

PRO-OILER

FAQ

v2.05 - 4

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Environmental Issues

1. PRO-OILER is a total-loss lubrication system - surely this is harmful to the environment?

Settings

1. How do I decide on the best setting?

What we call the **"best"** setting is the one where you can ride for hours and the chain has **stable lubrication**

This means it does not **change** in appearance as you ride (get wetter or dryer)

Under normal dry conditions (no excessive sand or dust), you should aim to leave the PRO-OILER continuously on setting **3**

Why's that? Here's a couple of examples...

- If you see that **1** looks **right** in normal conditions, then you have no room to lean off the oil delivery (for example, after it has rained and you've soaked the chain). Your only choices are then **OFF**... or **richer**. This isn't a critical problem, just an inconvenience.
- But if **1** is **too rich**, then you have a problem. There's no choice but to move to a **"leaner" table** because no setting in the currently selected table is **lean enough** for you.
 - This could happen if you run a narrower chain (525 or 520) on a setting intended for a bigger section chain.
 - In this case you would want to select a leaner table to get yourself to setting **3** as your "normal" setting.

To see what your current **table** is:

Turn on the ignition, and the following info is displayed in sequence

- **Pro-Oiler** message
- Main version nr (**02**)
- Sub version nr (**05**)
- Currently selected Timed/Emergency Mode table (eg **t6**)
- Currently selected Calibration Mode table (eg **06**)
- Display ends up on current setting (eg **3.**)

Tables allow us to **compensate** for different wheel diameters and chain-sizes.

We need to compensate because:

- A typical 530 size big-bike chain needs more oil than a 525, which in turn needs more oil than a 520
- The length of your chain has a direct impact on how much oil it needs
- The diameter of your wheel also has direct effect

Every bike has a particular combination of chain size, chain length and wheel diameter. So you need to select a table that allows you to get to setting **3** as your "normal", day-in day-out setting.


PRO-OILER can advise you on the best starting point for your particular bike

2. How do I know when my chain is properly lubricated?

The best lubrication is an oil bath. But we don't want an oil bath!

We only want **sufficient** lubrication

The chain must always have enough lubrication to prevent metal-to-metal contact between the pins and rollers, and prevent the o-rings from overheating and degrading.

 **Running too lean and dry will quickly damage the chain**

If you are not sure you can stay in the "sweet spot", then the advice is clear:

Play safe! If in doubt, run a **richer** setting to be sure

But beyond a certain point, any extra lubricant just gets thrown off the chain (fling-off).

There's no benefit in running such a rich setting. On the other hand, an over-rich setting will do no harm other than excessive fling-off.


If there is a choice between too much or too little lubrication, just play safe!

3. My chain is over-lubricated. What do I do now?

If the chain is soaked and you see there is excessive fling-off

- Maybe your normal setting is too rich for normal running
 - Select a leaner **setting** - or move to a leaner **table**
- Maybe you have just ridden in the rain, or in dusty conditions, so you turned up the delivery temporarily and simply forgot to turn the delivery down when conditions got back to normal.
 - The **safest** way is to select **1**
 - The **quickest** way is to select **--** (OFF)
If you turn the delivery OFF, there is a risk you may not get back to your normal setting before the chain runs dry


Check your chain's condition after a few kms, and return to your normal setting when the chain has dried off.

 **Running too lean and dry will quickly damage the chain.**
Do not forget to re-select your normal setting!

4. My chain has gone dry. What do I do now?

If your chain is too **dry**, then you need more lubrication

- Maybe your normal setting is just **too lean** for normal running
 - Select a richer **setting** - or move to a richer **table**
- Maybe you have just ridden in the rain, or in dusty conditions, and need to **temporarily** increase your oil delivery

 If you are unsure **why** your chain has gone dry, you should

- Check that there is a **signal** from the reed switch
- Check that the pump is functioning

Go to **Troubleshooting** for further information

Whatever happens, you need to get your chain to "normal" - **urgently**

- You can run **Prime** a few times
 - How many times depends on how dry your chain has become and the chain size/length. After a while with your PRO-OILER you will get a feel for it.
 - [see **Priming**]
- You can run on maximum setting **12** for a while
 - From **fully dry** to **fully wet** you should need no more than 15km/10mi before turning the flow back down to your "normal" **3** setting



Don't forget to turn the flow back down - this setting can create a mess with a lot of fling-off!

