bgm PRO MRB Race-Tour 195/200 & 225/230 CYLINDER KITS

Thank you for purchasing one of our bgm PRO MRB Race-Tour (RT) cylinder kits. Here you will find all setting up hints as well as some fitting advice that you should take care of.

All parts of the bgm range are

- ***Developed with the real needs of Scooterists in mind***
- ***Extensivily tested***
- ***Improving weak links on original designs***
- ***Designed for ultimate reliability***
- ***Either German or MRB engineered and produced by reputable manufacturers worldwide***

bgm PRO MRB Race-Tour 195/200 & 225/230 CYLINDER KITS

1. SCOPE OF DELIVERY*

· Ceramic plated alloy Race-Tour cylinder
· Billet machined CNC Race-Tour cylinder head
· Italian made Meteor piston kit with Ø = 65 mm on 195 cc kit, Ø = 70 mm on 225 cc kit
· MoS2 coated piston for extra lubrication and safety during the running in period
· High tensile cylinder studs, heavy duty head nuts and washers
· High tensile cylinder head allen screws and washers
· Stainless steel exhaust studs
· Extra long brass exhaust nuts
· 7mm plain and spring washers
· 0.3, 0.5 and 0.7mm cylinder alloy base gaskets/packers

Sticky's Complete Spanner's Manual Lambretta

**This is the scope of delivery at the time of writing. These may be subject to changes.*

2. NEEDED TOOLS FOR THE JOB

Working on a Lambretta is very easy and straight forward job. Nevertheless, when you do it for the first time, take your time and read our fitting instructions and the Spanners Manual thoroughly before getting started.

The tools needed on a standard Lambretta or one that is close to standard are:
· Ratchet with 8, 10, 11, 13, 14, 24 mm
· Wrench of 8, 10, 11, 13 mm
· Spark plug spanner
· Screwdriver
· Pliers or ideally circlip pliers for taking the old piston off
· Torque wrench with 14 mm nut and size 6 hexagon socket
· Solder iron
· Caliper
· Dial gauge

3. PREPARATION

Before fitting the cylinder kit to your engine, you should bear in mind that you increase the power output. Therefore the bottom end should be in very good condition especially the con rod and bearings. The same holds for clutch unit, chain, chain tensioner and so on.

Remember cleanliness is essential.

You can fit the kit with the engine taken out of the frame or you can leave the engine in the bike.

However, the workbench makes things more accessible. But even with the engine left in the scooter the job is very straight forward. In the end it is up to your personal preferences what suits your working style best. For different stroke and con rod options we have listed the most commonly used spacer combinations.

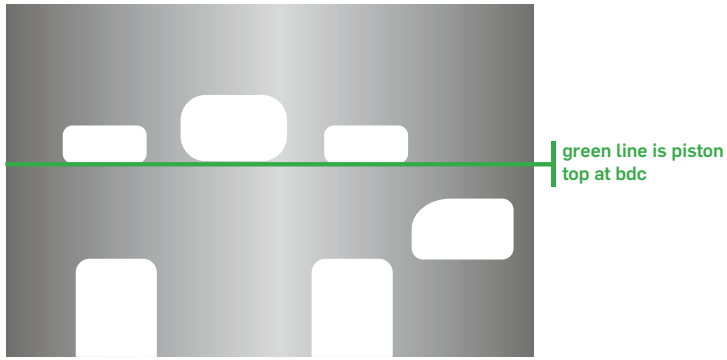
4. DRY BUILD RT 195 WITH 58 mm STROKE, 107 mm CON ROD CRANK

With casings from Italy, India, Spain and so many repaired and machined ones, it is very hard to cover every particular case. But nine times out of ten we got away with the basic setup to get the port timings and squish clearance right.

For the RT 195 kit with the 58/107 crankshaft fit the 0.3 mm alloy base gasket and then tighten down the barrel to the casing. Use M10 nuts, inner bushes of the fork link bolts or find a suited spacer to bolt down the cylinder on two studs.

Turn the piston to BDC. The piston crown should sit at level with the bottom of the transfer ports.* It gives the right transfer timing. The squish clearance should be around 1.0 - 1.1 mm.

It should look like this:



RT 195 – 58/107 basic setup: 0,3 mm base gasket

On the RT 195 the exhaust port bottom sits slightly above the bottom of the transfer ports.

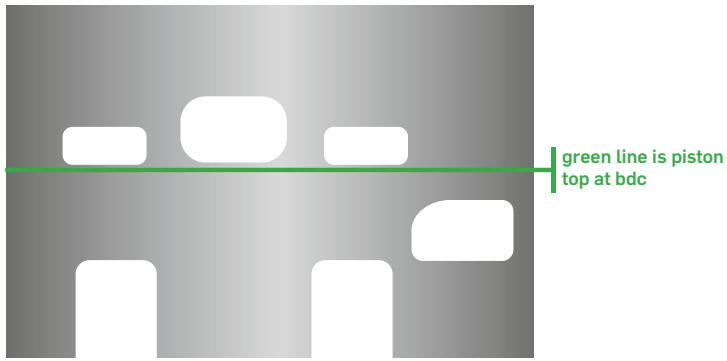
5. DRY BUILD RT 195 WITH 60 mm STROKE, 107 mm CON ROD CRANK

With casings from Italy, India, Spain and so many repaired and machined ones, it is very hard to cover every particular case. But nine times out of ten we got away with the basic setup to get the port timings and squish clearance right.

For the RT 195 with 60mm crankshaft it now becomes a 200cc kit. With the 60/107 crankshaft use no base gasket and later, on final assembly a 1.5 mm head gasket. Use M10 nuts, inner bushes of the fork link bolts or find a suited spacer to bolt down the cylinder on two studs.

Turn the piston to BDC. The piston crown should sit 0.3 mm below the bottom of the transfer ports.* This gives the right transfer timing. The squish clearance should be around 1.0- 1.1 mm.

