

Fred's Guide on How to Fix Your Moped

By Fred

Read this guide to figure out how to get your moped to run, or maybe run better. If you have a specific question about a specific part, scroll down, you might find that part covered with its own section.

GENERAL MOPED TROUBLESHOOTING and TUNE-UP PROCEDURES

It takes 3 things for an engine to run.

1. Gas
2. Spark
3. Compression

If your engine doesn't run, 1 of those 3 things is gone or not good enough. (If your engine has all 3 of those things, IT WILL RUN, it does not have a choice!)

The 3 most common reasons why mopeds don't run are

1. dirty carburetor (inside)
2. fouled spark plug
3. Dirty, worn, or misadjusted ignition points.

The dirty carburetor is the most common reason.

BASIC TROUBLESHOOTING (follow these steps to get it to run)

The first thing to check on a moped that won't run is to see if you have spark at the spark plug.

Pull the old spark plug out put a NEW spark plug in the cap and hold the metal part of the plug firmly against the cylinder head while you kick or pedal the moped rapidly with the key and switch on. It will help to do this at night or in a dark garage to make it easier to see the spark. It will also help if you have 2 people, 1 to pedal/kick, and 1 to hold the plug firmly against the cylinder head. You are looking for a blue spark to jump the gap on the plug.

Make sure you have a good spark plug to start with, a black or gunky or wet one will not spark. It is smart to just buy a new plug to start with; you can always save it for later if the old one turns out to be good. (Working for hours only to find out it was a bad plug is extremely frustrating)

If there is no spark, clean the ignition points (like it says below)

If there is spark, squirt a little bit of gas (like a spoonful) into the spark plug hole and try to start it. If it starts and runs for 5 seconds and then dies, then check for fuel flow to the carburetor (like it says below)

If you have fuel flow to the carburetor and spark at the plug and it still won't run, then clean the carburetor (like it says below)

If you have done all those and it still doesn't run, go to the part that says "What Else?"

GENERAL TUNE-UP

FUEL FLOW to the CARBURETOR

Fred's Guide on How to Fix Your Moped

By Fred

Remove the fuel line going into the carburetor, turn the gas on. Does fuel flow freely out the gas line? No? You may have a vacuum operated petcock (if you do there will be another rubber line going from the engine to the petcock). Take this second line off the engine or carburetor and suck on it and watch for fuel flow out of the other line. If no flow, you must take the petcock off and disassemble and clean it.

CLEANING the CARBURETOR

Clogged or dirty carburetors are the most common reason for poor performance. The parts of the carburetor that are dirty or clogged are the small holes inside the carburetor (air and fuel passages) not the outside. You can not see the stuff that is clogging the flow.

YOU MUST USE COMPRESSED AIR to blow it out! That dirt and crud has been accumulating for 20 years in some cases, it will not just fall out. You need it to BLAST the dirt out from those small passages.

Substitute copper wire only in this section.

DO NOT use carburetor cleaner on older mopeds as the seals may be natural rubber and will distort or swell from the cleaner.

The carburetor must be removed, then you take off the float bowl (on the bottom), then you remove the brass "main jet" in the middle of the carburetor. Try to blow air thru it, now hold it up to the light and look thru it, it must be clean and clear. If it is not clear you must poke a piece of fine wire thru it, a wire plucked from a wire brush works good or some soft multistrand copper wire like from speaker wire or lamp cord wire. Don't use a drill bit, it might damage the brass or make the hole too big.

Next you should screw the idle mixture screw in. Before you screw it in, look at where the screwdriver slot is at and then count how many turns it takes to go all the way in gently, like 1 3/4 turns or whatever, and remember that number for later. Then remove it and all other screws, be careful, don't forget where everything goes and don't lose anything!

Now you must clean out all passages in the carburetor with aerosol carburetor cleaner and compressed air (like 80 psi) with a blow nozzle. Squirt the cleaner in ALL THE SMALL ORIFICES one by one followed by a blast of compressed air while you are blowing air thru the holes feel with your fingers to feel where the air is coming out of and blow the other way too. DO THIS SEVERAL TIMES then reassemble all the parts.

