

1. Air bubbles in the oil lines
2. Pump
3. Oil delivery
4. Reed switch + magnet
5. Electromagnetic interference
6. Controller
7. Nozzle

### 1. Air bubbles in the oil lines

There should be no air bubbles anywhere in the lines from the container to the nozzle in normal operation.



Except for Symptom 1, air bubbles in the line are a sign of something which needs to be fixed - either just re-filling with oil... or there is an actual problem

Unlike a gravity feed system which flows oil as long as the valve is open, the PRO-OILER **only** flows oil when pumped.

Air bubbles will not disappear without being pumped out. This can which can take a long time to clear, and play havoc with the calibration. [See [FAQ: Oil-Lines](#)]

#### [Symptom 1](#)

Small bubble(s) <5mm long, for a short period after priming the system

Causes:

- Some air that remained trapped in the pump and/or connecting tubing for a time after being first put into service, or being drained
- When the lines have been disturbed or taken apart for whatever the reason, small pockets of air will make their way down the lines.

Action:

None - harmless

#### [Symptom 2](#)

Bubbles >10mm long, or empty stretches of line before **and** after the pump.

However, there is **no oil dripping** from the nozzle when the system is off.

Causes:

- Scavenge pickup in the oil container is drawing air due to:
  - Low oil level.
  - Note: hard acceleration and braking can cause the oil to press up to one or the other end of the oil container. If the pump pulses when the scavenge is out of the oil, then air will be sucked in.
  - The more time you spend on hard braking and acceleration with a low oil level, the more likely you will encounter this problem.

Scavenge intake stuck out of the oil [*only containers with brass tubes in the cap, pre March-05*]

- One or more seals in the lines **upstream** from the pump are faulty. The pump finds it easier to draw air in through the bad seal than to draw oil from the container, which can seriously affect calibration - and the system will run too "lean". Note: this is rare.

Action:

- Check oil level and re-fill if necessary
- Under track or hard riding conditions, you may need to
  - keep the oil level topped right up - but then it's critical to ensure the breather tube is routed as high as possible
  - think about using a tall, thin container mounted vertically which will minimize sloshing about. Please contact PRO-OILER for further information and solutions
  - in any case it's desirable to mount the container as vertical as possible.
- If the oil level is sufficient:

[*Only containers with brass tubes in the cap, pre March-05*]

Check the scavenge is not stuck against the side of the container. If the scavenge is stuck: the soft rubber tube inside the container is too long. Carefully pull the brass output tube further out through the cap until the scavenge falls to the bottom under its own weight.

- If the problem is not due to the oil level or scavenge. Check for faulty seal(s) in the line: Disconnect and then re-make the connections in the oil lines.

#### [Symptom 3](#)

Empty stretches of line **after** the pump.

Oil **drips** from the nozzle while the system is off.

Causes:

- Air leak in the lines downstream from the pump.

This is a **critical** problem, as it can allow the line to drain while the system is off, and disrupt or even halt lubrication. Air is drawn into the line, and this allows the column of oil to move. The bigger the puddle of oil, the bigger the air leak.

Action:

- [*concerns systems delivered before Feb 2004*]

Silicone type adapter on the pump outlet:

Silicone can be porous, allowing air to seep in slowly through the tubing walls over time. This may be especially noticeable when the bike has been standing for a while.

**Solution 1:** request a replacement current-type pump output adapter from PRO-OILER.

**Solution 2:** push the 8mm silicone tubing as far as possible up over the pump's output nozzle - so that the inner silicone tube presses up against the the output, leaving no space. This will solve the problem in most cases.

- [*concerns systems delivered before Feb 2004*]

Is there a tear or cut in the silicone tubing at the pump output nozzle?

Very carefully bend and examine the tubing for any split. Even a pin-prick hole is sufficient to cause a problem.

If yes: replace the silicone tubing with the current black rubber type.

Disconnect and then re-make the connections in the oil lines.

#### [Symptom 4](#)

[*This applies to the silicone-type connectors - later black rubber types are not affected*]

Bubbles >10mm long, or empty stretches of line **after** the pump. However, there is **no oil dripping** from the nozzle when the system is off.

Oil flows back to the container (if the container scavenge is placed below the pump).

