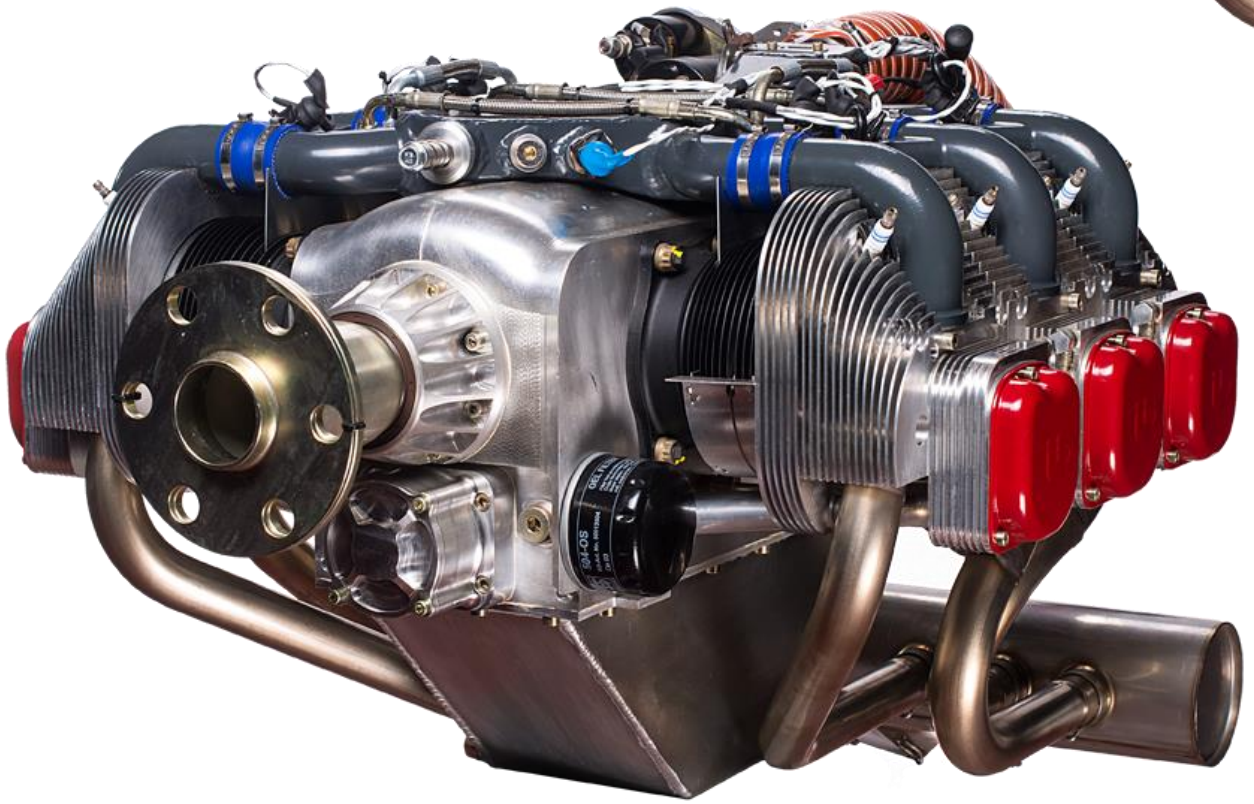
ULPOWER
AERO ENGINES



Interactive Troubleshooting Guide

Beta version 1.1
Not for general release

Click an engine or scroll to next page to continue

ULPOWER
AERO ENGINES

Contents:

Instructions

Before first start checks

Trouble shooting guide

Welcome to the ULPower troubleshooting guide Beta 1.1

The first section covers ‘procedures to follow before first start’ this is a reminder for those who are not yet ready to start – to make sure that they have covered the basics. Your particular installation may vary slightly, and we refer you to your engine and OEM installation guides for further details

The Troubleshooting guide starts immediately after and is linked between topics. You may always return to the ‘Troubleshooting Start Page’ for troubleshooting by clicking on the ULPower logo on the top right of each page.

You may also simply ‘scroll’ through the guide. If you are using this guide on a mobile phone or tablet you may need to download the Adobe Acrobat Reader to enable the links.

This document is provided as a guide only and is a beta product and may contain errors. Please use at your own risk and do let us know if you find any errors or provide ideas for improvement.

Please note that the definitive guide will always be the latest manuals available from ULPower - http://ulpower.com – The abbreviation “i.a.w. … manuals” means ‘in accordance with… manuals” – and we ask you to ALWAYS cross check with the latest manuals before carrying out any work on your engine.

Regards

The ULPower Team (email *info@ulpower.com*)

E&OE Mar 2018

BEFORE FIRST START:

During installation consult and work i.a.w. the various installation manuals

1. Battery/Oil:

Check if the battery is fully charged and oil level is sufficient

2. Calibrate senders/sensors:

Oil temperature, EGT and CHT senders using boiling water (100°C/ 212 F)

3. Check the Fuel System with a fuel flow test:

Disconnect return line and put into measuring jug
Run pump 1, collecting fuel
Measure fuel flow coming out of the return line +/- 120 l/h or 1 liter(quart) in 30 seconds
Repeat for pump 2
Reconnect lines and check fuel pressure (+/- 3.3bar/49psi) (without starting the engine)

4. Check ECU warning light:

Power ON to ECU
UL check light should NOT light up
Disconnect Air box temp sensor – if working, the UL check light comes on. Reconnect sensor – light goes off.