5. It's started to rain. What setting should I choose?

How wet is wet?

You could live till you're 100, and still learn something new every time you ride in the wet...

So, the basic guidelines for running in the wet are:

Turn up the oil delivery as soon as the road becomes wet

- If your chain is currently nicely lubricated, the water will **start** to wash the chain
 - You may not be able to see this actually happening. Why?
 - The oil does not wash off instantly - it can take a little while for this to happen.
 - You may stop after 20km and see the chain still looks ok. But in fact, some of the oil has washed off (how much depends on the circumstances)

Suddenly, all the oil is gone, and your chain is now suffering. The change from sufficiently lubed to dried out can happen in a flash, and is nearly impossible to predict.

Turning up the delivery **immediately** is the best way to ensure proper lubing in these circumstances

- Watch the spray coming up from the tyres of the vehicles in front of you. This gives you the **best idea** of how much your chain is being washed. It's not how hard it's raining, but the **amount of water, and the type of road surface** that counts.
- When the roads dry out, check the chain to see whether it's been over- or under-oiled. Adjust the flow accordingly to get your chain to its normal condition
- **Play safe.** It's far better to run too rich and have to lean off the delivery after the wet roads dry out. The worst that can happen is the bike gets a bit dirtier - and if it's been wet, the bike's getting dirty anyway!

Other tips:

- Take a little time to look at the settings table you are running.
- You can see how the oil delivery rises very rapidly as you get to the rich end of the scale.

Don't be afraid to turn up the delivery a lot even in slightly wet conditions. Your bike will get dirty anyway, so just protect your chain!

Reed switch and magnet

1. Why do you recommend fitting the reed switch to the back wheel?

The "recommended" location for the reed switch is the rear wheel purely and simply because it's **easier** on most bikes, and will perform reliably

- There's no **technical** problem at all with fitting to the front, though you will need extra length of wiring, and the routing the wiring is a little trickier than when fitted to the rear wheel.
- There are some bikes where a rear wheel fitment is not possible, or very difficult - mainly single-sided swingarm machines like the Honda VFR, some Triumph's, Aprilia's and Ducati's

However...

- Most bikes have "solid" rear discs, as opposed to "floating" discs which are normally found on the front.
 - The carriers and bolts on floating discs run **far cooler** than those of solid discs
 - Magnets can **lose their magnetism** when subjected to excessive heat, which can lead to a loss of the signal
 - The solid rear disc carrier and disc bolts can get **very hot** when used on the track or coming down mountain passes.
 - **If you ride in these environments, then it may be better to consider fitting the reed switch and magnet to the front wheel**

2. I already have a Sigma bicycle computer reed switch and magnet fitted to the front wheel. Can I tap into this wiring for the Pro-Oiler?

Yes, no problem in principle.

Of course, you will still need to check that you have a good signal!

3. Does the position of the reed switch matter?

As long as it works, not really!

Tip: fix the reed switch **temporarily** in your intended location (eg. with double-sided tape), and test for the signal

But... there's always a "but"

- The one real no-go is lengthwise relative to the magnet (so the path of the magnet is along the length of the reed switch). This can generate multiple signals
- Even technically "undesirable" locations (like end-on to the magnet, pointing at the magnet's path like a proximity sensor) can work. You just need to test it.

Some important points:

- It's best not to place the reed switch on a surface which moves relative to the magnet, for example on the swing-arm itself. As you adjust the chain, the magnet may move **out of range**, resulting in a loss of signal. Having said this, if you do mount the switch on the swing-arm, just check for a signal when you have adjusted the chain. Anyway, as you are using a PRO-OILER, you will not need to adjust your chain very often!
- It's worth putting some thought into placement of the reed switch - there will often be more than one workable location.
- Think about how **vulnerable** the switch will be at **wheel-change** time. This is a major factor in deciding on a location

4. What is the best way to fix the magnet?

The magnet supplied is a powerful neodymium 6mm dia x 4mm high button.