It is even better to submerge the carburetor overnight in a can of carburetor cleaner (remove rubber and plastic parts first) then blow it out.

Remember to turn the idle mixture screw back out to its original setting usually between 1 and 2 full turns out from all the way in and reinstall the carburetor.

Putting a capful of gas treatment in your gas tank occasionally will help keep the inside of the carburetor clean (go to the bottom to read more about this)

The IGNITION

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By Fred

Older engines have "breaker points" ignition, which can get dirty, wear, and need adjusting occasionally.

You will find them by looking through holes in the flywheel (under a cover on either the right or left hand side of the motor)

Newer motors don't have points, they use an electronic ignition called a CDI and there is nothing to clean and set, but you can still check the timing with a strobe light.

CLEANING the POINTS

You can clean them through the holes in the flywheel (you don't need to remove the flywheel)

Substitute a points file only in this section as sand paper sheds grit. Use only electrical contact cleaner or pure rubbing alcohol to clean as there is no residual carrier.

To clean them you need some sand paper (use 400 grit wet and dry sandpaper), a piece of clean paper, some scissors, and some aerosol brake cleaner or carburetor cleaner and some compressed air with a blow nozzle.

Remove the ignition cover and look for the points in one of the holes in the flywheel, lay the bike over on its side and sit on a milk crate or something to get comfortable.

Then cut some thin strips of sandpaper (like 1/4" wide, 3" long), pry the points open with a small screwdriver and stick the piece of sandpaper in between the points and let them close, then pull the sandpaper out. Do this SEVERAL TIMES TO EACH SIDE till they are smooth. Now pry the points open and blow them off with compressed air. Then spray them with the cleaner. Next cut a strip of the clean paper and pry the points open again and drag the paper thru a few times (the paper should come out clean, and should drag through smoothly). Blow them off again with air while open. Now they should be good.

WHAT is IGNITION TIMING?

Correct ignition timing means the spark plug is firing at the correct moment in the engines rotation a little before TDC (top dead center when the piston is closest to the spark plug).

The spark plug fires the instant the points "break" open.

The factory reference marks do not pertain to all mopeds.

You want the points to open when the "F" mark on the flywheel lines up with the mark on the engine case.

Look on the outside of the flywheel for some lines and letters; there should be a T mark next to a line, and an F mark next to a line. There should also be a mark on the engine case, the T mark will line up with the mark on the engine case when the piston is at TDC.

To find the mark on the engine case, you can remove the spark plug and stick a screwdriver in the hole against the piston and turn the flywheel, when the

Fred's Guide on How to Fix Your Moped

By Fred

piston pushes the screwdriver the farthest out, the T mark will be lining up with the mark on the engine case..

The points should have already opened BEFORE that, they should just START to open when the F (Fire) mark lines up with the mark on the engine case.

To check this accurately you would need to have special tools.

But to do it without those tools... go to the next step.

CHECKING and SETTING IGNITION TIMING

You check and set the timing with the flywheel ON (you don't remove the flywheel)

Clean the points like it says above FIRST.

There are 2 simple ways to set and check timing.

1. The easiest is by setting the point gap.

It is not real accurate, but it is usually good enough for a moped motor to run OK.

To set the gap you just rotate the flywheel near where the F mark and the engine mark line up. Watch the point gap and wait till the gap is at its biggest. You want this gap on most mopeds to be about the thickness of a thin piece of cardboard about 0.015" or 0.4mm.

They sell "feeler gauges" at a tool store to check this gap

or a macaroni and cheese box is..... 0.018"

or a Girl Scout cookie box is..... 0.016"

or a small breakfast cereal box is about..... 0.016"

large breakfast cereal box's are..... 0.020"

If you use the large cereal box, your timing will be a little bit advanced from stock.

So if you cut a thin strip of one of those you can use it as a "feeler gauge".

Then you LOOSEN the small screw that holds the small point's set down. Then you can pry the points set around with a screwdriver in the "pry notches" they have, the gap will get bigger or smaller depending on which way you move it. You want to adjust it so that the cardboard slides in and out nicely. Not too tight, not to loose.