5. Start-up routine with COIL checks

- Ignition coils : set coil 1 ON / coil 2 OFF
- Throttle max 30% open (normally cracked open)
- Safety check – area clear and shout 'clear prop'
- Master ON
- Main Fuel pump selected ON
- ECU ON
- Activate 'Start' - max 5 sec – wait 15 sec - repeat max. 4 times
- Engine should be running. Wait 15+ seconds, stop engine (ECU OFF)
- Repeat with coil 1 OFF / coil 2 ON. Wait 15+ seconds, stop engine
- Repeat with coil 1 ON / coil 2 ON. Leave engine running

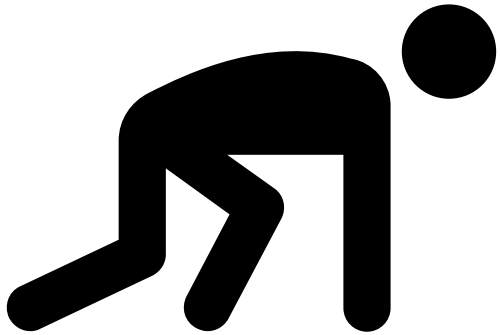
6. Other first start checks

- If possible connect Ulcheck/ULread cable to a computer.
- Visual check for oil leaks / fuels leaks / mechanical interference
- Measure oil pressure and to check with instruments/readout
- Run the engine at +/- 1200 rpm until oil temp. is 60°C (140°F)
- Shutdown (switch ECU OFF, Fuel pump OFF, coil 1 OFF , coil 2 OFF Master OFF
- Adjust idle if necessary
- Allow engine to cool and 'finger test' for oil leaks.

7. Running in: Avoid full throttle (max 2800rpm) for the first 10 hours

TROUBLESHOOTING STARTS HERE

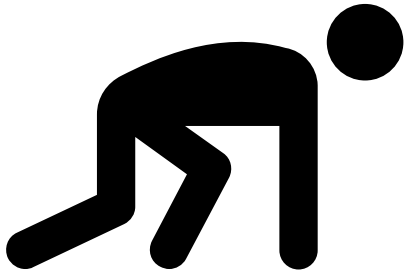
What to do if your engine won’t start?



at first start

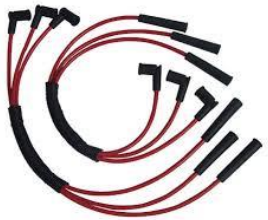
after first start

Remember to always work i.a.w. the latest manuals. If you are unsure of what action to take or unable to resolve your problem, contact your local ULPower Aero Engine dealer http://ulpower.com/en/dealers



Trouble shooting when your engine fails to start at FIRST START

Start button, Grounding & ECU connection



Ignition cables

Fuel system

Sparkplugs

Coils

ECU

Wiring loom

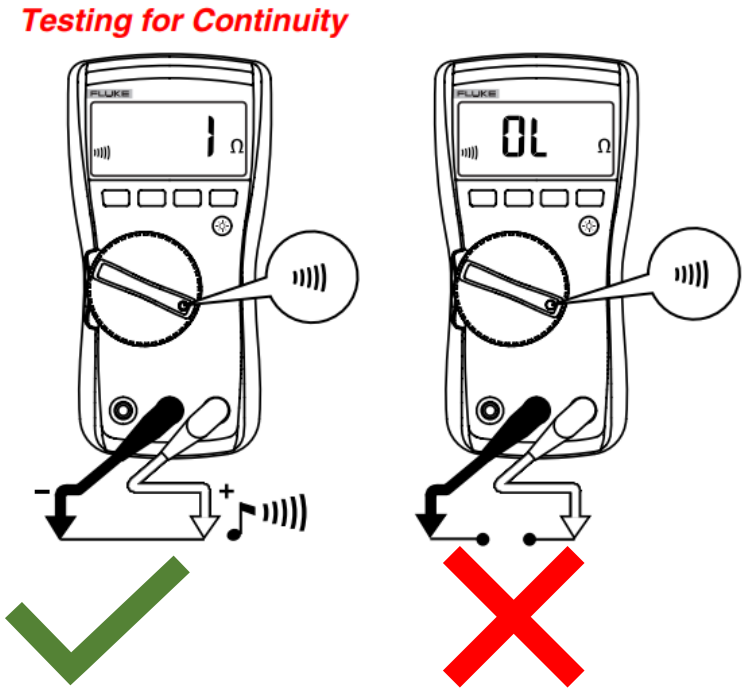
Injectors

No RPM Reading

Click text or the image above for an aspect you suspect – or, if unsure follow the sequence from left to right...

Start button, Ground cable & ECU connection

1. Check that the start button closes the circuit to the starter relay – disconnect at starter relay and check using continuity on a multimeter. Reconnect if good.
2. Visually check for presence and connection of ground cable between the engine and the airframe.
3. Check using a multimeter check for ‘continuity’, i.e. that there is no break from engine to the negative terminal on the battery. This may require sequential readings, depending on the installation.
4. Check both ECU connectors are connected and that all wires are routed and connected i.a.w. the latest installation manual for the engine. (available from ULPower.com)



Ignition cables

Check the ignition cables and connections

- Make sure that both connectors (coil side and spark plug side) are installed i.a.w. the installation manual. If not installed properly, no contact or an incorrect contact may occur.
- To check if the connectors are installed properly, pull fairly hard on both ends of the ignition cable.(coil side + sparkplug side). The connectors will remain in place if installed correctly. If they break free – REMAKE THE CONNECTION
- Check if both connectors from the wiring loom are well connected/seated to the coil
- For 4 cylinder engines (260 and 350 series) make sure that the supplied aluminium coil bracket is installed. (Omitting the coil bracket may result in a deformed coil with loss of contact inside the coil.)