It should look like this:



RT 195 – 60/107 basic setup: no base gasket

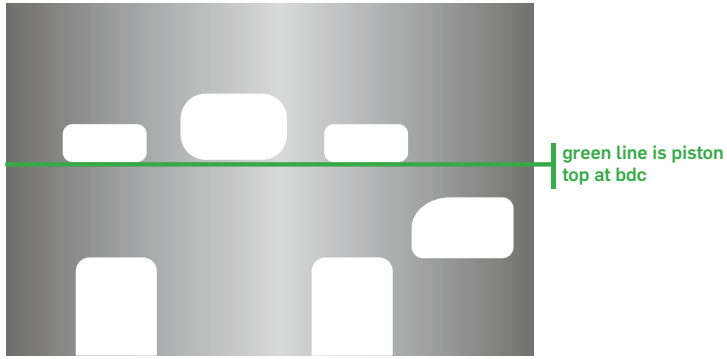
6. DRY BUILD RT 195 WITH 58 mm STROKE, 110 mm CON ROD CRANK

With casings from Italy, India, Spain and so many repaired and machined ones, it is very hard to cover every particular case. But nine times out of ten we got away with the basic setup to get the port timings and squish clearance right.

For the RT 195 kit with the 58/110 crankshaft fit a 3 mm base packer. Tighten down the barrel to the casing. Use M10 nuts, inner bushes of the fork link bolts or find a suited spacer to bolt down the cylinder on two studs.

Turn the piston to BDC. The piston crown should sit at level with the bottom of the transfer ports.* It gives the right transfer timing. The squish clearance should be around 1.1- 1.2 mm.

It should look like this:



RT 195 – 58/110 basic setup: 3 mm base spacer, no head gasket

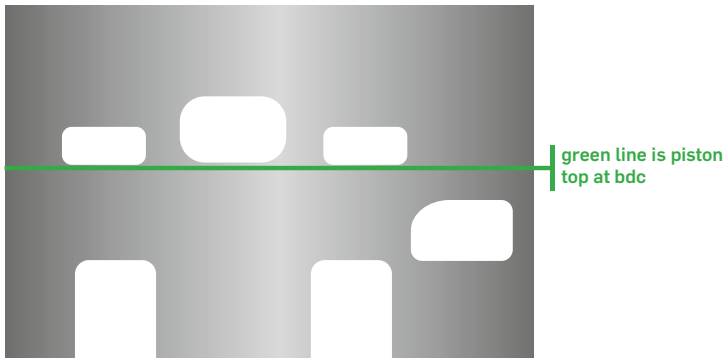
7. DRY BUILD RT 195/200 WITH 60 mm STROKE, 110 mm CON ROD CRANK

With casings from Italy, India, Spain and so many repaired and machined ones, it is very hard to cover every particular case. But nine times out of ten we got away with the basic setup to get the port timings and squish clearance right.

For the RT 195 kit with the 60/110 crankshaft fit a 3 mm base packer and on final assembly a 1.5 mm head spacer as well. Tighten down the barrel to the casing. Use M10 nuts, inner bushes of the forklink bolts or find a suited spacer to bolt down the cylinder on two studs.

Turn the piston to BDC. The piston crown should sit 0.5 mm below the bottom of the transfer ports.* This gives the right transfer timing. The squish clearance should be around 1.0- 1.1 mm. While the piston is roughly level to -0.5 mm at BDC.

It should look like this:



RT 195 – 60/110 basic setup: 3 mm base spacer, 1.5 mm head gasket

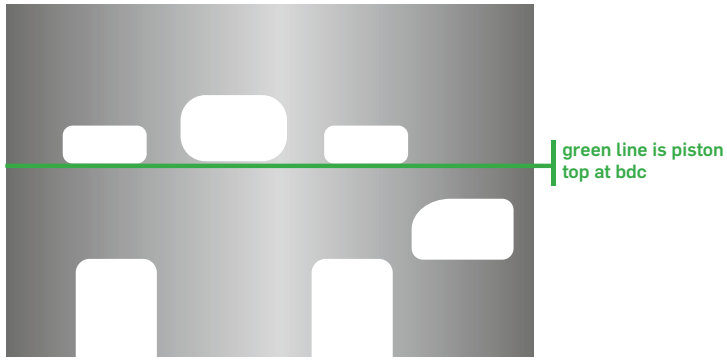
8. DRY BUILD RT 225 WITH 58 mm STROKE, 107 mm CON ROD CRANK

With casings from Italy, India, Spain and so many repaired and machined ones, it is very hard to cover every particular case. But nine times out of ten we got away with the basic setup to get the port timings and squish clearance right.

For the RT 225 kit with the 58/107 crankshaft fit the 0.3 mm alloy base gasket and then tighten down the barrel to the casing. Use M10 nuts, inner bushes of the forklink bolts or find a suited spacer to bolt down the cylinder on two studs.

Turn the piston to BDC. The piston crown should sit at level with the bottom of the exhaust and transfer ports. This gives the right transfer timing. The squish clearance should be around 1.0- 1.1 mm.

It should look like this:



RT 225 – 58/107 basic setup: 0,3 mm base gasket, no head gasket

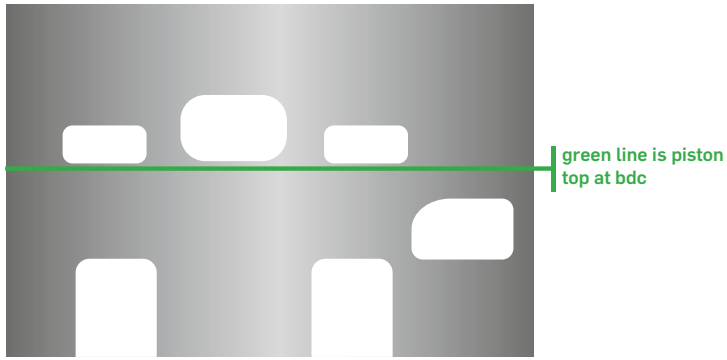
9. DRY BUILD RT 225 WITH 60 mm STROKE, 107 mm CON ROD CRANK

With casings from Italy, India, Spain and so many repaired and machined ones, it is very hard to cover every particular case. But nine times out of ten we got away with the basic setup to get the port timings and squish clearance right.

For the RT 225 kit with the 60/107 crankshaft use no base gasket and later, on final assembly a 1.5 mm head gasket. Use M10 nuts, inner bushes of the forklink bolts or find a suited spacer to bolt down the cylinder on two studs.

Turn the piston to BDC. The piston crown should sit 0.5 mm below the bottom of the exhaust and transfer ports. This gives the right transfer timing. The squish clearance should be around 1.2- 1.3 mm.