Causes:

Air leak at the pump's **inlet** silicone connector. Note: it's possible you will not see any bubbles on the input side, as the air is being drawn straight into the pump.

Action:

Is there a tear or cut in the silicone tubing at the pump nozzle? Carefully bend and examine the tubing for any split.

**Note:** even a pin-prick hole is sufficient to cause a problem. If yes: replace the silicone tubing (request a new-type spare from Pro-Oiler).

Disconnect and then re-make the connections in the oil lines.

## 2. Pump

### 2.1 The pump does not pulse

To check whether the pump is functioning:

The pump makes a very light "tap" when it pulses

- You can usually, but not always **hear** it (it's a faint sound)
- You can always feel the pulse if you place a finger on the pump

Run **Prime** with your finger on the pump

If you feel nothing (even though the LED's on the controller count through to 20)

#### [1. The battery may not have sufficient power to fire the pump](#)

- If the battery's voltage falls below 11.5-12V, the pump may not fire, or you may feel/hear a pulse, but it's not powerful enough to open the valve.



**Important:** the controller can work down to below 6V, so just because the **controller** has sufficient power does not automatically mean the **pump** has enough power!

Start the engine and run **Prime** again - you will then have 13.5V

#### [2. A connection in the terminal box may have come loose](#)

- Check the green and white wires from the controller, and the black wires to the pump are making a good contact.
- Even if this is unlikely to be the problem, it still needs to be checked.

#### [3. If after checking 1, there is still no pulse at the pump](#)

One or more of the pump's valves or the piston itself may be stuck in the oil film - which can happen when the pump has not been used for a while.

Tap the pump's epoxy body with a screwdriver handle while running prime. Tap it very sharply several times - you cannot damage the pump.

If this does not free the stuck piston or valve, blow the pump through. See [2.3 Clearing the pump](#)

#### [4. If after checking 1-3, there is still no pulse at the pump](#)

The pump's NBR seals may be swollen and are blocking the piston - this should not happen if you are using motor oil, gear oil, automatic transmission fluid (ATF) or mineral-based hydraulic oil. The pump may need replacing.

## 2.2 There is a leak, but no air in the oil lines

Symptoms:

- Oil is leaking from the nozzle outlets
- The rate of leakage seems to be constant

Probable cause:

There is a particle of dirt stuck in the pump holding a valve open

Solution:

Blow the pump through. See 2.3 Clearing the pump

## 2.3 Clearing the pump

To clear a dirt particle or loosen up a sticking valve/piston

- Disconnect the oil lines

Note: plug the output line, otherwise oil will just flow out of the nozzle, and make sure the input line is **higher than the oil container** - otherwise you get a **syphon** action!

- Put a rag over the output of the pump, or point it into a container.
- Take an aerosol can of WD40 or equivalent penetrating oil with a spout tube

[Pumps up till April 2005, with silicone insert on the pumps inlet adapter]

- push the spout tube carefully down the inlet of the pump
- when it meets resistance, push and you will feel the intake valve move about 1mm against the spring

[Pumps after April 2005, with one-piece black rubber adapter]

- Cut a 20mm piece of oil line and push it over the end of the WD40's red oil spout tube - it will be a tight interference fit.
- Push the tube into the inlet adapter so that it seals (as if it were the inlet oil line)
- Give it a few shots of oil - watch out, the oil shoots out!
- Run **Prime** 20x. The pump get quite warm and make a lot of noise - this is normal.

## 3. Oil Delivery

**Too little** oil is reaching the chain

- The current **table** and/or **setting** is too lean
- The **oil level** in the container is low (check for air bubbles in the line)
- The **nozzle** is misaligned or has been damaged
- Check that there is a reliable reed switch/speedo sensor **signal**

**No oil at all** is reaching the chain

- Any of the above can also be the cause of this - check and fix as appropriate
- Reed switch:
  - check that there is a reed switch **signal** (in signal counting mode, or with a multi-meter)
- Speedo sensor: check that
  - the correction factor is set (if it is = 0, then the pulses cannot be interpreted)
  - there is a signal (in signal counting mode, or with a multi-meter)
- Check all the oil-line connections - if any connections have come apart, no oil can flow to the nozzles
- Check the oil lines have not been crimped shut
- Check that the pump is **actually pulsing** (run Prime and watch for oil coming out of the nozzles)
- Check the nozzle tips are not **blocked** (for example; at installation time by oil grease)

**Too much oil** is reaching the chain. This may or may not be an error condition

- The current **setting** is too rich.
- Your currently selected **table** is too rich.
- Speedo sensor operation: incorrect (too low) **correction factor**
- Both speedo sensor and reed switch operation: **electromagnetic interference**


See the **Manual** for more information on finding the right base settings.