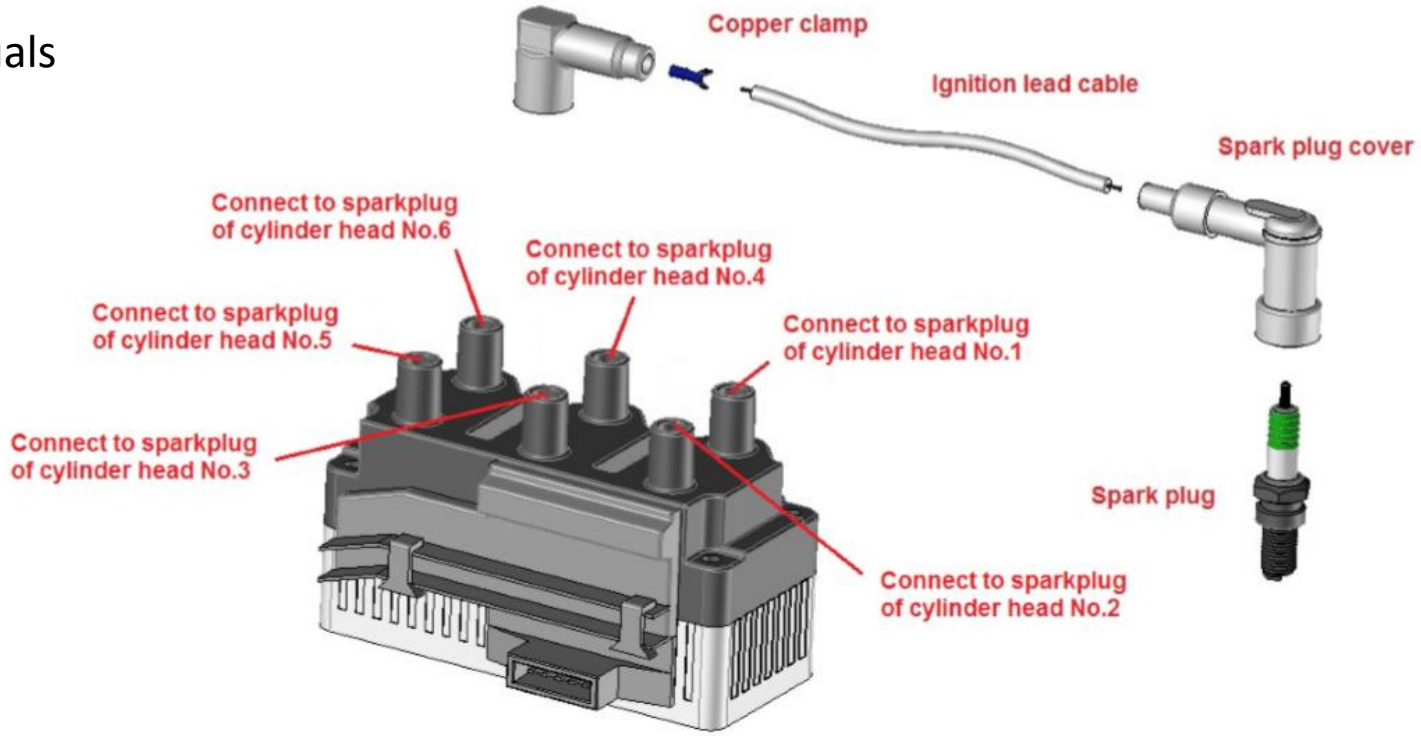
4 cylinder coils require the aluminium brackets for correct operation

Ignition cables

Check HT cable orientation (are HT cables correctly installed between cylinders/spark plugs and coils)

NOTE: for RR engines see relevant installation manuals

4 Cylinder
260/350 series



6 Cylinder
390/520 series

Fuel system

UNDERSTAND THE INSTALLATION

Normally two fuel pumps are installed, at times only one is installed. CHECK before continuing.

Depending on the installation, the main and/or auxiliary fuel pump may be commanded by the ECU via a relay.

Depending on the installation there may be a DPST switch to select pumps and/or an ‘over-ride switch’.

UNDERSTAND THE INSTALLATION YOU ARE WORKING ON BEFORE TROUBLESHOOTING.

Fuel Pump Control Relay (FPCR)

With the FPCR is fitted, when switching the ECU ON: the FPCR protected pump(s) run(s). If the engine is not started, the ECU will switch off the FPCR protected pumps after 15 seconds. If this is part of your installation – CHECK it functions correctly.