Now tighten the screw back down. Now check the fit again because tightening the screw can change the gap. Sometimes you have to do this a few times to get it right.

You have just set the point gap to get the timing close.

2. A more accurate way to set timing is by ignoring the gap and doing the "cigarette paper method". For this you need a very thin piece of paper (like cigarette rolling paper or a cigarette pack piece of cellophane). All you do here is put the thin strip of paper between the points and keep light tension on the paper (like as if you are gently trying to pull it out) while watching the F mark and the case mark as you slowly rotate the flywheel with your other hand. Remember you are rotating the engine in the direction it normally travels (CCW as viewed from the left side of the bike. CW as viewed from the right). The paper should slip out just as the points start to open when the F mark lines up with the case mark.

So it's one hand on the flywheel other hand on the paper...eyes on the F mark. If the paper pulls out too late, you will have to move the points for a larger gap. Too early, move the points for a smaller gap.

Fred's Guide on How to Fix Your Moped

By Fred

(NOTE: If a tiny piece of paper tears off and stays in the points, you will get NO spark, pry them open and blow them out)
You can get MORE accurate by using electronic equipment to tell exactly when the points open.

OK.... WHAT ELSE...???

I've checked for fuel flow to the carburetor
I've cleaned my carburetor THOROUGHLY
I've cleaned and set my ignition points
I've got a fat blue spark at a brand new plug

But my moped still won't run or it runs like CRAAAP!
..... Why??

Some common reasons why.

- The muffler is clogged with carbon
- The exhaust port is clogged with carbon.
- The rings or cylinder are worn out or damaged and don't have enough compression.
- The air filter (going into the carburetor) is too dirty to flow air very well.
- The air filter is missing, and the engine is getting too much air.
- Your head gasket is leaking.
- Broken or dirt in the reed valve
- Poorly planned kitting upgrade (larger volume, same exhaust or intake)

MUFFLER CLOGGED with CARBON

A moped whose muffler is clogged will usually start and run but will not run very fast. To test to see if this true with yours remove the muffler and run the moped without the muffler. It will be loud, if your moped goes a lot faster, then the muffler is probably clogged.

To unclog it you need to get it real hot and burn it out. One way is to attach a coat hanger wire to it and set it into the coals of a hot campfire. Pull it out every 5 minutes or so to make sure it is not melting it, turning orange is OK, melting is not.

So not recommended.

You can also unclog it with an oxy-acetylene torch by warming up the outside till it is orange hot and then blowing flame down into the pipe and pulling the oxygen trigger. Only do this if you know what you are doing, you could damage the pipe badly if you don't.

Either way when you are done with the burning out you need to bang out the ash that will be left over after it cools down.

EXHAUST PORT is CLOGGED with CARBON

Same as a clogged muffler, it will run but not very fast.

Fred's Guide on How to Fix Your Moped

By Fred

To check this, remove the exhaust pipe and look into the exhaust port (on the cylinder). Lay the moped over on its side to get a good view. You should be able to rotate the ignition flywheel with your hand while looking into the port and clearly see the piston going up and down.

If you can't, you need to remove the head and cylinder and thoroughly scrape out the exhaust port with a screwdriver or old metal butter knife. Scratches in the port won't hurt anything, but try not to scratch the cylinder where the piston rides up and down.

WORN OUT RINGS and CYLINDER and PISTON

..... (Test for compression).....

A quick way to do an easy test for this is to remove the spark plug and have someone kick or pedal the motor rapidly while you hold your finger or thumb FIRMLY over the spark plug hole.

You must wiggle and squish your finger down on the hole and your finger must be big enough to TOTALLY cover the hole, push hard, now pedal or kick.

The piston and rings should compress the air enough to blow your finger right off the spark plug hole. If it doesn't blow your finger off the hole then your compression is low, and you need to remove the head and cylinder and look for the reason why.

Look for scuffing and scoring on the cylinder and piston skirt. Or it might have had a seizure and smeared aluminum from the piston on the cylinder and even smeared melted aluminum over part of the rings.