Error conditions:

Applies to both speedo sensor and reed switch operation:

- **There is an electromagnetic interference issue (EMI).**

See Troubleshooting Electromagnetic Interference

 **Electromagnetic interference can cause seriously over-rich running**

Speedo sensor operation only:

- **Invalid, or incorrectly programmed Correction Factor (CF)**  
Programming a CF with a number **lower** than the real CF **automatically** results in over-rich running - **by the amount of the error.**

 **An invalid (too low) correction factor can cause seriously over-rich running**

Reed switch operation only:

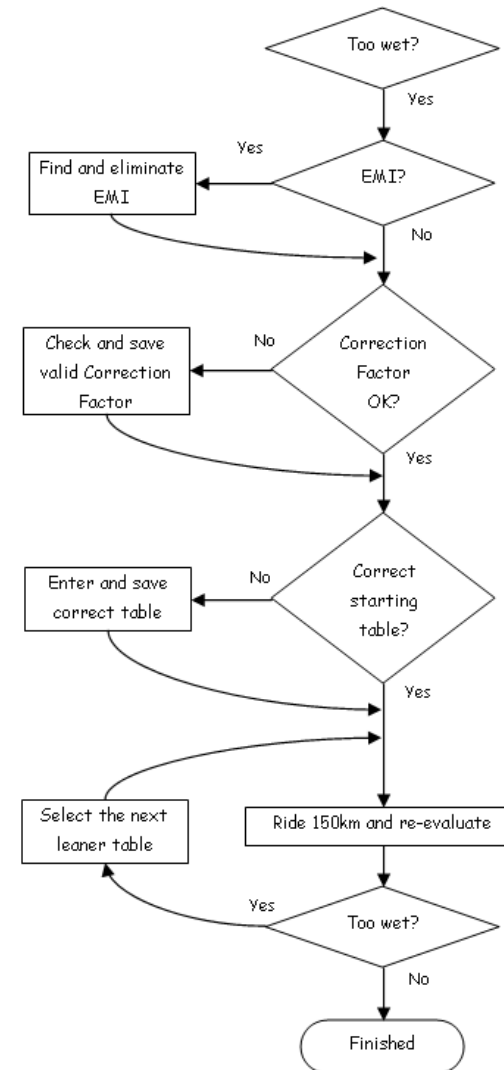
- The reed switch is too close to the magnet, which can then give double signals. These extra signals are filtered out by the software at higher speeds, but will result in 2x the oil flow at <50kmh.

This is a problem which must be fixed!

See **Troubleshooting: Reed switch + magnet** for more info.

- The reed switch is damaged and is giving too many signals.

Note: this would occur if the contact inside the switch is loose and is flopping around - unfortunately this is very difficult to test. In case the over rich running is not a problem with the selected settings, then replace the reed switch. This would be an unlikely problem.



## 4. Reed Switch + Magnet

The right hand decimal point on the controller is used to indicate that no incoming reed switch signal has been received within the last 2 seconds

So when you come to a standstill, the dot will come on almost immediately.

When you move off, it should go out in max 10m (5x wheel revolutions)

If it stays on longer than 5x wheel revolutions (or comes on whilst you are on the move), this is the warning that there is **no signal** from the reed switch.

### 4.1 No signal

The reed switch can stop generating a signal if

- the magnet or switch has moved out of range
- the bracket has moved or been bent
- the switch is fixed to the swing arm and you have adjusted the chain - and the magnet and switch are out of range
- the reed switch or magnet have come off
- the magnet has become de-magnetised temporarily due to temperature changes - or permanently due to overheating.