Fuel system (cont…)

Check the fuel pressure – if no/insufficient pressure then:-

1. **Can you hear the pump(s)?** If not, check the electrical connection – use a multi-meter on 'DC' setting if necessary.
2. **Is there FUEL to the Pumps?** Check fuel taps and that check valves are correct – and that fuel is in the selected tank. Check for blockages/restriction in the lines (kinks, collapsed lines etc)
3. **Do you have the right fuel lines?** You need 1/2"/12mm I.D. lines (-8) to the pumps to ensure sufficient volume at the intake.
4. **Are you sucking air?** Check pick-up points in the tanks and no weak spring drains that allow air to be sucked – if necessary provide fuel from a slave tank to test flow.
5. **Are you sure your instruments reading correctly?** To check pressure install a second analogue manometer in the fuel line. (Ask your agent for the ULP oil and fuel pressure trouble shooting kit T080001)
6. **Are the filters blocked?** Check pre-pump and fine post-pump filters for blockage, replace if necessary.
7. **Check return line** is not compromised or closed off NOTE: min 1/4"/6.35mm (-4), ideally 3/8"/9.5mm (-6)
8. **Pressure Regulator?** There might be a fuel pressure regulator problem (please contact your ULP agent)

TO SEE FUEL FLOW CHECK CLICK HERE

Spark plugs

How to check the spark at the plugs

- For safety reasons: always disconnect the fuel pump before running this test
- For both coils : put switch TO ON

Method 1:

- Remove 1 sparkplug and hold the spark to the "ground" (or use a new spark plug)
- Engage starter engine
- Check if there is a spark. CAUTION HIGH VOLTAGE!
  NOTE: You may not see the spark in bright sunlight (shield it for better visibility)

Method 2 (preferred method)

- Install a 'HT ignition lead spark tester' unit between the boot and the spark plug (you may install 4 to see all at once)

ACTION?

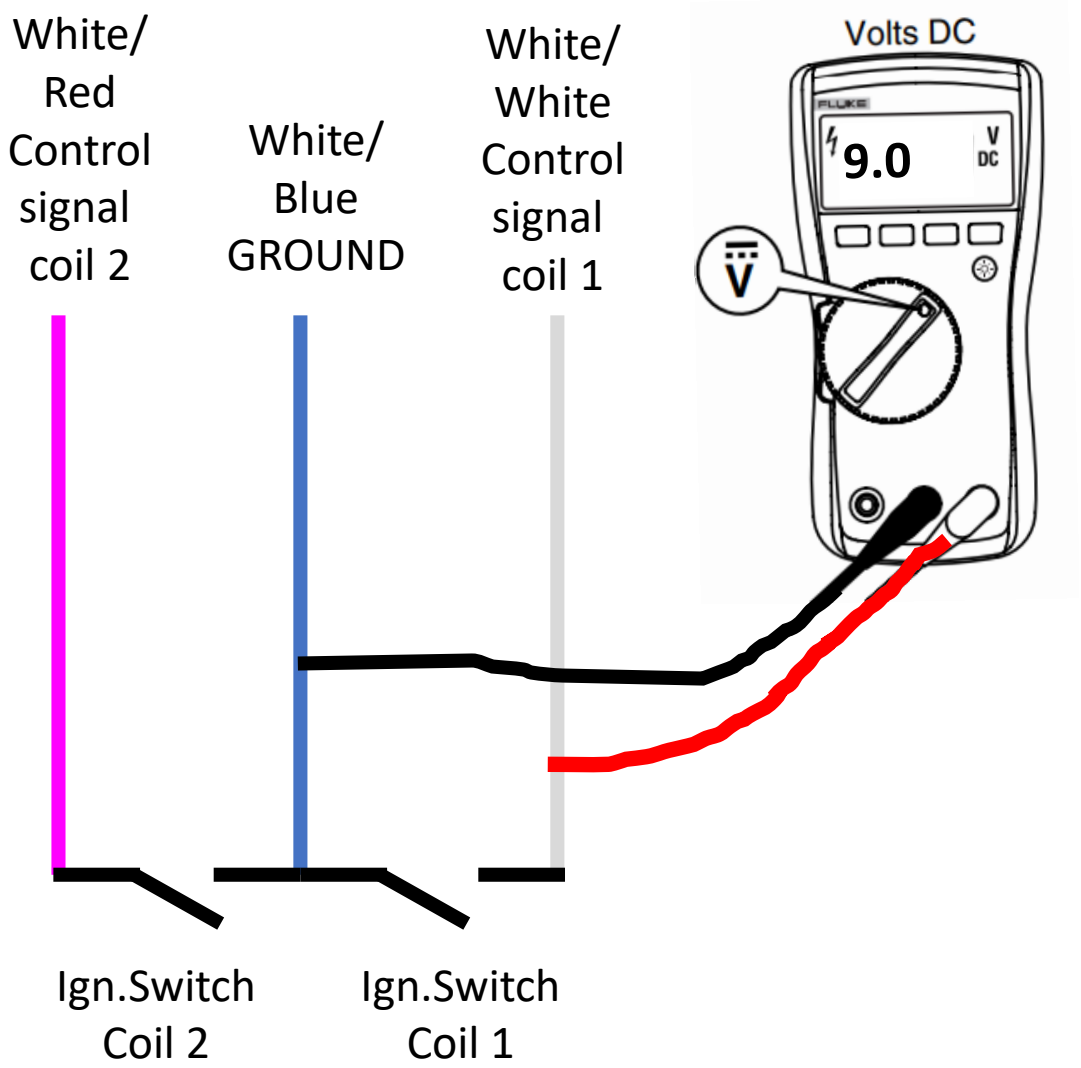
- If there is **NO** spark, go to COILS

If there **IS** a spark, go to INJECTORS

Coils

Check for a short-circuit in the wires to the coil switches

- Switch both ignition switches to ON (ie OPEN circuit) alternatively disconnect wires from switches.
- Master ON and ECU ON (NOTE ENGINE IS LIVE)
- Using a multi-meter (set to DC volts) Measure voltage between “ground” and “control signal wire” – see right.
- If you have 0v , there is a short-circuit between ground and control signal wire in the wiring loom. Check/correct/replace wiring.
- If you have 9v go to ECU troubleshooting