If there is no scuffing and scoring, and there is no evidence of a seizure and the moped has over 5000 miles on it with the same rings, buy new rings and install them correctly.

If there is heavy scuffing and scoring in the cylinder then you need to buy an oversize piston and rings and have the cylinder bored and honed to fit them.

INSTALLING PISTON and RINGS CORRECTLY

Everything should be cleaned very carefully before you put a new top end together. Dirt now will ruin parts very quickly. You should smear the piston and cylinder with 2 stroke oil fresh out of the bottle with your finger.

The piston is only supposed to go in one way. It should have an arrow on the top which is supposed to point at the exhaust port (away from the carburetor).

Rings are supposed to be installed one side up, they usually have some very small letters on them which go on the top (towards the spark plug), look very carefully. If they don't have small letters on them look closely at the ring ends and the type of the pin and you will see how they mate together.

Next you have to locate the ring end gaps correctly on the piston. Look closely in the piston ring grooves, you will see a small pin in the groove, the ring ends go right at those pins. If you have 2 rings the pins are NOT in the same location for both so the gaps DO NOT line up.

Fred's Guide on How to Fix Your Moped

By Fred

The difficult part is compressing the rings with your fingers while keeping them in the right location (at the pins) while sliding the cylinder onto the piston. It is not easy, just keep trying and take a break if you have to. It is frustrating for everybody at first.

You can get them started easily if you put a hose clamp around the piston over the new rings and just snug the clamp up enough to hold the rings unto the grooves but not so tight that they grip the piston. Once you slide the cylinder over the piston enough to push the clamp off the rings, undo the clamp completely and take it out of your way.

AIR FILTER

Engines are designed to run with air filters to keep dirt out so that the piston and rings and cylinder will last a long time. If the air filter gets clogged with dirt or too much oil it will richen up the air/fuel ratio and slow it down, maybe foul spark plugs, and maybe cause the engine to "four-stroke".

Foam air filters can be cleaned in gasoline and allowed to dry. Then LIGHTLY be oiled (just use a LITTLE oil and try to spread it around).

Make a thin little puddle of 2 stroke oil the size of the face of the foam on a piece of plastic or foil, then squash the foam face first into the puddle. Then blot the filter onto a piece of newspaper. You want to only make the surface of the filter damp enough to trap dirt.

Paper filters can be blown off with compressed air (or buy a new one). Use NO oil. If you are using compressed air, blow the paper filter from the center or carburetor side outward.

Pleated cloth ones (in a wire gauze like the K&N brand) can be cleaned in gasoline and be LIGHTLY oiled with light oil (like ATF)

Running with no air filter can cause the engine to get too much air and lean out and possibly seize. If the engine runs a lot faster with no air filter then your main jet in the carburetor is too big (and many of them are too big, especially Euro mopeds)

LEAKING HEAD GASKET

Some mopeds don't use a head gasket, most do.

The head nuts should be tightened correctly. Loosen them all, then tighten each bolt or nut a little at a time (like an eighth of a turn at a time) in an X pattern until they are good and tight, but don't over tighten them and strip the threads. If you have a torque wrench the correct figure is usually 9 foot pounds (for a 6mm thread size).

Best practice is to ONLY use a torque wrench.

If you have a leak you can sometimes hear compression squeezing out past the head gasket... pfft... pfft... pfft.... Or look closely between the cylinder and head to see if it is oily, this usually indicates a leak. Or remove the head and gasket a look for black traces of soot on the surfaces of the gasket or head or cylinder.

Head gaskets on 2 stroke mopeds are made of metal (usually aluminum...sometimes copper). Metal head gaskets can be reused over and over as long as you didn't damage them by bending them badly.

Fred's Guide on How to Fix Your Moped

By Fred

I would not recommend a gasket made of all purpose gasket material for a head gasket. That is similar to paper and is not made to withstand the heat and pressure of combustion. Paper head gaskets are OK for an emergency, but don't be surprised if it doesn't last very long.

Some people have been successful in varying degrees with fabricating a head gasket from a coke can.

