

Fred's Guide

How to Fix Your Moped

by Fred M. published (on mopedriders.org) with permission.

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 carb (inside). 2. fouled spark plug. 3. dirty, worn, or mis-adjusted ignition points. The dirty carb 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 carb, like it says below. If you have fuel flow to the carb 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

Remove the fuel line going into the carb, 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 carb 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 carb that are dirty or clogged are the small holes inside the carb (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.

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 carb. 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, 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 carb with aerosol carb 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 carb overnight in a can of carb 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 carb.

Putting a capful of gas treatment in your gas tank occasionally will help keep the inside of the carb clean. Go to the bottom to read more about this.

The IGNITION

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.

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 carb 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. Then 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.

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 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 ped 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, wait till the gap is at its biggest.

You want this gap on most peds to be about the thickness of a thin piece of cardboard.... about .015" or 0.4mm.

They sell "feeler gauges" at a tool store to check this gap, or a macaroni and cheese box is .018" or a Girl Scout cookie box is .016" or a small breakfast cereal box is about .016" and large breakfast cereal boxes are .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 points set down, and 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 too 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.

(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 carb. I've cleaned my carb 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 CRAAAAP! 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 carb) 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.

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 ped without the muffler, it will be loud. If your ped 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.



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.

To check this, remove the exhaust pipe and look into

the exhaust port on the cylinder. Lay the ped 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, say,

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.

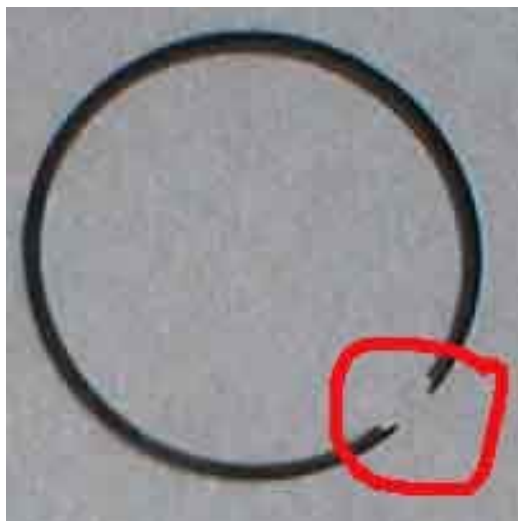
INSTALLING PISTON and RINGS CORRECTLY

Everything should be cleaned very carefully before you put a new top end together. Dirt now will ruin parts very quickly.

You should also 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 carb.

Rings are usually (but not always) 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.

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.

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. Paper filters can be blown off with compressed air, or buy a new one). Use NO oil.

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 carb is too big, and many of them are too big, especially Euro peds.

LEAKING HEAD GASKET

Some mopeds don't use a head gasket. Most do.

First, 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, till 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).

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 and 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.

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.

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 carb 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 carb 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 carbs the main jet is a small brass piece inside the center of the float bowl screwed into the carb. 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 carb, 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 ped 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 transmission. Idle mixture screws are usually supposed to be between 1 and 2 turns out from all the way in.

Some carbs 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 ziiiiiiiiinnngggg 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 ped has a gas tank AND an oil tank, it has an autolube oil pump. If it only has a gas tank, you have to pre-mix.

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.

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 oct.), and higher octane will not make it run better or faster or make more power.

But 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. 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 carb 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 tank full, 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 quits running, it is smart to buy a new plug and check for spark to see if that is why.

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 ped 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 peds with kick or pedal start, they will run just fine on a dead battery. The purpose of a battery on peds 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 ped 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 !

Fred ... Apr 26, '01.

This guide is available on the Moped Riders Association web site at:-

www.mopedriders.org/man_fredsguide.php

My "Technical" page has a link to the original. I have prepared this printable version to enable owners to read this excellent advice off-line.

Much more information and moped repair advise at:-

www.mopedriders.org