Many bikes have M8 allen head brake disc fixing bolts, and the ideal is to fit the magnet into the bolt head.

- The magnet will stay in the bolt head without need for any form of glue
- To remove the magnet from the bolt head, use a magnetized screwdriver or another magnet


If your bike does not have M8 allen disc fixing bolts:

- If it has M6 allen bolts (and you did not specify which bike you have at the time of ordering), PRO-OILER will post you a smaller 5x4mm magnet free of charge
- If it uses conventional hexagon set-bolts, consider swapping one of the bolts for an allen disc mounting bolt.

There is no technical problem with this, however...

-  Make sure there is enough clearance - allen bolts usually have taller heads!

- Otherwise, glue the magnet to an *aluminium* bracket fixed by a disc bolt

-  Do not glue the magnet directly to the brake rotor!
There is no glue in existence that can withstand the heat generated by a brake rotor.

Oil Container

1. Is there an ideal position for the container?

Yes!

- Vertical, or up to 45deg from the vertical
- Cap pointing **upwards**
- The breather intake must be at the **top** of the container (look for the breather's intake hole through the container wall)
- The breather is best routed along the **length axis** of the bike, with its outlet at least 5cm above the highest point you can foresee the for breather intake (for example, when the bike is on its side-stand). A sufficient length of tubing is supplied to allow the breather outlet to be placed in a good position.
- Bear in mind the **usable** capacity of the container will be **reduced** if you do not place the container vertically.

2. What is the maximum oil level in the container?

The container should not be overfilled. This means:

- When the bike is vertical or on the side-stand, the oil level should be min. 10mm below the breather intake.
- The more vertical the container is positioned, the greater the quantity of oil that can go in.
- As a guide, the 170ml container actually takes 125ml only (75%). The 170ml figure is the capacity filled to the neck.
- In addition, the more vertical the container, the lower the oil level can be allowed to get before needing a refill.
Why?
 - The oil will slosh about in the container with acceleration and braking
 - When the container is fairly full it's not so critical
 - But when the container is only 20% full, then the scavenge can draw air instead of oil if the pump stroke happens when all the oil is at the other end of the container due to these forces. In the worst case scenario, this could lead to the chain drying out if too many pump strokes draw air

Rules of thumb

- **maximum 75% full**
- **the harder you ride, the higher the minimum oil level you need**
- **the more vertical, the better**

Note: in a competition environment, it could be useful to use a tall, thin container. Please contact PRO-OILER for solutions.

3. Can the container be mounted with the cap pointing downwards?

 **Never!**

Under NO circumstances may the container be mounted with the cap pointing downwards!

This is a serious safety issue.

If the cap comes off, then all the oil will pour out instantly - and if it all hits the back wheel this could easily lead to an accident

There would also be a serious problem with the scavenge for the main feed to the pump, as well as the breather.

4. Can I locate the container on its side?

Yes, however

- The end of the breather tube must be pointing **upwards** into the corner of the container nearest the cap.
- Bear in mind the **usable** capacity of the container will be **significantly reduced** - you need to keep the container more topped up, and the maximum fill is reduced (see point 2 "What is the maximum oil level in the container")



If the cap comes off, then all the oil will pour out instantly - and if it all hits the back wheel this could easily lead to an accident

5. What's the best way to refill the container?

- Pull the brass tube out from the silicone tube connecting it to the feed line to the pump (make sure the outlet of the tube from the pump is higher than the pump itself - otherwise, the tube can drain)
- Remove the container from the bike
- With a small flat-head screwdriver, turn the screw out in the top 1/2 a turn at a time, pulling/twisting the plug with steady force until it starts to move. Repeat until it does move before wiggling it out of the neck.
- The reason for doing it one-step-at-a-time is that the nut on the inside can (and will) drop off into the oil if you turn the screw too far!
- Fill the bottle, though no more than about 75%
- Line up the marks on the bottle and top, push/wiggle the top back in and re-tighten the screw

Trying to fill the bottle through the breather is a messy. It can be done, but **cyanide kills you quicker!**

Nozzles

1. Is there a "best" placement for a nozzle?

Yes, definitely!