ENGINE TUNING

READING SPARK PLUGS and JETTING and PLUG CHOPS

Two stroke engines are sensitive to the level of heat inside the engine. The main jet size in the carburetor is the main determiner of how hot the engine runs at wide open throttle. Too hot and they will seize the piston. Too cool means they are not making full power. Engines get the hottest when they are running at wide open throttle making maximum HP.

"Reading" a spark plug is the best way to see how hot your engine is running. Reading the plug means looking at the ceramic insulator inside the plug and checking its color. The color will indicate the overall level of heat in the engine.

Reading the plug requires fully warming up the engine by running it for about 10 minutes. Then making a top speed full throttle run for a half mile or more, then killing the motor and stopping and pulling the spark plug on the spot. That is called "Doing a plug chop". When doing the "plug chop", it is important to chop the throttle and turn the engine off with the switch or key and then pull over to stop. You don't want the engine to idle, that will change the plug color. You can wait till the plug cools, the color won't change.

The color of a plug on a correctly running engine is a light brown or tan color. Lighter than that means danger of a piston seizure. Darker than that is OK, but real dark or wet looking means your main jet in the carburetor is too big (too rich). Pull it out and look at the number on the side and buy the next size smaller (leaner).

Note: To get an accurate plug reading takes a fairly new plug, a plug with 2 years of crud on it will never really show the true color (or heat) the engine is running at.

JETTING and ADJUSTING the CARB

Jetting refers to changing or adjusting the parts of a carburetor that control fuel flow.

The "main jet" controls the fuel/air mix at top speed, and is the most important jet to get right. On most carburetors the main jet is a small brass piece inside the center of the float bowl screwed into the carburetor. It has numbers stamped on it for size. A bigger number means more fuel flow or "richer". A smaller number means less fuel flow or "leaner".

There are also usually 2 external adjustments on the carburetor, they are the idle mixture and idle speed screws. Idle speed usually opens the slide or butterfly for a little more airflow. Idle mixture controls the air to fuel ratio (at idle). They only affect idle, they don't affect how fast your moped goes or how it runs while going fast. So you can just play with them till you like the idle, fast enough not to stall, slow enough not to engage the

Fred's Guide on How to Fix Your Moped

By Fred

transmission. Idle mixture screws are usually supposed to be between 1 and 2 turns out from all the way in.

Some carburetors with a slide have a needle in the middle of the slide with adjustment slots on the needle for raising or lowering the needle. Raising the needle makes the midrange richer. Lowering the needle makes the midrange leaner.

JETTING and WEATHER and AIR FILTERS and FOUR STROKING

Colder weather makes an engine run leaner with the same jets in it. Warmer weather makes an engine run richer with the same jets in it.

Running with no air filter makes your engine run leaner. Too much oil (or dirt) on your air filter makes it run richer.

"Four stroking" means your air to fuel ratio is too rich. Four stroking is this: when you near top speed the engine goes from a smooth high pitched ziiiiiiiiinnngggggg tone to a lower pitch rougher tone and the engine acts like it is choking, like it would like to go faster and sometimes it WILL go faster if you close the throttle a little bit.

IF your engine is doing this and the air filter is clean remove the filter and test ride it again, if it goes faster and "four-strokes" less then you need to lean it out with a smaller main jet.

GENERAL MOPED INFO

GAS and OIL and TWO STROKES

Most mopeds have 2 stroke engines, 2 strokes consume oil for lubrication. Newer mopeds might have an auto-lube oil pump, so that you don't have to pre-mix the gas and oil, for older mopeds you will need to "pre-mix" the oil with the gas. How to tell?? If your moped has a gas tank AND an oil tank it has an autolube oil pump. If it only has a gas tank, you have to premix.

OIL

With modern 2-stroke oils you should probably pre-mix between 3 oz (43 to 1) or 4 oz (32 to 1) of oil per gallon of gas. Make sure you buy 2-stroke oil. Some people say synthetic works better, but I have found regular 2 stroke oil to be just as good as the much more expensive synthetic oil.

For colder weather you can mix your fuel a little drier by using a little less oil, this will give you a little more heat in the engine and keep the power up. You should mix your fuel a bit wetter by using a bit more oil when the temperature is very high.