It should look like this:



RT 225 – 60/107 basic setup: no base gasket, 1.5 mm head gasket

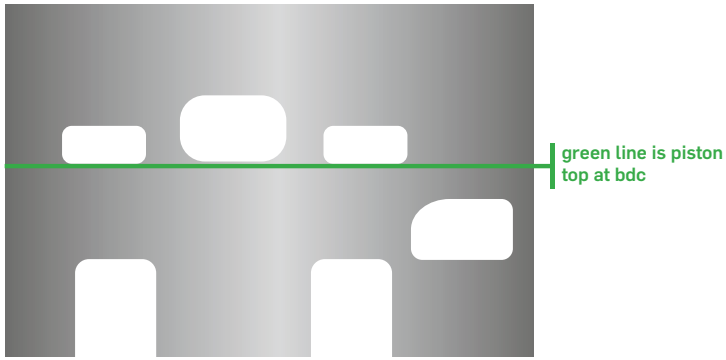
10. DRY BUILD WITH 58 mm STROKE, 110 mm CON ROD CRANK

With casings from Italy, India, Spain and so many repaired and machined ones, it is very hard to cover every particular case. But nine times out of ten we got away with the basic setup to get the port timings and squish clearance right.

For the RT 225 kit with the 58/110 crankshaft fit a 3 mm base packer and then tighten down the barrel to the casing. Use M10 nuts, inner bushes of the forklink bolts or find a suited spacer to bolt down the cylinder on two studs.

Turn the piston to BDC. The piston crown should sit at level with the bottom of the exhaust and transfer ports. This gives the right transfer timing. The squish clearance should be around 1.2- 1.3 mm.

It should look like this:



RT 225 – 58/110 basic setup: 3 mm base spacer

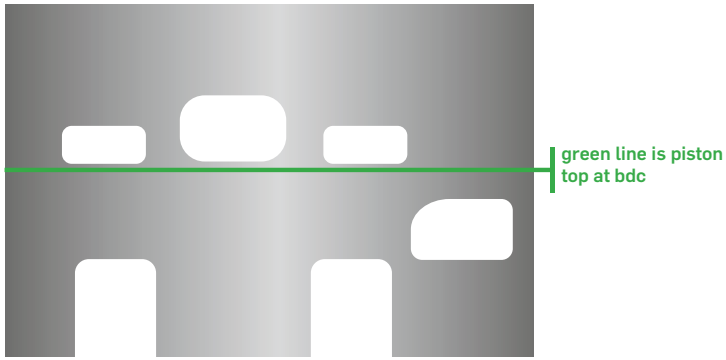
11. DRY BUILD WITH 60 mm STROKE, 110 mm CON ROD CRANK

With casings from Italy, India, Spain and so many repaired and machined ones, it is very hard to cover every particular case. But nine times out of ten we got away with the basic setup to get the port timings and squish clearance right.

For the RT 225 kit with the 60/110 crankshaft use a 3 mm base packer and later, on final assembly a 1.5 mm head gasket. Use M10 nuts, inner bushes of the forklink bolts or find a suited spacer to bolt down the cylinder on two studs.

Turn the piston to BDC. The piston crown should sit 0.5 mm below the bottom of the exhaust and transfer ports. This gives the right transfer timing. The squish clearance should be around 1.0- 1.1 mm.

It should look like this:



RT 225 – 60/110 basic setup: 3 mm base spacer, 1.5 mm head gasket

12. DRY BUILD RT KITS WITH ODDBALL CRANKS

Most engines use 58 mm and 60 mm stroke crankshafts for some good reasons.

One of the advantages of the RT kits is the extended barrel top by 5 mm. This is done for some reasons:

· To let the head drop into the bore for centralizing

· To make squish clearance easier to set up and prevent head gaskets blowing

· To make the use of cranks up to 64 mm possible without the need to machine the head or welding the top of the cylinder.

Cranks with more than 60 mm stroke and up to 64mm stroke are real oddballs in the mass market.

They affect the port timings, the time area of the ports, the compression ratio and if your intention is to fit one of these, you should know what you are doing.
Best left to the experts and of course it's a service Mark Broadhurst of MB Scooters Ltd is specialized in.

13. RT KIT PREPARATION

If you have done the dry build for your RT kit and found the right choice of spacers, it is time for the final assembly. We would like to guide you thru this with our way of doing it. There are for certain other sequences that work perfectly as well.

A. CHECKING THE RING GAP BEFORE ASSEMBLY

Before you are going to fit the RT kit finally, make sure to check the ring gap. To do so fit one ring at a time into the top of your cylinder, push it down about 10 to 15 mm then use the piston to square it up in the bore and use feeler gauges to check the size.
Ideally it should be in the range of 0.010'' - 0.015'' (0.25 - 0.4 mm) on assembly.

If the gap is too small adjust it by filing the rings with a diamond file or an oil stone.

Put a ring into the bore, take care it sits square.

Use the piston to get the ring into square position to take accurate measurements

Use the feeler gauge to measure the ring gap

In case the gap is too large please contact info@bgm-tuning.com.

The ring gap and the wear of your piston rings are essential for the longevity of your RT kit. The wear on the piston rings with a proper engine setup is very low and ready for thousands of kilometers without any problems.

The classic symptoms of worn rings are lower compression to when the engine was first built, bad starting and less pulling power in a head wind for instance.A worn out ring gives a too large ring gap. The ring can move and literally hammer the ring peg out and cause a massive damage to the complete cylinder kit and even other major engine parts.

Please ask your bgm dealer for advice of good two stroke oil or use one of the bgm two stroke oils. The recommended percentage is a mixture of 2-3%.

Point 23 of this fitting instruction is your SETUP CHECKLIST. Please note the ring gap on assembly and the readings of your speedo. So you can easily check the wear in correspondence to the covered distance.

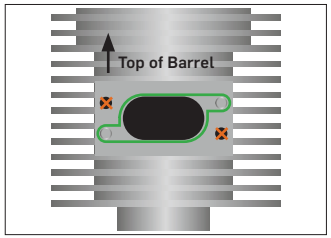
B. FITTING STUDS

Now it is time to fit the stud for the inlet manifold and the studs for the U-bend or exhaust stub. The short inlet and four exhaust studs are included in the kit.

Note the new exhaust port stud features a four stud hole pattern. You can use the two originally positioned studs for a standard type oval exhaust flange. If you are using the MBgm Clubman you can use all four studs.

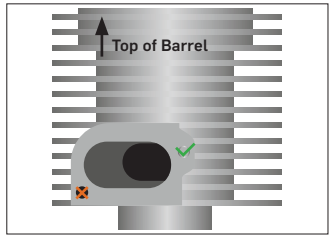
When using a four point fixing on the exhaust fit all four exhaust studs that are supplied with the kit. Put a fine smear of Loctite or a similar product onto the thread. Fit the studs by using two M7 nuts locked together on the opposite thread or use the bgm stud tool.