ECU (Engine Control Unit)

Check ECU supply voltage

The ECU needs at least 10V (even during cranking) to function. If your battery is faulty or not fully charged, the ECU will not boot and remain active – consequently there will be no spark and no injector signal.

Using a multi-meter set to DC Volts, measure the voltage at the battery terminals (min. 12 V)

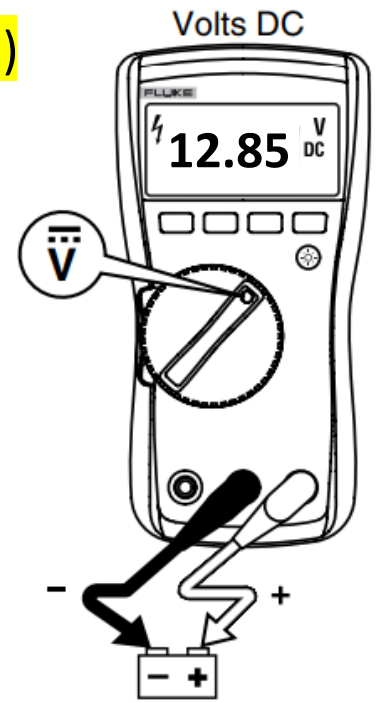
- If not ok , change battery and try to start engine again.
- If ok , disconnect both coils for safety reasons. Master ON and ECU ON (NOTE ENGINE IS LIVE)

Measure voltage between "+" and "-" on the ECU wiring loom coming from the cockpit.

TIP: Ideally use a Multi-meter which will record minimum voltage.

Engage the starter of the engine and check for voltage drop to the ECU.

If the voltage drops below 10v during cranking, relocate battery closer to the engine and/or use larger section wires. (see installation manual for more details)



Cockpit Wiring

How to check a possible wiring problem on the cockpit side

Instruments or bad wiring in the cockpit can disturb the ECU

Either

Use the ULPower TROUBLE SHOOTING WIRING LOOM (T08003) by removing the small connector from the ECU and replace with the troubleshooting loom

or

- Disconnect ALL wires from the Ecu-cockpit harness
- Insulate all wires (green, browns, grey yellow), white shrink sleeve to avoid contact with each other or ground.
- Use a separate fully charged battery (do **not** connect two batteries together)
- Connect the blue shrink sleeved wire to the battery NEGATIVE (-) side
- Connect the red shrink sleeved wire to the battery POSITIVE (+) side

Then (NOTE ENGINE IS LIVE)

Try to start the engine. If the engine starts, the problem is in the cockpit side. Check/correct/replace wiring as necessary.

If engine is still not starting, consider replacing the coils

Troubleshooting wiring loom T08003

Injectors

How to check if the injectors work

- Use the ULP injector trouble shooting kit (T080002) (shown right)
- For safety reasons : disconnect both connectors from the coils
- Disconnect a connector from the injector on cylinder 1.
- Connect the trouble shooting kit
- Master ON and ECU ON (NOTE ENGINE IS LIVE)
- Keep the additional injector close to your ear.
- Engage the starter of the engine
- Listen to hear “click – click – click”
- If no : it means that there is no signal coming from the ECU or damaged cable/loom – try another injector…
- If yes : there is a signal coming from the ECU.
  - The installed injector is possibly blocked and may have to be replaced.

If you have been through all of the above steps and still cannot identify the issue, contact your ULPower dealer .

NO RPM READING

<u>No RPM read out on the instruments</u>

Check electrical connections to the instrument

Check rpm us

Check the installation manual for the type of output signal from the ECU.

A standard VDO tachometer is able to pick up the signal and should be able to give a correct read-out

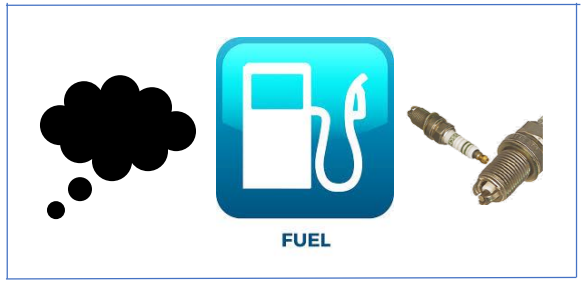
Field experience has shown that in some installations a resistor is needed between signal and +12V (1KΩ)

Contact your instrument supplier in case of problems.

An analogue VDO (2 inch / 0 – 4000 rpm) is available in the ULPower webshop to check output/values.

