

# Fitting, Engines – Setting up – 1

## TECH ENGINE SETTING UP INSTRUCTIONS PART 1

### PART 1

#### PREPARING AN ENGINE UP TO START RUNNING IN AFTER A TOP END OR FULL ENGINE REBUILD

This is the start of the MB Setting up, Running and Jetting – in procedures for Tuned Cylinder kits and Tuned Engines using large bore carburetors. It was originally produced as a booklet and was printed to serve MB reconditioned Lambretta engines, to show the back up to the work we produce. We have spent a LOT of time preparing this information so we ask that you read this before you fit your carburetor kit, read it again before you try to start your scooter and read it again before you phone us for help. EVERYTHING we know about carburation is here! It is very important you read these instructions it will help keep your engine as reliable as it can be if purchased from MB. If you have an engine or a kit from another dealer then seek their advice, if you are not happy then we don't mind casting an eye over your parts to check it out.

We have UPDATED this article to offer free advice to anyone wishing to know how to set up their Lambretta engine and jet in their carburetor.....

- Spark Plugs
- Spark Plug Table
- Gearbox Oil
- 2 – Stroke Oil
- Oil Mixture Table
- Fuel

#### SPARK PLUGS

Choose the correct spark plug for your engine and for the use of that engine. Manufacturers recommend different grades of plugs per engine. Basically, you will require a hot plug for stopping and starting – running in and around town-work. A medium grade plug will be required for all round work, i.e. a bit of town, dual carriageway or motorway and a cold plug will be required for fast use, i.e. motorway work, fast touring and racing. There are various plug types available, some good, some bad. Usually NGK, Nipon Denso or Champion are employed. Each has different numbers and letters, but all basically are equal to each other's heat range as per chart.

Running an engine on a hot plug used flat out on a motorway would soon overheat, pink and finally burn out. (This in turn could damage your engine and we see this a lot, terminal melted pistons all because of the wrong plug grade).

Running an engine around town on a cold racing plug would soon foul up (due to fuel mixture not being burnt off!) causing mis-fires and again, finally

pack up! The indication is a wet or black plug. So, it does help to keep an eye on plug grades.

Plug gaps should be correctly set, this varies from engine to engine. Gaps vary from .016" to .022" (0.35mm – 0.55mm), usually a choice of .018" – .020" is used on older type ignitions.

Today modern electronic ignitions, improved CDI's, external pickup and coils may work up to .025" plug gap and will improve power and starting.

To be safe set the plug gap on a Lambretta at 0.018" to 0.020" for all ignitions and go from there.

If in doubt it would be easy to say 'check your manual', but there isn't one like a modern bike would have. Some good reading can be found in the Spanners Manual. Now, providing that your ignition system is in perfect working order, then you shouldn't have a problem with spark plugs. Renew your HT lead and suppressor cap if there is any doubt to their condition.

We recommend Nipon Denso plugs, we have used them for years with very little comebacks compared to other makes where we saw regular failures!

We see so many melted pistons where people have fitted the hotter spark plugs of 7/8 and 22/24 grades these help overheat an engine, especially if used to it's full ability..... YOU HAVE BEEN WARNED

If you are going to use your tuned motor as it should – constant fast speeds. As soon as the bike has been jetted in correctly ALWAYS USE a 9 or 27 grade plug. We've never needed a 31 plug on a road motor!

	NGK	Nipon Denso	Champion	
Hot	B7	W22	N5	Town
	B8	W24	N4	All round use
	B9	W27	N3	All round use and Motorway
Cold	B10	W31	N2	Racing

## GEAR BOX OIL

Lubrication is very important. Fill your gear box with fresh oil. Lambretta manuals say use 1 1/4 pints 750ml, we suggest 500ml with modern oils. We recommend the fantastic Maxima 85 oil, not only does it lubricate the gearbox better than anything else, the engine runs cooler and the clutch works all the time. On a new engine rebuild it is an advantage to change oil at the first 200 miles, 500miles, 1000 miles and every 1,500 miles or so! Afterwards. (there is no advantage to add any more oil than is required, racing engines can run less but beware). Lambrettas do use up oil on a regular basis, this is why we suggest changing oil regular. Always check drained gear box oil for metal parts.

## TWO STROKE OIL

There are plenty of 2-stroke oils available to choose from. Some are good, some are not so good, most these days work well in any engine. Over the years

we have recommended oils that have become out of date for various reasons, so for these reasons we have moved forward onto newer oils. Saying this some of the newer spec oils are not as good as older spec oils as the new specs are aimed more towards burning clean than lubrication! Lambrettas are one of the most under-cooled engines ever made, so always use the best oil you can afford to help lubricate them. Fully synthetic racing oils are the best.

We have found these to be very good especially with unknown quality of the new ethanol mixed fuels

- MB-S Race-Tour Ester 2-stroke
- Maxima Formula K2
- Motul 800 Road Race
- bgm Pro Race
- Castrol Racing

Of course there are lots of very good manufacturers of oil, these companies are constantly updating their oils and may be very good. A word of warning! Try to use the same make each time. Some oils do not like to mix and can separate causing problems.

Fully synthetic oils are expensive and sometimes hard to get, so any old mineral oil will do, but mix at 25:1 (3.85%) – 16:1 (5.9%) and don't swap with synthetic oils.

It is thought in some circles it can be an advantage to mix more oil when running in or for fast road use. This may have been true in the old days – today it's not required with modern Ester based Synthetic oils!

If you do add too much oil, around town your engine may smoke, so a weaker mixture may do.

A warning! More oil can foul plugs, so beware!

Engines running on old mineral oils will require decoking more often than synthetic oils.