For two point fixings on the exhaust fit the studs as illustrated on the right.



Put a ring into the bore, take care it sits square.

Next fit the short inlet stud. Instead of the longer inlet stud we recommend a M7 screw, like included with the MB and bgm inlet manifolds. Fit the short inlet stud in the same way you did with the exhaust studs.



A new set of longer-stronger long cylinder studs are supplied with your RT kit. For taking the old cylinder studs out you may need to heat the casings around the studs. Unlock the studs with two M8 nuts locked together, once all four old studs have been taken off or use the bgm stud tool. Check the condition of the threads in the casing. A good practice is to run a number 1 or 2 thread cutter (M8x1.25) thru before fitting the new studs.

The new cylinder studs are fitted with the short thread side to the engine casings. In case the threads are tight and in a good condition use a fine smear of grease at the side of the thread. For threads which are a little bit loose use a fine smear of Loctite or similar compound on the side of the thread.

Once again use two nuts locked together and fit the cylinder studs.

C. INLET MANIFOLDS

Check you have a 200 inlet manifold as both small and large block MBgm kits use 200 one. Check you have a correct small inlet stud to suit whatever inlet manifold you are using. These are available separately in different lengths to suit different manifolds. Usually inlet manifolds come with the long inlet bolt/screw.

It's an advantage before you fit the cylinder to match the inlet manifold to the inlet port of the barrel. As much as we tried to make a cylinder with a correct sized inlet port we could not suit all the manifolds on the market. Whatever manifold is used some tweaking will be required, this can be done at home or given to a professional.

bgm PRO MRB Race-Tour 195/200 & 225/230 CYLINDER KITS

The RT kit comes with universal inlet gasket, which can be trimmed to suit the manifold and inlet port. You can use a silicone sealer instead of the gasket. This has no interruption at the joint which always makes a better running engine.

If fitting the cylinder/inlet manifold with the engine in the frame, normally you get away with the rear shocker and the bump stop rubber taken off. This gives enough space to get the barrel over the studs. If the barrel and inlet manifold touching the frame, you have to remove the engine bar and drop the engine.

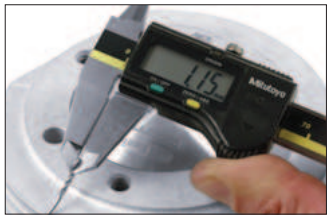
Beside the inlet manifolds of other manufacturers there is a bgm inlet manifold available, specific designed for the RT kits. This is CAD designed and aimed for the use with 24 – 30 mm carbs. It uses a flange type connection rubber and the carb sits nearly in the original position. Additionally the panel clearance is as big as it is possible on the Lambretta frame; ideally suited to be used with our bgm air filter box or an airhose with foam filter.

The gasket surface of the bgm inlet manifold is slightly undersized compared to the gasket surface of the RT barrels. This way there are no flow interruptions on the induction tract. Using it as it comes is fine otherwise the intersection can be matched with a Dremel in a few minutes. We recommend not using the gasket. Instead a fine smear of sealing compound should be used for obvious reasons.

If you want to fit the inlet manifold or the barrel with the manifold, the engine bolt needs to be taken off. We offer complete carb kits that are based around our manifold and the neat Polini carbs. These give excellent value for money and are physically perfectly sized for the Lambretta.

Carb kit bgm PRO 195-225 cc Lambretta - Ø=30mm Polini	*BGM8597*	*229,00 €*
Carb kit bgm PRO 195-225 cc Lambretta - Ø=24mm Polini	*BGM8596*	*229,00 €*

** KG – M 2.0 – 2.5 / LBS-FT 15 – 18 / Nm 20 - 24*



D. SETTING SQUISH AND COMPRESSION RATIO

On the RT kits used with cranks of 58 mm or 60 mm stroke, you only need to setup the squish clearance. This is the gap between the combustion chamber of the cylinder head and the piston crown at TDC.

This gap should be between 1.00 mm and 1.4 mm for road going engines.
We recommend a squish as close to 1.0 mm as possible. Yet anything in the given range is fine.

The compression ratio of the head it set to be safe with 58 mm and 60 mm stroke.

- RT 195 65 x 58 mm: 9.47:1 uncorrected, 6.13:1 – 6.34:1 corrected
- RT 195 65 x 60 mm: 9.77:1 uncorrected, 6.42:1 – 6.64:1 corrected
- RT 225 70 x 58 mm: 9.10:1 uncorrected, 6.09:1 corrected
- RT 225 70 x 60 mm: 9.38:1 uncorrected, 6.38:1 corrected

To check your squish clearance tighten the head down on the four cylinder studs to the right torque setting* before the clearance is checked.

Use a 2 mm or a twist of two 1.5 mm solder to check the piston to head clearance. Insert the solder through the spark hole until you touch the opposite side of the barrel. Turn the engine over to compress the solder.

Take the solder of and measure the thickness of the compressed solder with Vernier calipers.

If the squish is within the tolerance fit the additional head screws to 20-24 Nm. Retighten the nuts on the cylinder studs.

If the squish is too large or too small, use different thickness of gaskets to correct it.

14. FINAL ASSEMBLY OF THE KIT: FITTING THE CYLINDER

Fit the small end bearing, we only recommend our bgm or INA small end bearings. Both 195 and 225 kits use a 20mm standard width small end bearing. Oil the bearing, oil inside the piston and oil the gudgeon pin. Offer the piston onto the con rod and bearing making sure the arrow on the piston points towards the exhaust port. Slide the gudgeon pin through the piston, through the small end bearing and through into the other side of the piston.

Next fit the circlips. We have the chosen the plain wire circlips for the MBgm pistons. These are the safest to use circlips. With the MB designed RT pistons there are double cut outs to make circlip removal easier. Thanks to the groove on the RT pistons they are easy to fit. Simply push the circlip against the piston and then set it with a small screwdriver into its groove. Make sure they are located in the grooves, spend a bit of time here to double check the circlips are seated.

Once the piston and small end bearing is correctly fitted it's time to fit the cylinder. Make sure that all residues of old gaskets are painstakingly taken off the gasket surfaces. If you want to use silicone sealer additionally, rough up the joint surfaces with fine emery. This allows the silicone to stick to the faces for a good seal. Don't try to use sealer on areas where there is grease or oil it does not work. Silicone sealer comes in many makes, sizes and colours, which ever you use only use the bare minimum just lightly smear in the areas where the faces will touch. If you over do it the silicone will squirt inside as much as it does on the outside!