Troubleshooting after first start

RPM



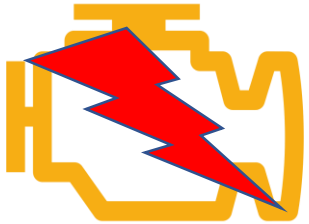
Black Smoke, High Fuel Consumption, Sooty plugs

Oil Pressure

Oil Temp

Oil Leaks/ consumption

Loss of Compression



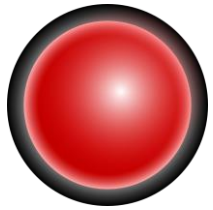
Detonation

Fuel Pump failure

CHT variations

EGT variations

Regulator/ Voltage drops



ULCheck Light

RPM

What if your engine runs out of control/ RPM unstable

DOES THE ULCHECK LIGHT COMES UP ?

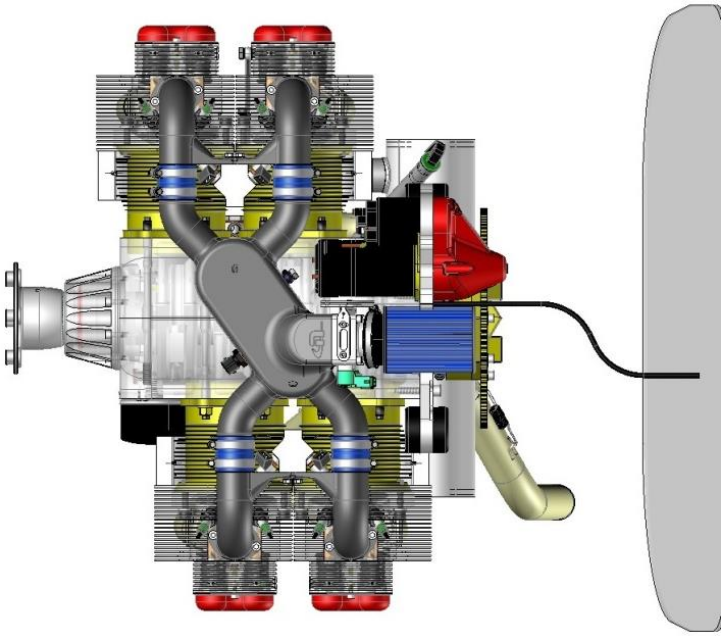
If yes, find out with ULCheck which sensor is causing it. Check connections, and if possible use ULCheck/ULread software. Identify and replace the sensor/connector or repair/replace loom if damaged. Test again.

If not, continue below

CHECK THROTTLE CABLE

As per the installation manual, the throttle cable should never be installed ‘taut’ or ‘tight’ from the engine to the firewall. Always install it with some slack. (see IM)

NB: If the throttle cable is installed under tension, the ECU may consider the engine movement (caused by vibrations pulling and releasing the throttle cable very small amounts) as a ‘request’ for continuous acceleration and therefore an increase in fuel injection, resulting in a rough running engine and/or black smoke.



Good

RPM

CHECK FOR 'FALSE' AIR/COLLAPSED LINES/OTHER SUCTION SIDE ISSUES

If the cylinder can suck air into the fuel system, or any other aspect of the fuel/air system that can affect mixture occurs it will cause inconsistent RPM readings. (increase/decrease):-

- Inspect the small hose between the airbox/manifold and the fuel pressure regulator for fit/damage.
- Check the same hose banjo eye at the airbox/manifold for torque/connection.
- Check torque on the two M6 bolts at manifold inlet tubes at each cylinder head
- Remove the air filter and check if both screws and throttle axle are still in place
- Check fuel line size, routing, condition and connections are i.a.w. manuals
- Ensure that the fuel return line is free of obstruction (check valve not stuck/incorrectly installed)
- Check filters
- Check for condition/fit of sensor connectors on airbox/manifold
- Check that fuel drains/seals are not allowing air to enter the system (eg Gascolator?)
- Check fuel tanks are not unported (the pick up pulling air from the tanks)
- Check fine screen on Pressure regulator (note only for advanced users)
- See here for more ideas

Black smoke / black spark plugs / high fuel consumption

DOES THE ULCHECK LIGHT COMES UP ?

If yes, find out with ULCheck/ULRead which sensor is causing it. Check connections, and if possible use ULCheck/ULRead software. Identify and replace the sensor/connector or repair/replace loom if damaged. Test again. If not, continue below for 'sensor faults that may not cause a ULCheck light'

- **TPS (THROTTLE POSITION SENSOR) PROBLEM**

If the TPS values are between 0.3 V (throttle closed) and 4.7 V (Wide Open Throttle) but the sensor is not working properly, resulting in an incorrect fuel/air mixture.

- **INLET AIR TEMPERATURE SENSOR (ATS) PROBLEM**

If the ATS values are reading between -20°C and +80°C the check light will not come up. However, if the sensor is not working properly (reading an incorrect temperature) the fuel/air mixture will not be correct.

- **OIL TEMPERATURE SENSOR (OTS) PROBLEM**

If the OTS values are reading between -30°C and +140°C the check light will not come up. However, if the sensor is not working properly (reading an incorrect temperature) the fuel/air mixture will not be correct.

Black smoke / black spark plugs / high fuel consumption

Install ULCHECK/ULRead to find out which sensor is misreading/not working correctly.