Put the controller into **programming mode**

- Hold down both the [+] and [-] buttons together and turn the power ON

[Step 1 - version 2.09 and later](#)

- **oH** appears
- press and hold [-] until you see **0** or **1**
- **0** is for reed switch operation
- **1** is for speedo sensor operation

If necessary, set the value to **0**, then Save the change. See **Manual: Programming** for more info

[Step 1 - version 2.07, 2.08](#)

- **o1** appears
- Go to **o2**

press and hold [-]

The value shown must be **00** otherwise the controller assumes electronic speedo operation.

If necessary, set the value to **00**, then Save the change. See **Manual: Programming** for more info

[Step 1 - version 2.05, 2.06](#)

- **o1** appears

Reed switch-only operation, so no action required

[Step 2 - all versions](#)

Test for a signal using the controller's own Test Mode (**ot**)

- press [+] repeatedly until you get to **ot**
- press [-] for >2s until you see **00**

Rotate the wheel to check for a signal. The display should increment by 1 each time a signal is received.

If it stays on **00**, then this confirms **no signal** is being received by the **controller**.

[Step 3](#)

Leave the controller in Test mode (**ot**)

Now check to see if there is any signal from the **reed switch**.

Test using a multimeter:

- Open the junction box
- Check for a signal on connections 1+2 as you rotate the rear wheel

If you now

- have a signal on the multimeter
- but the Test mode counter stays on **00**

a) either there is a defect on the junction box pcb

b) or the controller's input has been blown. Please contact PRO-OILER.

[Step 4](#)

If there is no signal on the multimeter

- Disconnect the reed switch wires from 1+2 in the junction box
- Repeat the previous test directly on the reed switch wires (to eliminate the connection as a source of the problem)

If there is still no signal from the reed switch:

- Take a magnet (any magnet will do), and manually pass back and forwards over the reed switch to try and get a signal.
- If you still get no signal, then the **reed switch** may be defective
- If you do get a signal then there may be a problem with the **magnet** or the switch has been moved **out of range** (see [4.2 Intermittent signals](#) below)

### 4.2 Intermittent signal

The magnet is temperature sensitive, which is to say its magnetic field weakens as the temperature rises.

If the distance between the switch and magnet is at the **outer limit** of where the switch can be operated by the magnet, then when the magnet warms up, this can be enough to cause the loss of signal. Since this is a temporary phenomenon, the effect can be an intermittent signal.

For example, early in the morning there may be a signal (mechanical parts have not yet warmed up and cooler ambient temperature).

- Then, a while into the ride, the right hand dot comes on, indicating the signal has disappeared.
- Also in some cases, the signal can come back at high speed (the magnet is cooling off due to the airflow).

The solution in almost every case of intermittent signals is to **fix the reed switch closer to the magnet**.

### 4.2 Multiple signals

[Symptom 1](#)

Multiple signals can be generated by the reed switch when:

- The reed switch is too close to the magnet
- The magnet is passing along the length of the switch

In these cases the reed switch is forced closed then pulled open, then forced closed again

**Solution:**

Adjust the position of the reed switch.

[Symptom 2](#)

Multiple and irregular/unpredictable signals can be generated when the switches' glass housing is broken, and the contact is flapping about.

**Solution:**

Replace the reed switch

## 5. Electromagnetic interference (EMI)

The PRO-OILER uses incoming signals from the the bike's own speedo sensor, or from the reed switch to determine the distance you have travelled, and so when the pump should pulse.

EMI is where electrical noise is being picked up, and interpreted by the PRO-OILER as valid distance signals – the PRO-OILER sees voltage variations over 1.25v as signals.

**How much** richer depends on the severity of the EMI.

This can span from occasional signals to massive interference:

- Occasional signals (a few signals per second) will have a limited effect on the oil delivery in practice
- Worst case, one signal is being picked for each of the engine's firing strokes or alternator pulses, which causes massively over-rich running.
- EMI can be intermittent, varying with unpredictable factors such as temperature. Apart from making calibration difficult or impossible, intermittent EMI can produce nasty surprises.