Now offer up the cylinder to the studs and slide it down slowly. When it comes to the piston and rings make sure the ring gaps are close to the ring pegs. These rings are strong and springy but can quiet easily be pushed together with your fingers as you do this wiggle and tap the cylinder so the rings enter the chamfer on the start of the spigot. If it's tight do not hit anything with a hammer. If the piston doesn't go in the cylinder with a slight tap then pull it back and check the ring gap over the piston pegs. As the piston enters the cylinder when the two rings disappear and has full support then you can tap by hand the top of the cylinder until it drops down to the base area. The trick is to gentle tap the cylinder down quickly with feel to get the rings through the inlet port and up the bore.

You can assemble the head with either no head gasket or with a head gasket or a number of gaskets to get the desired squish clearances. You can assemble the head either dry, with grease, sealer or loctite, the design of the cylinder stops head gaskets leaking however you seal them.

Now you can fit the head. Fit the four washers onto the long studs and screw on the special head nuts by hand, don't forget to get the longer version for the head cowl in the correct position. Take the four additionally screws and fit their washers and handscrew them down through the head into the cylinder.

When the head fixing is in place tighten the main four nuts, diagonally slowly increasing the torque until you get to the required figure*. When these are tight, tighten the four screws. Again diagonally slowly increasing each one until you hit the desired figure*. This will help spread the load across the head and stop the head distorting and blowing.

Finally recheck the squish clearance is the same as when you did the dry build.

Now you can fit the exhaust, cowlings and so on as normal and set up the carb and electrics but make sure you read the setting up procedures.

Nothing is ever simple to the untrained eye, but it really is.

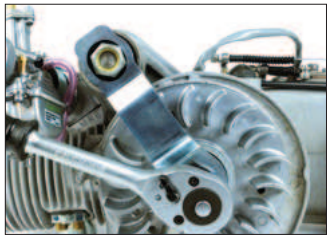
** KG – M 2.0 – 2.5 / LBS-FT 15 – 18 / Nm 20 - 24*

15. RECOMMENDED IGNITION TIMING FOR RT KIT

When your engine is completely rebuilt it is not worth taking the head off to fit the dial gauge. In this case, you should use the positive stop method. For this method you will need a piston stop and a soft ruler or timing degree disc. The piston stop is fitted instead of the spark plug and by turning the flywheel by hand you will find the piston stopping. Turn the flywheel in both directions until the piston rests against the piston stop. Mark the stopping positions. In the middle of these there is the TDC of the engine. For greater accuracy it is advisable to shorten the piston stop to get stopping points as close together as possible. Once you have marked both stopping points use the soft ruler to measure the distance and mark the middle position. To be 100% sure double check. Once you are sure you found the TDC permanent mark it opposite to the arrow. Remove the piston stop and refit the spark plug.

When the settings of your TDC are done, you can start to adjust the ignition timing. On the bgm flywheel there are timing marks on the flywheel. (Don't be confused that these are opposite to the timing marks you normally put on the magneto housing, this is right.)

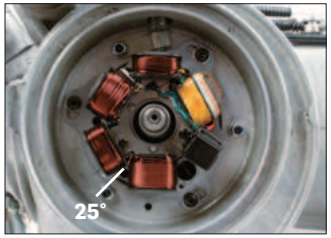
If you have another make of flywheel it is advisable to measure the circumference of the flywheel. This is divided by 360 and then you know how many millimeters of the circumference equal 1°. This is multiplied by the desired ignition timing and then you can apply your ignition marking on the flywheel. Put the flywheel in place. Take care that the woodruff key is in position and use a washer and flywheel nut torque the nut down to 75 Nm (or 55 LBS-FT or 7.6 KG-M). It is advisable to use a high quality flywheel nut with the right taper and made from sufficient material.



Tighten down the flywheel nut to the right setting, using the holding tool BGM2109T that holds in place on the flywheel and on the engine bolt nut of the large silent blocks.

Now you can fire the engine up and strobe the ignition timing settings. Hold the strobe gun to your TDC marking and have a look at the flywheel timing marks to see your actual ignition timing. If you are happy with the setting, you can start to wire the electrical system.

If you have to adjust your ignition timing, take the flywheel of again and adjust the stator plate to the required ignition timing.



Once everything is fine, make sure that the nut is tightened down properly and refit the cowling.

Moving the stator plate clockwise gives less pre-ignition timing: e.g. 15° instead of 20°.* Moving the stator plate anti-clockwise gives more ignition pre-timing, e.g. 20° instead of 15°.* *Depending how far the stator plate is moved. If you need to adjust the pre-ignition timing, by a certain amount of degrees, you can use the circumference of the stator plate to speed things up. The stator plate circumference is 333 mm. This equals out that moving the stator by 0.9 mm gives around 1° change of ignition timing. So if you have 25° pre-ignition and you want to set 19°, simply turn the stator plate by 4.6 mm clockwise and strobe again.

16. SPARK PLUGS

When it comes to the right spark plug for your RT kit, you should use a long thread one with the right heat rating. Like:

Make	Heat rating	Thread
BOSCH	W3	CC
NGK	B9	ES
Nippon Denso	W27	ESU

17. CARBURATION

The RT kits are very easy to set up. We have listed the jetting details from engines that are run by us for some time now.

The most common carb size used with the RT kits is 28 to 30 mm.

But please take these jettings only as very rough starting point. You always need to richen up the carbs and then jet down until the engine runs free again.

One to watch is that the power output depends very much on the right jetting. Too lean as well as too rich can drop the power down.

SETTING THE CARBURETTOR

The main reasons for unreliable engines and seizures are not mechanical failures but incorrect ignition timing and badly set-up carburettors. There is no such thing as a touring or in-town setting, only a correct one.

A typical indicator for the setting is the spark plug colour. The problem with this is that unleaded fuel and fully-synthetic two-stroke oils make this much harder to see than in the old days. However as a rough guide it is still a worthwhile check. You will have to do this directly after a run on full throttle, ideally switch the ignition off while you are still on full throttle (and pull the clutch of course). A very light colour (grey or white) indicates that the engine runs got the mixture is lean. A black or even oil-covered spark plug shows that the mixture is too rich. The classic recommendation is that the spark plug colour should be a dark chocolate brown colour.