- Replace the TPS, ATS or OTS, if necessary

- **AIR PRESSURE SENSOR (APS) PROBLEM/INSTALLATION ISSUE**

If the APS (installed in the ECU) is not reading the air pressure 'at the entry to the air filter' an incorrect fuel/air mixture will occur. Inspect line condition, looking for cracks, kinks, connection issues. Make sure that the line is not blocked (DO NOT BLOW INTO THE LINE WHEN CONNECTED). DO NOT ATTEMPT TO OPEN THE ECU.

NOTE: Your engine ecu-map is set to run a little rich at idle (for easier starting and cold running), consequently 'black' spark plugs may be seen if inspected immediately after a period of 'idling'. To check mixture is accurate: -
Run the engine on the ground at +/- 2300 rpm for three minutes. Stop the engine using the ECU switch. (do not throttle down to idle first). Allow engine to cool and check spark plugs. If the spark plugs are grey / clear, the mixture is correct.

Oil pressure

- If you do not read positive oil pressure on start up, shut down your engine and investigate.
- Oil Pressure may be higher than usual when starting in very cold conditions, due to the viscosity of the oil. Allow oil pressure to stabilize with temperature.
- The oil pressure sensor has to be compatible with your instrument. Sometimes calibration is needed.
- We advise to install an analogue manometer (or ask your ULP agent for the oil and fuel pressure trouble shooting kit)
- Adjust the parameters on your instrument, or change the sensor until logged values are
- very close to/equal the manometer reading.
- If the oil temperature is too high, the oil pressure will drop. We advise to keep the oil
- temperature below 105°C (221°F).
- Use of the wrong type of oil may not only affect oil pressure but damage your engine.

NOTE: A well-functioning engine doesn't always need a high oil pressure. A high oil flow is as important as the oil is not only a way to lubricate your engine but also to cool it down.

Oil temperature

<u>OIL TEMPERATURE IS TOO HIGH</u>

- FAULTY SENSOR/FAULTY GAUGE

- Immerse the sensor in boiling water to check if the read-out is correct. (boiling water = +/- 100° c)
- Calibrate the senor and adjust your instrument or replace it if necessary

- LOW OIL LEVEL

Fill up to the maximum level as read on your dipstick (normally 3litres or 4litres for aerobatic engines)

INLET AIR TEMPERATURE IS TOO HIGH

If the air filter is taking in hot air due to its location inside the engine compartment, the engine temperature will rise, and consequently the oil temperature will rise also.
NOTE: max inlet air temperature = ambient air temperature + 10 °C
Consider bringing fresh air from outside the cowling, for example using a NACA duct and the ULP air inlet box (K0600001 / K0600002), and scat hose the filter to fit inside to bring fresh, cooler air to the air filter.

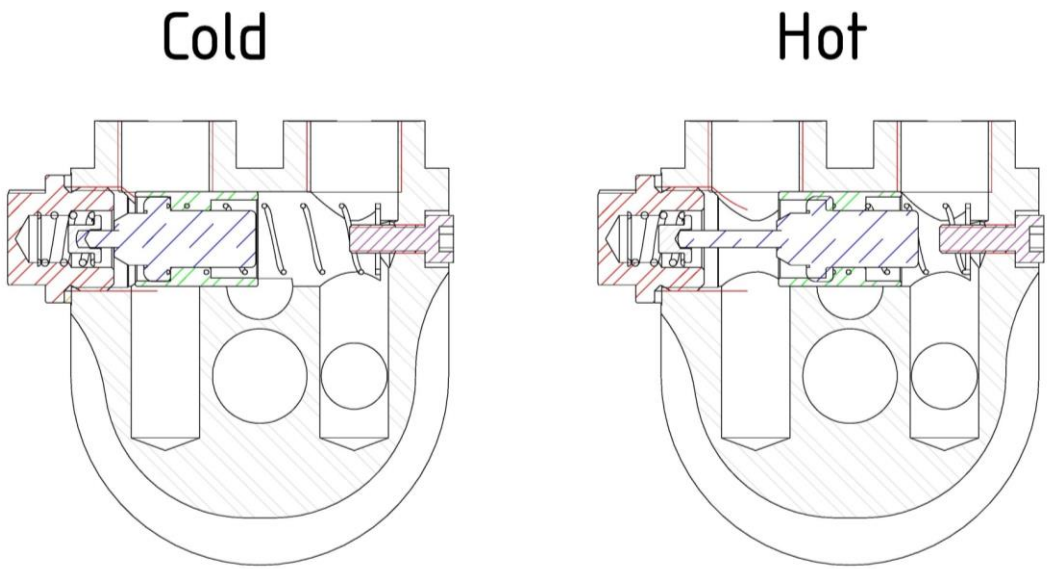
Oil temperature

INSUFFICIENTLY WORKING OIL COOLER

- Not only the oil cooler size but also the location of the oil cooler is important.
- Install the oil cooler as low as possible under the engine centre line. This ensures that the incoming air is not deviated by the turbulence around the propeller.
- Close all gaps around the cooler
- Incoming air must find an easy way out. Make sure there is no interference with the air coming through the cylinder heads and create an escape-way out of the engine room that is big enough. See installation manual for a testing procedure. Your oil cooler installation works fine if there is a delta T of at least 15°C (27°F°) (measurements at the entrance of the cooler and on the outlet)

THERMOSTAT STUCK/NOT WORKING

- If the thermostat sticks in the ‘open’ condition the engine may run cooler than expected.
- If the thermostat sticks in the ‘closed’ condition the engine may run hotter than expected.
- Consider taking thermostat housing temperature measurements



CHT: There is a big difference between cylinders

FAULTY SENSOR OR INCORRECT SETTINGS ON INSTURMENTS

- Immerse the sensor in boiling water to check if the read-out is correct. (+/- 100C)
- Calibrate the senor and adjust your instrument / replace if necessary

NO SPARK OR NO FUEL INJECTION

- check ignition system or spark plug
- check fuel injector

RAM AIRBOXES NEED MODIFICATION

- An equal amount of fresh air is required to ALL cylinder heads. Sometimes you need to modify the ram airboxes to achieve this. Check that baffle seals (if installed) are fitting correctly.