**EMI always leads to over-rich running, and MUST be solved.**

The two main causes of EMI being picked up by the PRO-OILER are:

- **Poor earth** connection - this is **by far the most likely** source.
- **Routing** of the PRO-OILER's wiring - signal wire, reed switch wiring, controller wiring running too close to the ignition coils or other source of strong signals.

[Poor earth connection:](#)

A simply loose or intermittent earth connection can of course cause a problem - and you need to check this.

On the other hand, a loose connection would also cause other symptoms, like spontaneous re-booting of the controller, so you may already be alerted that there is a problem.

A "poor earth" in the context of EMI means:

Whatever the PRO-OILER's earth wire is fixed to is **not functioning** as an adequate earth - you could be using a gold-plated connection to your chassis, and still have a "poor earth". In other words, the selected earth has **poor conductivity**.

In simplistic terms:

Signals will take the easiest path available.

There are no hard and fast rules, but here are some pointers:

- Connect the earth to the frame



**Never** connect the earth to the battery - if the battery or regulator not 100%, then this is very likely to cause EMI

- If the bike has a separate rear subframe, connect the earth to the **main** frame.
- If the bike's frame is painted, clean out the thread with a thread tap.

- If the bike has a speedo sensor on the gearbox output shaft, manually hold the earth wire against one of the engine mounting bolts, and test for EMI - if this solves it, then try connecting the PRO-OILER's earth to the speedo sensor's own earth wire.

#### Cable routing:

If any of the PRO-OILER's wiring (controller cable, speedo signal wire, reed switch wires) are routed too close to a strong source of emissions, they can act as an antenna.

The main candidates are the ignition coils, but injectors and other components can also produce EMI.

In some cases, running any wires within 15cm of the coils can cause a problem if the coils/leads have faulty insulation. The distance varies between bike models, but also between individual bikes of the same model.

In practice, EMI caused by cable routing is rare.

#### Solving EMI:

There is no option other than to be systematic about it.

The solution may be dead simple, or it could take some effort...

The flowchart on the right should help you with the process.

In case of doubt, please contact PRO-OILER.

## 6. Controller

If there is no power to the controller even when the power source is turned on:

- Check the earth connection is good - a poor earth is a major problem, and can lead to unexpected behaviour, including spontaneous rebooting.
- *Note:* the earth should be taken from the chassis, **not** the battery.
- If the power feed is taken from the lights, check the lights are switched on!

Basically the controller either works 100%, or there is problem. Any flickering, unusual symbols or erratic behavior means the controller needs to be checked/replaced.

## 7. Nozzle

Most of the time it will be obvious if there is a problem with the nozzle.

A quick visual check will show if an arm has come out, or the nozzle has swivelled on its spindle, or if there is any other physical damage.

If the nozzle block persistently swivels upwards

- Check that the chain is not hitting the nozzle block (any contact will leave score marks on the underside of the block).
- *Important:* a chain can move 10-15mm further than you are able to push it with your finger - you are unlikely to have the strength to take up all the accumulated tolerances in the chain just with the classic "finger-under-the-chain" test.

The nozzle tips should be resting lightly on the sprocket face and not coming into contact with the sprocket bolts, hub castings, sprocket teeth, lightening holes.

Any such contact will usually be fatal to the nozzle assembly because it causes the arms to vibrate heavily.

It's possible the nozzle block has rotated slightly on the spindle, and it is now making contact. Tighten it enough to hold it in position.

Notes:

The earlier long-arm nozzle versions (*prior to April 04*) are more sensitive to misalignment - any movement is magnified.

The current self-centering short-arm versions (*introduced April 06*) basically eliminate misalignment issues by being easier to set up, and more resistant in operation.



In the event that an arm comes out of the nozzle block, you can temporarily block the hole with chewing gum, then oil will flow to the remaining arm, which will act as single nozzle

(concerns only fixed nozzle types prior to April 06)

If oil only comes out of one nozzle outlet, then it's probably blocked by old chain-grease.

This can happen when the PRO-OILER is first installed - if the chain and sprocket have not been cleaned. If one nozzle outlet is blocked, the oil takes the path of least resistance, and comes out of the free outlet. To clear a blocked nozzle, immerse the tip in degreaser or paraffin and carefully work the hole free with a *fine* wire.

## EMI Troubleshooting