THE THEORY

All carbs work with atmospheric pressure which makes air and petrol flow through the carburettor. We can now try to influence this pressure by altering the different jets, to get the mixture of petrol and air right.

This mixture is generally influenced by the diameter of the carb. If the carburettor is opened by the throttle, air is sucked into the engine. At the same time, a conic needle, which is connected to the slide, is pulled out of the atomiser, opening the main jet and adding fuel to the mix. The shape of the needle and the height at which it sits in the slide will determine the mixture from lower throttle settings right up to near full-throttle. The float will provide an even level of fuel for the main jet. Just over the main-jet, the bypass for the idle-setting is cast into the carb, which can be adjusted by the idle mixture screw from the outside of the carb. A second screw forms an adjustable stop for the slide, so that the tick-over speed can be set.

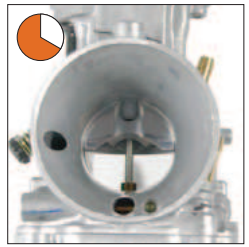
THE PREPARATION

On to the actual setting, beyond very basic setting you will definitely need a suitable selection of jets to play with. If you don't have a dyno available, you will have to set the carb on the open road. The easiest way to do this is to use an open stretch of road where you can repeat the same testing procedure several times. After you have got the basic setting to a point where the engine is ticking over and responds to the throttle, you start setting the lower and middle range of throttle openings. The main jet can be left at an estimated and rather rich setting, as it only comes into effect when the throttle is nearly opened up completely (see illustration). Always keep in mind that the setting depends on the throttle opening and not on the speed. The following components of the carb are responsible for the setting in the individual stages of throttle opening.
To find out which part of the throttle range you are trying to set up, it is a good idea to mark the throttle opening. This can be done by sticking tape on your throttle grip and handlebar and mark the stages of throttle opening as listed.

THROTTLE OPENING

Starting the engine
Choke jet
Pickup from tickover SlideCutaway, mixture screw

-> 1/3
Idle mixture screw, pilot jet



1/3 - 2/3
Atomizer, needle

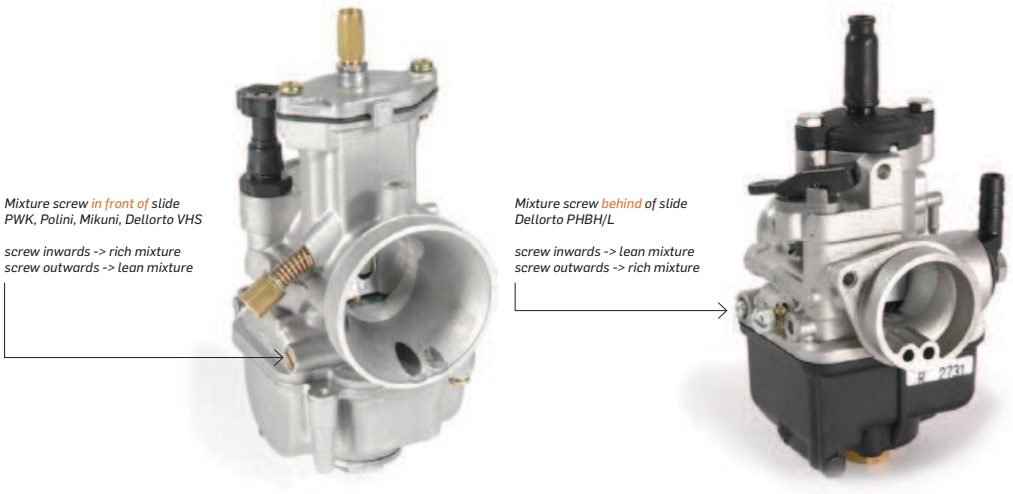
2/3 - 3/3
Atomizer, needle, main jet

SETTING THE TICK-OVER

Tick-over should be set to an even and steady pace using the tick-over screw which is going horizontally into the carb body at the middle of the slide. If an even tick-over can't be achieved, the mixture is either lean or rich. This has to be adjusted using the idle mixture screw.

ADJUSTING THE MIXTURE AT TICK-OVER

If the engine is running uneven and noisy, the mixture at tick-over is weak. This is also the case if the engine seems to run fine for a few seconds, just to cut out the moment after. If the engine splutters when opening the throttle from tick-over or smokes badly, the tick-over mixture is rich.
The idle mixing screw also goes into the side of the carb, either in front or at the rear of the slide. If it sits in front of the slide, it adjusts the amount of air available at tick-over. Screwing it in will therefore result in a rich mixture. If it sits behind the slide, it is responsible for the amount of fuel and will work just the other way round.



If you are not sure about the behaviour of your engine, do the following: Set the engine to a quick tick-over (1300-1400 rpm). Now start setting the mixture screw increasingly richer, until the engine starts to run significantly slower. Now turn back the mixture screw for ¼ turn, and there you are. Connected to the function of the mixture screw is the pilot jet. If no suitable setting can be achieved by adjusting the screw, a different pilot jet has to be used. Here the setting is rather simple: a larger jet will richen the mixture, a smaller one will weaken it. A good set-up is found when your engine picks up revs easily from tick-over and settles back to an even idling pace afterwards. If the idling pace needs some time to settle back of keeps revving erratically, this is again a sign for a weak mixture. On some types of carbs the slowly coming back to idle speed can be an indication of too rich as well. If it's reluctant to pick up revs or splutters, it's rich again.

After the setting is right, you can finally re-adjust tick-over speed, which will be somewhere between 1000 and 2000 rpm.

THE CUTAWAY

The cutaway of the slide has a decisive influence on how the engine responds to the throttle. This works according to a simple rule: the larger the cutaway, the smaller the depression which sucks fuel up into the atomizer, hence a weaker mixture at acceleration. If the engine does not respond to the throttle properly when pulling away, a weak or rich cutaway setting can be the reason. If the engine coughs when opening the throttle, the cutaway is too big and the engine runs weak. If it is spluttering and slow taking up speed, the cutaway is too small and the engine has to burn off the superfluous fuel before it can accelerate properly.