- At, or behind the point at which the lower chain run meets the rear sprocket - so from 6 o'clock to 8 o'clock (or for bikes with the chain on the right hand side from 6 o'clock to 4 o'clock)
- Not touching the chain, but 2-3mm above it
- Pointing onto the sprocket so that the oil slides down onto the chain's inner plates. The nozzle can touch the sprocket, but only lightly - otherwise there could be a heat buildup and the tip could deform or close up

Why is this the "best" place?

- The chain does not move vertically once it has engaged on the sprocket
- Lubing the chain on the top of the lower run of the chain run as it goes round the sprocket forces the oil onto the chain due to centrifugal force
- If the nozzle is located **ahead** of the sprocket, then
 - It has to be placed with enough **clearance** to the chain so that it does not get damaged by the chain
 - This makes the whole system **less efficient** and results in **more fling-off**.

2. Can I place the nozzle on the front sprocket?

In principle yes, but there are some **practical disadvantages**:

- It's inconvenient to get access to the nozzle
 - for maintenance
 - or even just to check it
 - or see the oil coming out when you prime the lines
- To check the nozzle's condition you have to take the cover off, and on some bikes that may mean removing the fairing...
- Bear in mind the nozzle must be placed **above the lower run** of the chain - the top run is not viable because the oil will fling off straight away as it goes round the sprocket

However, for bikes used **off-road**, there can be good reasons to fit the nozzle(s) at the front sprocket

- A nozzle setup on the rear sprocket is **vulnerable** to damage from all sorts of sources, whilst up front the nozzle is better protected
- If you ride in deep mud, or through brush, then the front sprocket may be the **only** option

3. Why is a twin nozzle better than a single nozzle?

This is a **BIG** issue!

To explain this you need to bear in mind that there are basically 3 aspects to lubing a chain:

1. The most important point is to get the oil into the **pin and roller**. This is the area where the wear occurs, resulting in chain "stretch" - the play between the inside of the rollers and the pin increases. Lack of lubrication here is damaging to the chain - and is the main reason why spray-on lubricants can't match the performance of continuous lubrication from a chain-oiler.
2. The **o-rings** also need lubricating to reduce heat build-up through friction.
 - An easy experiment: spin the wheel by hand when the chain is dry and gauge the resistance. This can often be so strong that it needs a lot of effort to do.
 - Then take a can of WD40 and quickly spray the chain. The wheel will instantly turn more freely - due almost entirely to the reduced friction between the o-rings and the plates. (Don't worry, WD40 does no damage to o-ring seals!)
3. **Corrosion protection** for the side-plates. In reality more of a cosmetic issue, but still a point - a rusty chain is not a pretty sight!

Gravity feed chain-oilers have been using a single nozzle for years, so **what's the problem?**

- A single nozzle setup only lubes **one side** of the chain. The really important job of getting oil into the pin/roller area is achieved just as effectively by single as by twin nozzles - the oil is sucked in by capillary action.
- The pair of outer plates and o-rings (furthest from the wheel) will also be lubed because you are depositing the oil onto the plate next to the sprocket. However, the plates on the chain run next to the **wheel** may not be receiving enough oil to provide any corrosion protection, and much more serious - **even lubricate the o-ring**.
- The **only** way a single nozzle setup can get oil to the plates and o-rings next to the wheel is by being set **rich** - then the oil gets to this area by means of **aerodynamic turbulence** - the swirling air literally does the job of coating the chain with oil. Fling-off is being left to do the job!
 - On a gravity feed system the oil deposition is varying all the time with temperature and speed changes - at high temperatures more oil is flowing, and at low speeds one and the same setting will be too rich
 - This rich running is all part of life with a gravity feed system, but it does mean that on average the inside links and o-ring should be well lubed - but the price of this is **a lot of fling-off**
 - The PRO-OILER's delivery does not vary in this way, so a single nozzle on a Pro-Oiler needs to be set **rich enough** so that turbulence gets the oil to the inner links and o-rings. This somewhat defeats the advantages of the PRO-OILER's efficient delivery!
 - The **double whammy** here is that if you run a PRO-OILER with a single nozzle at low speeds, there won't be enough turbulence to distribute oil to the other side of the chain - this "distribution" will only occur at higher speeds. A very simple experiment can demonstrate this:

- Run the chain fairly dry at low speeds for 50+ kms (so that you can see a clear difference between the condition of the outer and inner plates and o-rings)
- Then go out on the open road at 120km/h or more for 50kms. You will see the chain is more evenly lubed after running at higher speed.

