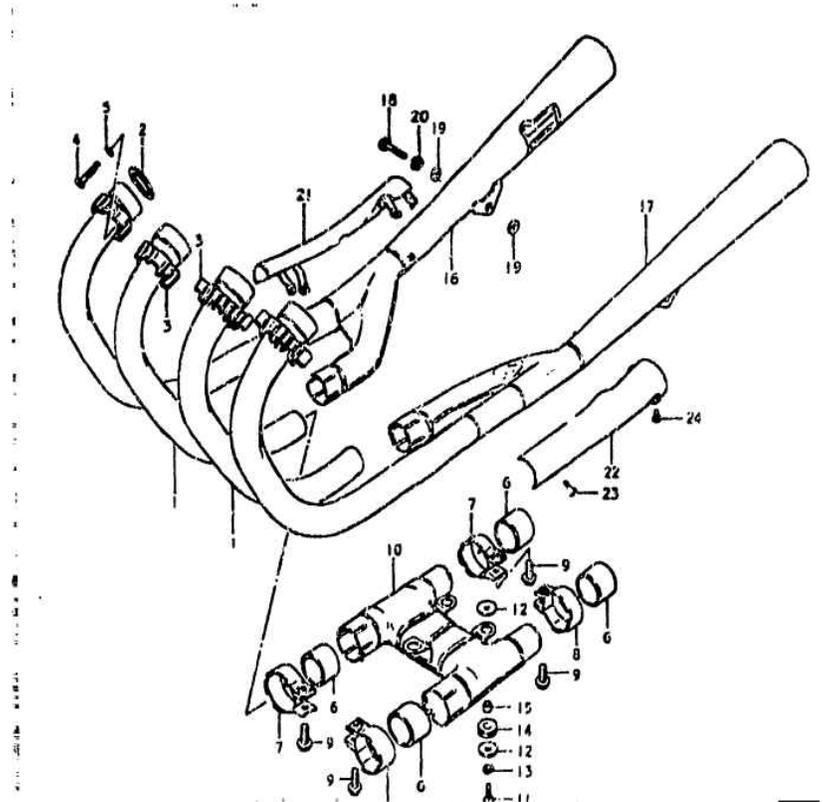
Fig. 9-34

This indicates "well balanced" for those bikes that have the crossover in the exhaust system. Notice that #1 and #4 are even. Cylinders #2 and #3 are even but slightly below the level of #1 and #4. Since there are no numbers on the Suzuki gauge we don't know how much lower, but about 1cm of mercury should be sufficient.

8. When the balls in No. 1 and No. 4 carburetor balancers are on the same level and the other balls are on the lower position as shown below, all the four carburetors are well balanced.



You see the “pre-muffler” or crossover labeled as #10 in this parts fiche picture. It connects pipes #2 and #3 in some stock exhaust systems.



For more information see Mr. bwringer's [carb sync guide](#) on his [Suzuki GS Motorcycle Repair and Maintenance](#) page.

You are also invited to join the community online at [The GS Resources forums](#) where we discuss the best ways to take care of these classic Suzuki GS series motorcycles. It's a friendly, knowledgable bunch who are very helpful.

Thank you for your indulgence,

BassCliff (a.k.a. BikeCliff)