GAS

Racing engines are high performance and need high octane or the engine will damage itself. But mopeds are low performance engines designed to run on the lowest octane of gas you can buy (87 octane.), and higher octane will not make

Fred's Guide on How to Fix Your Moped

By Fred

it run better or faster or make more power. Higher octane will not hurt your engine either.

And you don't need to use leaded gas, some old mopeds have that warning on their gas tanks, ignore it. That was to prevent people from using "white gas" (like Coleman fuel). Two strokes have NEVER needed leaded gas.

GAS ADDITIVES

Unless you have modified your engine for higher compression, you don't need these additives >>>

Octane booster

Lead additives

Racing gas

Fuel system cleaner

Marvel Mystery Oil

They are a waste of time and money.

BUT, I do put a little gas treatment in the gas every once in a while because moped carburetor jets are so tiny that they get clogged easily, the gas treatment helps dissolve stuff in the gas that will clog these jets. It also soaks up any water that might have gotten into the fuel system (like "dry" gas). I use one capful of gas treatment per moped tankfull (but you won't hurt it if you miss a tank now and then). You buy the gas treatment at a gas station or Auto parts store.

FUEL FILTER

Since mopeds have such small carburetors, they get clogged easily, and you should get an inline fuel filter and install it in the fuel line going to the carburetor. The filter has an ARROW molded into it, that is the direction the gas is supposed to flow. You can buy a fuel filter from a motorcycle shop or lawn mower shop.

SPARK PLUGS

You can find out the correct spark plug for your engine by going to a motorcycle shop or auto parts store and looking up your model in the spark plug book. They will have a "cross-reference" for the correct plug for your bike from the different manufacturers.

SPARK PLUG FOULING

Spark plugs in 2 strokes get "fouled" easily. This is mostly because of the oil that the engine burns. Fouled means the spark won't jump the gap. It won't jump the gap because there is a film of baked on gas and oil on the insulator (the white ceramic part inside the plug) that allows the electrical energy to "bleed" off and run to ground instead of jumping the gap.

The spark plug might still look good, yet the spark still won't jump the gap. That is why if your engine quit running it is smart to buy a new plug and check for spark to see if that is why.

Fred's Guide on How to Fix Your Moped

By Fred

If the new plug still doesn't spark, then you are SURE there is a problem somewhere else.

Emergency spark plug fixes >>

You can scrape the film off all the way around the insulator with a sharp knife, then wire brush it. Spraying it with brake cleaner will help. Burning it with a propane torch will also help too. These "fixes" will usually let an old plug live a while longer.

BATTERY

Some mopeds have batteries. Some don't have batteries. All mopeds with electric starters have batteries. If your moped (or scooter) does NOT have an electric start, you DO NOT have to have a good battery for it to run, but you should leave the dead battery in.

On mopeds with kick or pedal start, they will run just fine on a dead battery, the purpose of a battery on mopeds with kick or pedal start is only for lights. The battery keeps the lights burning bright when the engine is at low RPM, and it acts as a voltage regulator to keep from blowing the headlight and taillight bulbs at high RPM. So if your kick or pedal start moped or scooter has a dead battery, LEAVE IT IN to protect your light bulbs (it will still protect them even if it is dead), but you can still start and ride it if you don't want to spend the money on a new battery. With a dead battery your lights will get dim when you let the engine idle down. But it won't hurt anything, except people won't be able to see you as well when you are stopped.

PARTS FALLING OFF

Mopeds are single cylinder engines, which means they vibrate a lot, they also have crude suspensions, which means a lot of road vibes shake everything. So bolts can loosen up and fall out and you will actually lose parts on the road. To stop that put "blue Loctite" (from the Auto parts store) on ALL the bolts and nuts and screws when you are working on your moped, don't use red loctite.. (it sticks too well). Losing a \$35 piece of plastic because a 5 cent screw fell out... SUCKS!

Use lock washers where ever possible.

To go HIGH TECH you can also drill and lock wire fasteners.

..... Fred Apr 26, 01.....