The answer to the whole problem is to use a **twin nozzle** setup

- Then a **lean** setting can be used
- The entire chain gets **just enough** oil to lube and protect it, but with a minimum of fling-off. Turbulence plays almost no rôle in getting the oil to where it needs to be

Advantages all round, and the reason that PRO-OILER **strongly** encourages wherever possible the fitting of a twin nozzle setup - and why the twin nozzle is included as part of the kit.

4. Does the nozzle material matter? Can I use a brass or aluminium tube?

Yes, the material does matter.

Metal nozzles may look attractive initially, but they have **serious disadvantages** in practice

- Thin-gauge brass and aluminium tubing is extremely fragile. The slightest contact can bend, deform, or clamp shut the nozzle tube. And once deformed, because of the poor elasticity, they may be **permanently damaged** and need replacement. Potential disaster when away on a trip.
- The 3mm od plastic tubing supplied with the kit has **proven ability** as nozzle material
 - Firm enough to hold its shape and position (especially if used with the piano-wire inserts provided)
 - Flexible enough to survive becoming snagged in the chain (for example, when reversing)
 - Significant wear resistance - the nozzle opening seldom deforms.

Oil Lines

1. I already have a chain-oiler. Do I need to replace those lines with ones provided?

The Pro-Oiler system is **pumped**, which means:

- It's able to push oil through much smaller ID tubing (1.8mm) than gravity feed systems (which typically use 5mm OD x 3mm ID polyurethane tubing)
- Keeping the quantity of oil in the lines as low as possible is a major plus all round, because:
 - The lower the oil volume in the line, the quicker the lines fill when priming [see FAQ: **Priming**]
 - 1m of 3mm ID line contains 7.07ml of fluid
 - 1m of 1.8mm ID line contains 2.54ml - just over 1/3 as much
 - On a normal "dry" setting, it takes about 170km to **pump** the contents of a 1m length of 1.8mm ID line, but... about **470km** of 3mm ID line!
 - The smaller the head of oil in the lines, the less the "pull" of the capillary action - and the less chance there is of an oil drip (from whatever source) when the system is off

2. I have air bubbles in the line. Is this a problem?

That depends.

It is critically important to work out **why** the air is there.

Air in the lines can be an indication of one of the following:

- Small air bubbles (up to 5mm long) in the lines after **priming** empty oil lines
 - harmless
- **Low oil level**, or scavenge in the oil container is/has been stuck out of the oil and **drawn air**
 - easily fixed by topping up the oil level (See FAQ: **Oil Container** for more info on oil level)
- An air leak in the tubing **upstream** of the pump
 - **serious**, affects performance.
- An air leak in the tubing **downstream** of the pump
 - **critical**, the line can drain while the system is off, and disrupt or even halt lubrication.

3. There is a trace of oil at a junction between a line and silicone connector. Is this a problem?

- If there is any air in the lines, then this may be the point at which the air is entering. In this case, yes it is a problem
- If there is no air in the lines, then it is not essential to fix the problem.

4. I'd like to use brake-line or brass tubing instead of the lines provided. Is that a problem?

Functionally no. However there is an important issue:

- If there is any air in the lines, then you will not be able see it.
 - This is a major problem for troubleshooting oil delivery issues
 - It makes priming hit and miss.
- If you wish to create a fixed and convoluted section (eg. to follow the contours of the inside of the swing-arm) , then consider using the provided 3mm od tubing with a wire insert to give it the required shape

Priming

1. How do I prime the pump?

The pump is delivered already primed and filled with oil.

Step 1.

