Valve Troubleshooting & Adjusting

If your scooter starts but won't rev or run well, there are basically five most probable areas of trouble:

- Problems with fuel flow
- Problems with the spark
- Air/vacuum leaks
- Problems with the carburetor
- Problems with valve clearance

Fuel flow problems can be caused by a clogged fuel filter, a clogged fuel line, a faulty fuel supply valve or a faulty fuel pump (on those scooters that use one). One way to bypass all these components is to rig up a temporary gravity fed fuel flow directly to the carburetor. If you connect a fuel supply directly to the carburetor from a container held above the level of the carburetor and the scooter revs freely, you've identified the problem and you need to check, or replace each component of the fuel supply to make sure it's working OK.

If the scooter starts, it must be getting some sort of spark, but the spark may be weak or there may be a problem with the ignition timing. The first thing to do is remove the spark plug and take a look at it. If there are heavy deposits on the tip black or white, or if it looks worn or damaged or if the gap isn't what it should be, it should be replaced. You could clean it and re-gap it but plugs are cheap $5 or less, so you should probably replace it anyway and see if the engine runs better. If there's no difference, at least you now have a spare plug if the one in the engine ever does fail!

Today there are very few scooter engines on which you can alter the ignition timing. All timing functions are done via the CDI (Capacitor Discharge Ignition) module. If it's bad, all you can really do is replace it. They're pretty reliable though, so that might be something to try if all else fails to find a problem.

Leaks in the air or vacuum lines can cause problems too. Usually it's leaks in the vacuum lines which control several functions related to the carburetor operation and fuel supply. First check all the vacuum line connection and the lines themselves for splits and cracks. If they look OK you can spray water on them while the engine is running and see if there is any change in engine speed. If there's a leak, the liquid will temporarily seal it and the engine will run better. Some recommend spraying WD40 or carburetor cleaning fluid on the lines, but if you do there can be a risk of fire, so be careful.

Carburetor problems are the most likely source of poor running. First check the idle speed and air/fuel mixture screws see carburetor adjustment. If the adjustment is OK, or you can't get the engine to idle well, then comes the next step. Over time, especially if the scooter is stored for long periods of time with gas in the carburetor, gummy deposits can build up. These are the residues which are left behind when gas evaporates. They can clog internals valves, jets and passages inside the carburetor which can affect fuel flow. The best way to deal with them is to remove the carburetor from the scooter, see carburetor re-jetting, take it apart and soak it in carburetor cleaning fluid, which will dissolve the deposits. Make sure the jets are clear too.

Valve clearance ("valve lash", "tappet clearance") can affect the way the engine runs. This is the clearance between the camshaft and the valve stem. If it is too large, the valve won't open all the way (and you'll get a loud "clattering" noise) and if it is too small (or non-existent), the valve may not properly close. Either way is a problem. You either won't get fuel/air into the cylinder properly or you won't get good compression and/or exhaust and the valve may overheat and suffer damage.

To adjust the valves the engine must be COLD. If it's not cold, the setting will be wrong. Then remove the valve cover. On single cylinder engines there are two valves (one exhaust, one inlet). Then follow the instructions in your manual if you're lucky enough to have one that gives them. If not then you can try this. Put the scooter on the center stand and/or a jack so that the back wheel is off the floor. Put a wrench on the nut holding the center of the fan and rotate the engine until it's at what is known as "Top Dead Center" (TDC), which is when the piston is at it's highest on the compression stroke. This may be marked with a "T" on the flywheel (see image below) At this point both valves should be fully closed and the gap between the rocker...
arm and valve stem (clearance) should be at its maximum. Both rocker arms will be at minimum height positions on the camshaft lobes. There may be marks on the flywheel to indicate TDC, and/or there may be marks on the outside of the cam sprocket. Check your user manual if you have one.

If you can't find any timing marks for TDC you can rotate the engine clockwise the cam lobe is about 180 degrees away from the rocker arm. This means that the clearance between the rocker arm and the valve should be at it's maximum and you should be able to wriggle the rocker arm back and forth a bit (that's the clearance). You can also remove the spark plug, put a straw into the cylinder and rotate the engine until you feel the piston is at its maximum height both valves are fully closed (note that there are two position in a 4-stroke engine at which the piston is at it's maximum height in the cylinder. Be sure you get the right one). Once you're at TDC, loosen the locking nut and adjust the clearance using a set of feeler gauges. When you have it set correctly, tighten down on the lock nut, and re-check it. Now do the same thing again for the other valve. For most 150cc GY6 engines the clearance should be around .004", but check your manual. For 50cc engines I've seen .002" recommended.

You may or may not need to remove some body panels for this job. You might need a flashlight and something soft to kneel down or lay on, as well as a set of sockets and wrenches, a Phillips screwdriver, a set of feeler gauges and a pair of pliers.

NOTE: THIS SHOULD BE DONE ON A COLD ENGINE!!!

1. Place the scooter on the center stand.

2. Remove the breather pipe from the valve cover.

3. Remove the valve cover from the engine. There is no need to drain the oil.
4. Remove the cooling fan shroud from the right side of the engine to expose the flywheel. There is a 1 inch diameter access plug in the fan shroud for timing mark viewing with a flashlight, however it's better to remove the entire cover to familiarize yourself with the marks if it is the first time you are performing this task.
5. Turn the engine to line up the T mark on the flywheel with the alignment mark on the engine case as shown below. This places the piston at the top of its stroke and assures the valves are closed. Ignore the F mark.

IMPORTANT! At no time during the adjusting process should you allow the flywheel to move!
The three cam sprocket holes should be aligned with the larger hole at 12 o'clock and the two smaller holes at 9 and 3 o'clock in relation to the head as shown below. If the T mark is aligned but the holes on the cam sprocket are not, rotate the flywheel 360° (1 full turn) and then it should line up correctly. Both valves are adjusted with the cam in this position.
6. Loosen the lock nut on the adjuster and using a gauge placed in the gap, turn the adjuster screw until the gauge is snug but not tight in the gap as shown in the following pics. The most manuals says .05mm for both valves. That’s about .002 in. It helps to bend the tip of the gauge to get into tight places.
7. Now the tricky part. Tighten the locknut without allowing the adjuster screw to move. This usually requires holding it with a pair of needle nosed pliers or some other tool while tightening the lock nut with a wrench, and may require a couple or more attempts to get it just right. Leaving the gauge in the gap while tightening the locknut is helpful. Again, you want the gauge to be snug but not tight in the gap after the locknut is tightened.

**Tighten the locknut very tight. Don't break the rocker arm**, but the last thing you want is for it to loosen up on you 35 miles from home.
8. Repeat the process on the other valve.

9. Replace the valve cover and tighten the bolts in a criss-cross pattern.
   There is no need for a new gasket.

10. Re-attach the breather pipe to the valve cover.

11. Replace the fan shroud.

12. Re-adjust the idle mixture screw according to this guide.

13. You are done.