

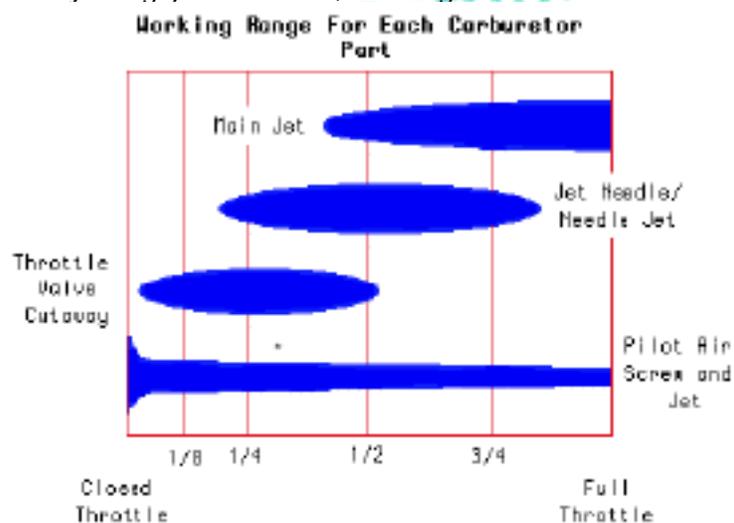
Cambridge Lambretta Workshops

How to tune your carburettor

The basic principles for 2 stroke tuning of carburettors remains the same which ever carb type you use. Below you will find a chart showing you which jet works in the particular range. The thing to remember is jetting works or throttle position, not engine speed, so if you have problems with tickover the main jet will not cure it, and vice versa. Altitude, temprature and the type of use you give your scooter will also affect jetting. If you set your scooter up on a cold day early in the morning, it will run vastly differently to a hot summer afternoon. Jetting of your scooter is a happy medium, which ever carb you choose. A scooter jetted perfectly for thrashing down the motorway will run rich around town, so you might need to alter your jettting from time to time depending on use, if you want a perfect set up. By altering one jet, you may also affect how another section of the throttle movement works, so you may want to back track and start again if you are not happy. Jetting of an engine that requires running in should be on the rich side, it might not run right or feel good to you, but it is far safer to correctly jet an engine it shoud be fully run in as it will be easier to carry out.

Before you start

When jetting your scooter, the engine and scooter should be up set up properly, squish clearance checked, no leaks etc. Of course you need to also be sure of correct timing, correct grade of spark plug. As we are checking fuel to air ratios to obtain the correct jetting, checks should be made to the fuel and air systems first. Make sure you have a clean air filter, all hoses and connections tight. Do you need the use of a fast flow fuel tap to allow enough fuel in? Are you running through a standard Lambretta air box, is this capable of supplying the amount of air you need? Another major factor of adjusting fuel / oil ratios that many people forget, or over look is oil ratio pre mixed with the fuel. **By adding more oil, you in fact not running safer and gaining more lubrication, but in fact you are running leaner and run a much greater risk of problems,** and the opposite is true of running not enough oil. Check the breather on the fuel tank cap is not blocked, and that fuel flows freely. Check cable adjustment on both the throttle and the choke to make sure the slide and choke can close an open fully.



Make sure you have enough fuel, a few spare spark plugs. Run the scooter first so it is at full operating temprature. We recommend that you use some masking tape around the throttle housing, mark out the starting position, and the full throttle position. Half way between these make another mark, and then divide this mark again. You are looking to get idle (no throttle) $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ and full throttle positions marked out so you can tell what is affecting the running in which particular throttle position. As well as seeing how your scooter runs you can use the spark plug colour as a guide to what is happening. Follow the guide below step by step, do not move onto the next step before you are happy with the outcome of any changes you have made and have the step you are on correctly set up. Changes should be made one at a time, otherwise you will never know how or if what you have changed has worked.

One last thing to remember though is that if you vary the use of your scooter, you will need to change the spark plug type (heat rating) and your jetting to have a perfect set up! It is probably best to choose you main use of the scooter, and jet accordingly! Please farmilarise yourself with each jet, what it does and does not do, and again we must state, change one thing at a time, and in small steps.

Idle to one quarter throttle

This is controlled by pilot jet, air screw and by the cut out in the throttle slide. First thing we will concentrate on is the pilot and air screw mix. If the engine is running poorly just off idle, the air screw can be turned in or out to

change the air fuel mixture. If the adjustment screw is in the back of the carb, screwing it inwards will lean off the mixture, while screwing it out will richen it.

(E.G. Both the SH and PHBH carbs have the air screw at the rear, so this will be in to lean it, out to richen)

If the adjustment screw is at the front of the carb, this will work the opposite way around, ie screwing it out will weaken it. If by turning the air mix screw less then one turn out, or more then 2 and a half turns out the scooter does not operate properly, the pilot jet will need to be changed to a higher or lower size as appropraite to whether you are leaning or richening the mixture. Roughly speaking if your scooter revs up and down on its own it will be weak, if the scooter ticks over unevenly and lumpy it will be to rich.