When the lines are connected, run **Prime** a few times until both lines are full of oil (press and hold **+** for >2s to trigger **Prime**)

If the oil is drawn from the container and the pump primes itself, then go to **Step 3**

Step 2.

If the oil is **not** moving in the lines when you run **Prime**:

By far the quickest and easiest way to prime the line to the pump and remove any air from the pump itself is to create a closed circuit as follows:

- Cut a piece of tubing the same length as the line from the container to the pump
- Use this temporary tubing to connect the **output** from the pump to the **breather** on the container (this way the pump flows oil back into the bottle - and pressurises it).
- Run **Prime** a few times until both lines are full of oil
- Carefully disconnect the temporary line
- Finally connect the main line from the pump output to the nozzles.

Note: it is best not to use the supplied breather line for this pump-priming operation - but if you do, then you **must** blow all the oil out before reconnecting it!

Step 3.

Place a container or paper towel under the nozzles to catch the oil coming out. Run **Prime** until you see oil coming out of the nozzles, and the line contains no air bubbles longer than 5mm.



*You must fill the oil lines downstream from the pump. Unlike a gravity feed system, **the lines will not fill themselves** - the oil needs to be pumped. 1m of oil line contains 2.54ml of oil - that can be **200km** of riding before oil reaches the chain!*

2. Do I need to prime all the air out of the lines?

Yes.

- Air bubbles mean the PRO-OILER will run lean - when the pump pulses, any air in the line will be pumped out of the nozzle at the same rate as oil. If half the line is filled with air, then only half the amount of oil required will get to the chain... [See FAQ [Oil Lines](#)]
- Very small bubbles (2-3mm) may remain caught in the pump, or at the connection tubing between the lines and the pump nozzles, and eventually move down the line - these are harmless
- The pump is designed to pump fluids, and is a **poor air-pump**. When priming empty lines, bear this in mind, as you will need to many more primes when pumping air than oil. (See [How do I prime the pump](#))

3. I'm running a Prime sequence, but nothing is coming out of the nozzle. What's happening?

- First of all, ensure the pump is actually running. Run Prime with your finger on the pump - you should **feel**, and maybe **hear** a light tapping as the pump pulses
- If the lines on the intake side of the pump are empty, then it may take several prime cycles to produce any movement - even as many as 20. Use the recommended method for filling the lines and the pump (See **How do I prime the pump**)
- Remember it can take a few seconds for the elasticity in the lines to be taken up - the colder the oil, the longer the delay.
- So, if you run several prime cycles there will be a delay before oil comes out of the nozzle, and oil will continue to come out of the nozzle until the pressure in the lines has been released.

Breather

1. Why do I need a breather?

- Air in the container expands and contracts with temperature changes - which can be significant if the container is mounted in the typical underseat area.
- If the air in the container can't expand and contract freely then this may cause sealing problems in the container's cap and leads. The same point applies to trapping/kinking the breather.
- If the pump is forced to suck too hard, it may cause seals in the lines to pop, allowing the pump to draw air, instead of oil from the container.

2. Is the breather tube routing important?

Yes, critical!

The breather tube's outlet should be well above the highest point of the breather intake in the container.

- ⚠ If the tube fills with oil, and the outlet is below the intake, there will be a **syphon** action which can cause oil to drain out. This is potentially **dangerous** and can cause an accident if it gets on the back tyre
 - Re-position the container so that the breather intake does not come under the oil level
 - Do not overfill the container (as a rule of thumb, the oil level should be at least 10mm below the breather inlet)
- Do not locate the container with the cap facing the left of the bike. When the bike is on its side-stand, the breather could become submerged and allow the oil to drain out.
- Check the breather tube is not trapped or kinked

3. What is the best breather tube routing? Any other tips?

- The breather is best routed along the length axis of the bike, with its outlet **at least 5cm** above the highest point you can foresee the for breather **intake** (eg. when the bike is on its side-stand)
- The greater the height difference between the intake and outlet, the better
- The longer the breather tube, in general the better (30cm is a good length)

4. What should I do if I see the breather tube is filled with oil?

- Try and work out why the breather intake came to be submerged in the first place
 - Don't forget that the higher the oil level, the more often the breather intake will be submerged temporarily under braking, acceleration and cornering forces. This is no problem as long as the breather intake is normally exposed, that's to say, located in the air in the top of the container.
 - Bear in mind, if the tube has oil in it, and the air in the container heats up and expands, then this oil can be **blown out** because it forms a plug.