NEEDLE AND ATOMISER

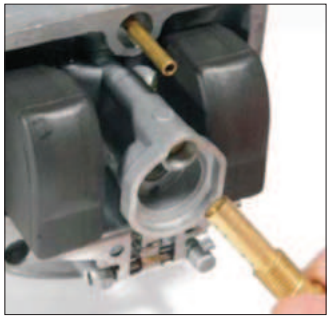
If the carb now responds well to the throttle in the first quarter of the throttle range, it is time to think about the needle and the atomizer. Those two parts always work in conjunction and limit fuel flow from the main jet to the carb venturi at mid-throttle openings. This is because the engine does not need all the fuel the main jet could deliver if the carb is not completely open. You could say that together they work as a variable jet. This amount of fuel is determined by the circular gap between the needle and the atomizer. As the needle has always the same thickness in its cylindrical part, the size of the gap is varied by different diameters of atomizer tubes. A larger atomizer will produce a richer mixture, as more fuel can flow through the gap. This is especially crucial with Dellorto carbs, which you could theoretically run without a main jet. As the engine will need more and more fuel the more the throttle is opened up, the needle has a conical part as well, which will allow for a steady increase of fuel delivered. The needles are available with different shapes of these cones, so that you can adjust the amount of fuel available at every stage of throttle opening. The general principle however is always the same: the larger the gap between the needle and the atomizer tube, the richer the setting.

So if the engine is not running well in the mid-range of throttle opening, you can both alter the size of the atomizer and the shape of the needle for adjustment. Also, there are alocating grooves for the circlip, which holds the needle in the slide. By changing the circlip position, you can raise or lower the needle, which will alter the range of the cone of the needle (the higher the clip, the weaker the mixture and vice-versa). If this doesn't help, different shaped needles or other atomizers are needed.

Finding the right combination of needle and atomizer is probably the most complicated part of setting the carb. It also is the most crucial one, as the setting will influence the way the engine behaves where it is used most of the time. However this is normally the case only with Dellorto carbs as the areas of the different setting components of the carb overlap slightly. In any case, getting the midrange setting right on a these carbs will require a lot of effort, as there is nearly an infinite number of possible combinations. Keihin, Mikuni and Polini are much easier and quicker to set up here.

To start with, you can try just altering the clip setting of the needle. If you raise the needle by using a lower clip setting, this will give a richer mixture and vice versa. If you find that this is not sufficient, you will have to change the needle or atomizer.

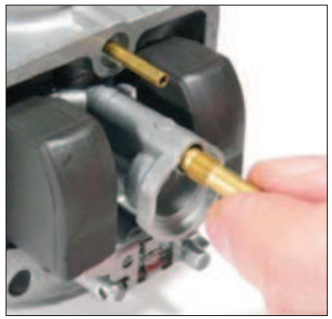
CARB INTERNALS



Atomizer

Needle & atomizer

Main jet



Idle jet

bgm PRO MRB Race-Tour 195/200 & 225/230 CYLINDER KITS

TOO WEAK?

If you can accelerate well when opening the throttle, but suddenly loose power between 1/3 to 2/3 of the throttle range, the setting is weak.

TOO RICH?

If the engine is spluttering with the throttle opened in this area, the setting is rich.

RULE OF THUMB

As a rule of thumb, you should use a smaller diameter atomizer if the needle is in the lowest setting (clip in highest slot), while you should use a larger diameter atomizer when the needle is in the highest setting (circlip in lowest position).

MAIN JET

If the setting is alright up to ¾ of the throttle opening, you can finally select the main jet. This is a rather easy pick. You should use a long straight piece of road, then choose a main jet which will be too big in any case, so that the engine is spluttering (four-stroking) at high revs. Then you gradually select smaller jets until the engine responds well. This is rather easy to do if you always use the same stretch of road.

The jet you will end up with using this method is still rather rich and will provide a good safety margin to avoid a lean mixture.

TOO WEAK?

If you pull the choke and the engine runs better then, the setting is weak. Also if the engine accelerates when closing the throttle a little bit, this is a clear sign of a weak setting.

TOO RICH?

If on the other hand, the engine starts to splutter badly when pulling the choke, it is rather rich.

engine	carb	idle	needle	atomizer	main
RT, Big Box, bgm airfilter box	TM24	17.5	4DH7 2nd	standard	170
	TM30	27.5	5EL68 2nd	standard	240
RT, Big Box, open bellmouth	PWK28	45	JJH 2nd	standard	125
RT, Big Box, open bellmouth	PHBL25	50	D22 2nd	AQ266	100
RT, Big Box, original airfilter box	PHBL25	48	D22 3rd	AQ262	92
RT, Big Box, open bellmouth	PHBH30	58	X2 2nd	AV264	115
RT, Taffspeed pipe	PWK30	38	JJH 3rd	clip	122

18. GEARING RATIOS

Gearing again is to some degree a matter of personal preferences. But there is a range that has worked for customers of the RT kits. This is from 5.20:1 down to 4.3:1.

Our best all round recommendation would be a gear ratio between 4.94 up to 4.80. This suits most customers and riding styles and there is enough power thru nearly the complete rev range in fourth gear.

If you ride most of the time two up and/or with luggage then you should consider choosing a slightly shorter gearing.

If you don't mind to ride in 3rd gear most of the time and use the 4th gear as overdrive or flat out on the motorway, you can opt for a slightly taller gear ratio than the 4.80. This gives a high top speed at low revs on ideal conditions.

RLC CYCLONE V2	**17/46**	**18/47**	**18/46**	**19/47**	**19/46**	**20/47**	**20/46**
1	13.5	13.1	12.8	12.4	12.1	11.8	11.5
2	9.25	8.92	8.73	8.45	8.27	8.03	7.86
3	7.34	7.09	6.94	6.71	6.57	6.38	6.24
4	6.09	5.88	5.75	5.57	5.45	5.29	5.18
5	5.26	5.08	4.97	4.81	4.71	4.57	4.47
MPH AT 1000 RPM	9.62	9.96	10.2	10.5	10.7	11.1	11.3
km/h bei 1000 U/min	15,39	15,93	16,32	16,8	17,12	17,76	18,08