Use your oil bottle as a guide to the amount of oil required for the amount of fuel used. Most use a Vespa oil jug which means one jug full equals 50:1 oil mixture for a gallon (4.56 litres), two jugs per gallon equals 25:1, or 1 and 1/2 jugs equals 33:1. There are other bottles or mixing jugs that are also available, most oil bottles have markings of the side to judge how much oil is required per liter.

We prefer the SIP oil bottle for mixing.

Our recommended mixture for Maxima/Motul/bgm is 30:1 (3.2%) – 40:1 (2.4%) or in simple terms 32:1 (3%)

Oil to fuel mixture	20:1	25:1 (4%)	30:1 (33.3%)	32:1 (3.13%)	40:1 (2.5%)
cc's of oil per gallon	227	182	152	142	114
cc's of oil per litre	50	40	33	31	25

## FUEL

Today modern petrol is the worst enemy of a Lambretta engine. You just never know what is in it and what it will do to your engine. Fuels are now mixed with Ethanol which decreases the octane value of the fuel and will get worse over time. It not only effects the octane rating but can affect any rubber part that is not resistant to the new fuels, so always make sure the carb rubber and crank seals are of good quality.

We recommend Viton Large mag seals and Viton drive side seals and MB carb mounting rubbers 25mm, 30mm, and 35mm. New fuels go off very quickly – say over a month old. When you stop your engine and if you don't know when it will be started again, run the engine until all the fuel has been used up inside the float bowl. Also modern fuels absorb water, so if you store your Scooter we advise to drain your tank or leave it in and drain it and use fresh fuel if you store the motor for a number of months.

In the old days we would have had 4 and 5 star fuels with lead in it to prevent knock. Engines performed was much better and you could get away with murder when it came to compression ratios and ignition timings. Today we only have these new fuels, either Super Unleaded 95 or Unleaded 92.

For some time we have suspected Super Unleaded has additives in it, which causes wear and tear within the engine – because it breaks down oil lubrication in hot areas with some oils. Even with a perfect set up engines designed with modern fuels you still can have problems, a lot depends on how you ride and how the engine is set up.

MB Scooters Ltd recommend using un-leaded fuel.

Tale tell signs of an engine run on modern poor fuels and poor oils are...

- Piston rings turning blue-black, making the rings soft, wearing down the outer hardened edges which makes the ring gap larger and looses compression. Eventually if ignored the rings on most engines will spin over the ring pegs and knock the peg in loosening it and sometimes falling out. The pegs always get the blame! So always compare new ring widths with the damaged piston rings
- Pistons coke up on the dome and under the dome, if rings wear the sides of the piston will become Blacked
- Con rod, small end and big end bearing areas turn the copper coating of the rod a dark, blue-black showing over heating and lack of lubrication to bearings
- Gudgeon pins turn blue/black and lock up in the piston
- Seizures can occur
- Pistons melt around the exhaust port or pop a hole in the center

From 2000 onwards when leaded fuel disappeared we found ignitions timings had to be reduced from 19 degrees which had worked for years in a tuned motor with high compression to 17 degrees to cool the engines – otherwise pistons would melt! Today this could be 15-13 degrees to cool a fixed ignition in a highly tuned engine. A lot depends on how you ride and where the power works

and where heat build up occurs. We now have advance retard ignition add on's to alter the ignition curve as the engine revs increase, this should be the way forward with new fuels.

With lots of testing on Race-Tour engines we've still found 17 degrees is best. It's very reliable and proved to give more power than 19/22 degrees. Using advance boxes actually loses power! This may not be the case on higher spec tuned peaky engines with an expansion chamber!

Compression ratios are so important these days, run an engine with too high a compression ratio and expect seizing, melted and holes in pistons.

But this also depends on many other factors

- Compression ratios
- Carburation
- Ignition timings
- Spark plug grades
- Port timings
- Exhausts
- Quality of fuel
- Fuel flow

In the old days we found 4-star, Super Unleaded or Unleaded worked with all engines. We use to say there should be no need for additives mixed with the fuel you used from the pump. Today yes there are special additives which may help improve the fuel you use. But it adds more money per top up and fuels and oils are not getting any cheaper. If you have a particular engine which fails then use it to help.

We also recommend fuel catalysts or lead pellets dropped into the tank as these also help to add lead to fuel and improve the engines reliability. We've found using these, fuels don't go off and our farm machines still start after a few years of no use!

When adding oil to the tank, turn off your petrol tap (this is very important) Add your oil which should be based on what amount you think you require..... depending on your tank you will get used to knowing how low fuel is in your tank or you may have recorded how many miles you have done since the last fill up. Or use our MB dip stick cap to show how much is in the tank. When you've mentally worked out what amount of oil is required fill with petrol therefore mixing the oil. Always use some form of measure to get the quantities correct and re-top up with oil when you know the exact amount of fuel used.

When leaving your bike over night it is an advantage to turn off your petrol tap, this stops any flooding out of the carb if the carb is faulty or a bit of dirt comes through the tank. More importantly, bikes left for some time might find that some oils separate from the fuel and sink into the carb making poor starting at a later date! If left, shake the scooter from side to side before turning on the fuel tap.

To prevent fuel starvation at high rpm it is advisable to fit a Fast flow tap. A tap should flow around a 1/2 – 3/4 – 1 pint of fuel in a minute on a tuned engine. If it doesn't, there is chance on a thirsty engine that it can suck the float bowl nearly dry at high speeds and then can seize or melt a piston.

Next we move to how the carb works and how to set one up..... PART 2

Mark Broadhurst MD MB Scooters Ltd. Ask Mark [mark@mbscooters.co.uk](mailto:mark@mbscooters.co.uk)