- If you clear the oil (see below), and then soon after see that the line is again filled, then
 - Consider running with a **lower oil level** in the container
 - and/or ensure you use a long breather line with a high outlet (the shorter the line the more likely that oil can start a syphon action)
- To clear an oil-filled breather line:
 - Ensure the breather intake is not currently submerged
 - Unplug the breather line from the brass tubing and drain it (blow into it if necessary)
 - Reconnect the line

Oils

1. What oil should I use in the PRO-OILER?

The short answer is use **any clean motor oil**

Mineral, semi-synthetic, fully synthetic... it doesn't really matter - though synthetic oil's better viscosity index is a marginal advantage

We have carried out extensive tests with various different classes of oils, and all have their pro's and con's.

Motor oil's cocktail of additives have **nothing** to do with exposed chain lubrication. **However**, it does have a mix of characteristics which make it the **best compromise** for use in the pumped PRO-OILER.

The PRO-OILER is a total-loss lubrication system - the old dirty oil eventually flings off as it's replaced by new oil (self-regeneration).

If the chain is **washed** in oil (imprecise gravity-feed systems), then the choice of oil is not so critical.

One of the PRO-OILER's **trump cards** is that it can run **very lean settings**. But this does mean that the small quantity of oil that does get used must do the whole job.

The oil has to have the following qualities

- Good coverage
 - Important because the oil has to get to all parts of the chain without using excessively rich settings (eg. the outside of the side-plates for corrosion protection)
 - Good coverage = low consumption = low fling-off
- Good lubrication qualities
 - Some oils may have a string of attractive features, but have poor lubrication... eg. silicone-based chain oils
- **Guaranteed** compatible with NBR seals (pump's seals and chain's o-rings)

Motor oil

- + Great coverage (spreads well on the chain = good hydro-capillary characteristics)
- + Self-regenerating (not sticky, so dirt and dirty oil remains do not stick to the chain)
- + Produces the best consumption
- + Guaranteed compatible with NBR seals in the pump and chain's o-rings
- Relatively low adhesion means
 - it flings off easily. **However**, this also keeps the chain clean
 - delivery has to be turned up **higher** and **more quickly** when the roads are wet (ie. it is not as resistant to the washing action as other more adhesive oils)

Gearbox oil

Pro's and con's broadly similar to motor oil

- + EP (Extreme Pressure) characteristics, so *theoretically* better protection at the pin-roller contact area
- Coverage not quite as good as motor oil

Chainsaw bar oil

- + Adhesive
- + Good performance in the wet, as it doesn't wash off as easily as motor oil. The delivery does not need to be turned up as high or as promptly as with motor oil
- + Inexpensive
- Coverage not as good as motor oil, so richer settings required
- Picks up dirt due to adhesiveness. Self-regenerating, but only at richer settings
- ⚠ Not guaranteed compatible with NBR seals
- Not always easy to find the right type of oil (mineral, not bio-degradable which rots in the lines and pump)

Specialized industrial chain oils

- + Great lubrication qualities
- + Self-regenerating
- + Hydro-capillary qualities (penetrates quickly)
- + Guaranteed compatible with NBR seals in the pump and chain's o-rings
- Relatively low adhesion means
 - it flings off easily. **However**, this also keeps the chain clean
 - delivery has to be turned up **higher** and **more quickly** when the roads are wet (ie. it is not as resistant to the washing action as other more adhesive oils)
- **Expensive**... up to Eur 30 per litre!

2. Do I need to use thinner oil in winter, like in a gravity feed system?

No.

The PRO-OILER's delivery is not affected by temperature. It's been road-tested down to -10C and performed well without even needing changed settings.

3. Can I use penetrating oil like WD40?

Unfortunately, no.