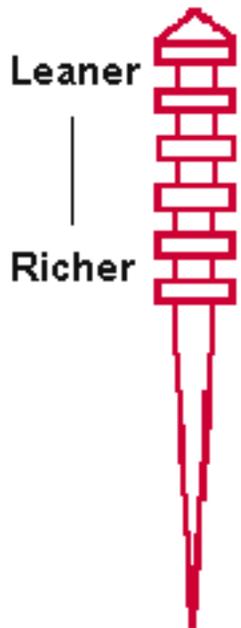
Pilot Jets come in a hugh amount of differing sizes, Lambrettas normally operate between 40 to 60 on Dell'Ortos (depending on varburettor type).

The slide affects carburation between 1/8th to 1/2th throttle, ie just as pulling away. It especially affects it between 1/8th and 1/4qtr but has a lesser effect up to half throttle. The slides come in varouis sizes, and the size is determoned by how much is cut from the back of it. The larger the cut away the leaner the mixture, slides normally run from 30 to 60 on PHBH, and on SH will have identifying numbers stamped into them which should be matched to your machines spec from sources such as the Home Workshop Manual.

If when you pull of gently your engine stalls, the slide will be to lean. You can double check this, try it again but this time with the choke on, if the scooter picks up better a richer slide is needed . If when you set off the engine splutters, it will be to rich. How ever you should continue to go through the gears and if this spluttering appears to clear by the time you are in third or four gear then the slide is fine. If the spluttering remains, fit a weaker slide. With Dello'Orto slides for the PHBH, the lower number is a richer slide, higher number is leaner.

One Quarter to three quarters throttle

The needle and needle jet (in the SH series, and the Jetex, they only have an atomiser and no needle) affects carburation from 1/4 throttle to 3/4 throttle. To a lesser extent the slide will as well, but this should have really been set up in the last section. Dell'Ortos supply a wide range of needles and needle jets for the PHBH range, so the are a hugh number of variteis you could use to fine tune your scooter. In pratice Lambrettas tend to run better on a limited number of these, X2 to X25 needles could be used. The AS and AV needle jets from 262 to 266 tend to work best.



The needle jet (or atomiser) differs by internal diameter and length. The AS range is longer then the AV, the longer the needle jet will cause the mixture to weaken at just over 1/4 throttle and under accleration. Within the AS range you can get different sizes, the lower the number the leaner it is. I.E leanest needle jet for a Lambretta is AS262, the richest AV266. You can buy other needle jets, but these tend not to work on Lambrettas.

The needle controls how much fuel is pulled up into the carb venturi and can be the hardest to get correct. The thinner the taper, the richer the mixture, needles also differs in taper, which is designed to fine tune the different mixtures at different throttle positions. The needle can also be adjusted by repositioning the clip on the needle, this has four positions. The highest clip position will be the leanest setting. For Dell'Orto PHBH, the leanest to richest needles are as follows :-
 Leanest - X12 - X7 - X13 - X2 - X25 - Richest

OK to set the needle, and needle jet, accelerate through the gears until the throttle is at half throttle, a slight up hill grade is the best place to do this. After a few seconds of running at half throttle, pull the clutch in and stop the engine. Do not allow the engine to coast or stop without the clutch being pulled in. Remove the spark plug and look at is colour, it should be a chocolate brown colour (or tan). If the plug is white it is to lean, or if it is dark brown or black, it is to rich. Also you could tell while running, if your scooter feels as if it has a flat spot on and around mid range, or it does not start to perform until the throttle is fully open, it will be to weak. If to rich the scooter will splutter at this position, but it will probably clear as you go onto full throttle. Again as we have stated, change one thing at a time, run the scooter down the road again, and then check.

Three quarters to full throttle

This is primarily controlled by the main jet. This operates when the needle is high enough out of the needle jet, which then allows the main jet to take over. The higher the number of jet, the richer it is

It is best when setting the main jet to start rich, and come down one step at a time to get it correct.

With the main jet ,running to weak will give symptoms of if you run on full throttle and slow down, your engine will feel as though it suddenly speeds up a little! Also the spark plug colour will be grey to white, this is very dangerous for your engine. If rich the engine should splutter and 4 stroke.

OK to set the jet, most kit or carb suppliers would have recommended a base setting, if correct it should be on the rich side. Run the scooter again, probably in third gear at just over three quarters throttle is best, there is no need at this stage to hold your throttle fully open. Again as before with the needle settings, pull the clutch in, kill the engine and stop. Check the colour of the spark plug. Hopefully you will be chocolate brown or darker. If running in best to be on the darker side, if trying to perfect, then chocolate brown. Continue to lower the main jet size, one size at a time and re run the scooter to check operation and plug colour until you are happy you have the correct size.

Final checks

On your first outing with a new jetted set up, ideal it would be best to start off at a slower pace, and gradually increase speed once you are happy that everything is running fine. If the scooter feels weak in any throttle position, stop and adjust your settings until it becomes richer or correct. Keep an eye on your spark plug colour until you are totally happy it is the correct colour and all is fine.

Jetting changes may be needed under the following circumstances :-

Change of use, ie town riding to motorway riding, change in weather, ie summer to winter and including factors such as, ambient air temperature, humidity, barometric pressure due to altitude changes. The fitting of any major parts such as exhausts, timing systems, air intake systems and of course tuning or cylinder changes.