Gearbox	Gear	Teeth	15/47	15/46	16/47	16/46	17/47	17/46	18/47	18/46	19/47	19/46
Close Ratio	1	18/68	14,24	13,92	13,77	13,1	12,56	12,33	11,87	11,6	11,24	11,01
	2	13/41	9,88	9,63	9,26	9,07	8,69	8,53	8,22	8,03	7,78	7,62
	3	16/39	7,64	7,46	7,17	7,02	6,73	6,61	6,36	6,22	6,02	5,9
	4	18/36	6,26	6,12	5,88	5,76	5,52	5,42	5,22	5,1	4,94	4,84
kph per 1000U/min			12,56	12,86	13,39	13,66	14,26	14,53	15,09	15,44	15,94	16,27
125LIS	1	18/37	15,66	15,3	14,7	14,4	13,8	13,55	13,05	12,75	12,35	12,1
GP/DL 125	2	15676	10,96	10,71	10,29	10,08	9,66	9,49	9,13	8,93	8,65	8,47
GP/DL 200	3	15/39	8,14	7,96	7,64	7,49	7,18	7,05	6,79	6,63	6,42	6,29
	4	18/36	6,26	6,12	5,88	5,76	5,52	5,42	5,22	5,1	4,94	4,84
kph per 1000U/min			12,58	12,86	13,39	13,66	14,26	14,6	15,09	15,44	15,92	16,27
LI 125	1	9/51	17,71	17,32	16,64	16,3	15,62	15,34	14,77	14,43	13,98	13,69
Serie 1, 2 &	2	15676	10,96	10,71	10,29	10,08	9,66	9,49	9,14	8,96	8,64	8,47
Early Series 3	3	16/39	7,64	7,47	7,14	7,03	6,74	6,61	6,37	6,22	6,02	5,9
	4	19/35	5,76	5,63	5,41	5,3	5,08	4,99	4,8	4,7	4,54	4,45
kph per 1000 U/min			13,66	13,98	14,54	14,85	15,5	15,77	16,4	16,75	17,33	17,68
SX 150	1	18/37	15,65	15,3	14,7	14,4	13,8	13,55	13,05	12,75	12,35	12,1
GP/DL 150	2	15676	10,96	10,71	10,29	10,08	9,6	9,49	9,14	8,96	8,64	8,47
	3	15/39	8,14	7,96	7,64	7,49	7,18	7,05	6,79	6,63	6,42	6,29
	4	19/35	5,76	5,63	5,41	5,3	5,08	4,99	4,8	4,7	4,54	4,45
kph per 1000 U/min			13,66	13,98	14,54	14,84	15,5	15,77	16,4	16,75	17,33	17,68
LI 150 S	1	18/68	14,24	13,92	13,38	13,1	12,56	12,33	11,86	11,6	11,24	11,01
Pacemaker	2	13/41	9,86	9,64	9,26	9,07	8,69	8,54	8,22	8,03	7,78	7,62
LI 125 Series 3	3	17/39	7,16	7	6,73	6,6	6 ,32	6,2	5,98	5,84	5,65	5,54
Frame No.> 94018	4	19/35	5,76	5,63	5,41	5,3	5,08	4,99	4,8	4,7	4,54	4,45
kph per 1000 U/min			13,66	13,98	14,54	14,85	15,5	15,77	16,4	16,75	17,33	17,68
LI 150	1	18/68	14,24	13,92	13,38	13,1	12,56	12,33	11,86	11,6	11,24	11,01
	2	14/41	9,17	8,97	8,61	8,44	8,07	7,94	7,65	7,47	7,24	7,09
	3	17/37	6,82	6,67	6,41	6,28	6,02	5,91	5,69	5,56	5,38	5,27
	4	20/34	5,32	5,2	5	4,9	4,69	4,61	4,44	4,34	4,2	4,11
kph per 1000 U/min			14,8	15,14	15,74	16,06	16,78	17,07	17,73	18,14	18,72	19,15
TV 175	1	18/33	12,77	12,48	11,99	11,75	11,26	11,06	10,65	10,4	10,07	9,87
SX 200	2	14/40	8,95	8,75	8,41	8,24	7,9	7,75	7,46	7,29	7,06	6,92
Jet 200	3	18/37	6,45	6,3	6,06	5,93	5,69	5,58	5,38	5,23	5,08	4,98
	4	21/33	4,91	4,8	4,61	4,52	4,33	4,25	4,1	4	3,88	3,79
kph per 1000 U/min			16,03	16,4	17,07	17,4	18,17	18,52	19,2	19,68	20,28	20,76
GT 200	1	13/47	11,33	11,09	10,62	10,39	10	9,78	9,44	9,24	8,94	8,75
TV 200	2	15/39	8,15	7,97	7,64	7,48	7,19	7,04	6,79	6,64	6,43	6,29
	3	19/36	5,94	5,81	5,57	5,45	5,24	5,13	4,95	4,84	4,69	4,59
	4	22/32	4,56	4,46	4,27	4,18	4,02	3,94	3,8	3,72	3,6	3,52
kph per 1000 U/min			17,38	17,75	18,52	18,94	19,68	20,11	20,84	21,3	21,99	22,48

When you have chosen the right gear ratio, you have to have a look for the right chain. With the new chain tensioners around you can use new IWIS chains (our recommendation) on all sprocket combinations.

Formerly you had to use worn out and stretched chains on some combinations.
The table lists what sprockets can be used with which chain and if the chain needs to be pulled up or down.

For all standard applications that are pushing the chain up, we recommend the MB chain tensioner. This is a classic that is much longer than 20 years around and is nearly indestructible. If you need to pull the chain down because of the sprocket combination, we recommend the use of the Jockey's Boxenstop one. This can push and pull the chain so it is perfect for all sprocket combinations.

Primary combination	Chain length	Shoe position
15 / 46	80	up
16 / 46	81	down
17 / 46	81	up
18 / 46	82	down
19 / 46	82	up
20 / 46	83	down
21 / 46	83	up
15 / 47	81	down
16 / 47	81	up
17 / 47	82	down
18 / 47	82	up
19 / 47	83	down
20 / 47	83	down
21 / 47	84	down

19. SETUP CHECKLIST

bgm PRO MRB RT Kit	RT 195			RT 225		
Crank	Make	Stroke	Conrod length			
Spacers used	Bottom	Top				
Ring gap on assembly						
Plug	Make	Grade				
Squish clearance						
Ignition timing						
2 stroke brand/type of oil	Make	mineral	semi-synthetic	fully-synthetic		
Ratio of oil	2 %	3 %	4 %	5 %		
Type of petrol used						
Advance/retard unit fitted	No	Yes	Make			
Air filter used	No	Yes	Make			
Fast flow fuel tap	No	Yes	Make			
Inline petrol filter	No	Yes	Make			
Petrol tank	standard	long range	Make			
Material on petrol tank	steel	aluminium	plastic	stainless	stainless polished	
Carb make and size	Make	Type and size				
Carb jetting	Main jet	Pilot jet	Needle	Needle clip position from top	atomizer	Turnsout on airscrew
Date of engine build						
Mileage on speedo						

NOTES