Those qualities that make penetrating oils like WD40 so good at their job, also mean the oil runs past the pump's seals, and leaks out of every joint in the lines!

Pro-Oiler Maintenance

1. Does the PRO-OILER need any maintenance?

No routine maintenance is required.

However, it's a good idea to **visually** check on a regular basis that everything is working.

The obvious one... is the chain correctly lubricated?

If it is, then that's all you need to do.

But if it's not, then start basic troubleshooting:

- Correct settings?
- Reed switch signal ok?
- Oil level ok?
- Nozzles in correct position?

Please refer to the **Troubleshooting** section for further information

2. How often do I need to refill my oil container?

This depends mainly on the settings you have been using.

Baseline consumption for a bike

- used in clean, dry conditions
- fitted with a 530 section chain of 110 links (average big-bike)
- with the reed switch on the rear 180/55-17
- running on table 6 setting 3 = 2510 revolutions per pump stroke

This gives a theoretical consumption of

- 4970 m / pump stroke
- 78886 km / L
- 1.27 ml / 100 km

The consumption is only "theoretical" because

- if you ride in all conditions, there will be times when you are running on the maximum, which is 6-7x higher than your normal dry-road setting
- even if you never go out in the rain, you may still get caught in a shower or two, when you will turn up the delivery
- the road can be dusty and dry out your chain, so you need to turn up the delivery (and/or run Prime) from time to time

Chain Maintenance

1. I've fitted a Pro-Oiler. Is that the end of chain maintenance?

Mostly, yes.

You still need to **visually** check your chain to make sure everything is working and the chain is properly lubricated.

In normal conditions the chain is **self-cleaning** when you use motor oil in the PRO-OILER, so there's no need for periodic de-greasing as with a spray-can lubed chain.

There's one exception, however.

Before you first run the PRO-OILER after using spray-on chain lubes, it's a **really** good idea to

- clean the chain **thoroughly** (use parafin, **not** petrol, which damages the o-rings)
- clean out the inside of the front sprocket cover
- clean the underside of the chain guard

The reason is that motor oil will **dissolve** the accumulated mess - which will start to come off in messy splatters. It can take quite a while before it all comes off, so it really is best to do it all in one go!

2. I've been riding in dirty conditions. What do I need to do?

In principle, nothing more than

- turn up the delivery to keep the chain properly lubricated
- and turn down the delivery when the chain condition has stabilized

If you have been through seriously dirty, gritty conditions, then it can be a good idea to just quickly wipe off the dirt with a cloth or paper towel soaked in paraffin - or even WD40

Environmental Issues

1. The PRO-OILER is a total loss lubrication system - surely this is harmful to the environment??

In theory yes. 1L of oil enters the eco-system every 70,000km

But in reality the net environmental effect of fitting a PRO-OILER is firmly positive!

Let's consider the following points:

Per 10,000km a "typical" motorcycle has consumed approximately

- Motor oil (burnt/vented and unburned): 1L (if your engine consumes 100ml/1,000km)
- Motor oil (oil changes): 5L (at 3.5L per oil change at 6,000km)
- Fuel: 700L (at 7L/100km consumption)
- Spray-on lube: 2L (at 100ml per application each 500km)

Over 10,000km a PRO-OILER will consume approx 0.15L of chain oil (PRO-OILER's consumption works out at around 70,000km/L for a typical 530 chain, and even less than that for the smaller sizes.)

The one **crucial** point when considering the PRO-OILER's environmental impact is this:

Being a continuous lubrication system, PRO-OILER actually leads to a reduction of emissions because a poorly lubricated chain can easily consume 5% of engine power - or put another way, use 5% more fuel for the same distance and speed.

The power consumption of poorly lubed chains has been proven countless thousands of times on dyno's worldwide. In fact, in especially tough environments like moto-cross, the chain can cost 5-10% of power by the end of a single race.

Let's be really conservative, and say that a Pro-Oiler kit can improve your efficiency by 3% on average, then per 10,000km

- you will use 21L less fuel
- you will reduce emissions of CO, CO2, and NOx by respectively [**]
- you will save 2L of lubricant suspended in volatile solvent