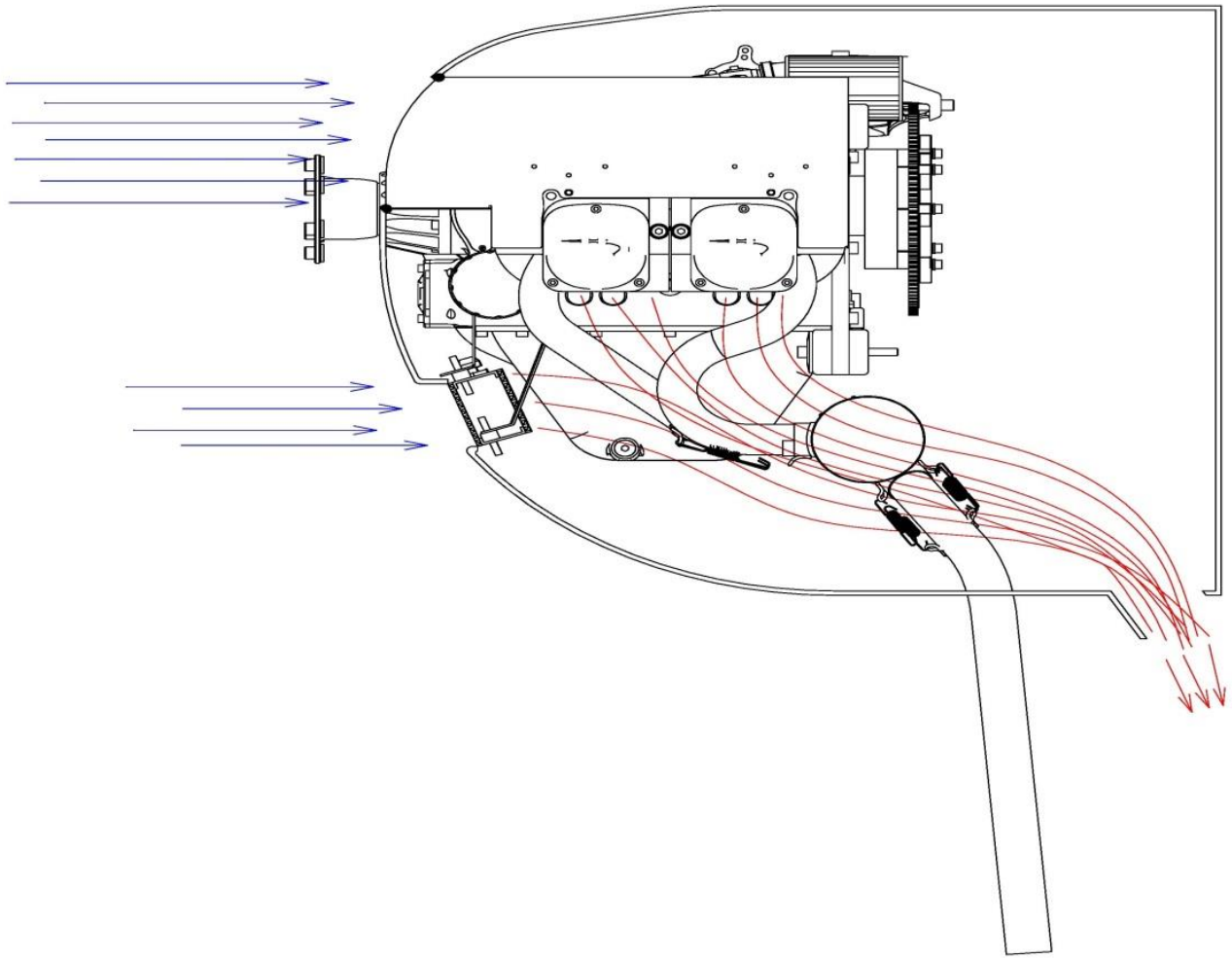
BAD VALVE CLEARANCE SETTING

- Check clearance and adjust i.a.w. latest manuals.

CHT : all temperatures are too high

Similar as to "oil temperature too high" (see here)
The installation of the ram air baffles is very important.

- Make sure that enough air can reach the air boxes.
- Close all gaps around the air boxes. That way the airflow is forced to go over the cylinder / cylinder heads.
- Incoming air must find an easy way out. Make sure there is no interference with the air coming through the oil cooler and create an escape-way out of the engine room that is big enough.
- See installation manual for a testing procedure.



EGT: Big difference between cylinders

FAULTY SENSOR OR INCORRECT SETTINGS ON INSTURMENTS

- Immerse the sensor in boiling water to check if the read-out is correct. (+/- 100C)
- Calibrate the senor and adjust your instrument / replace if necessary

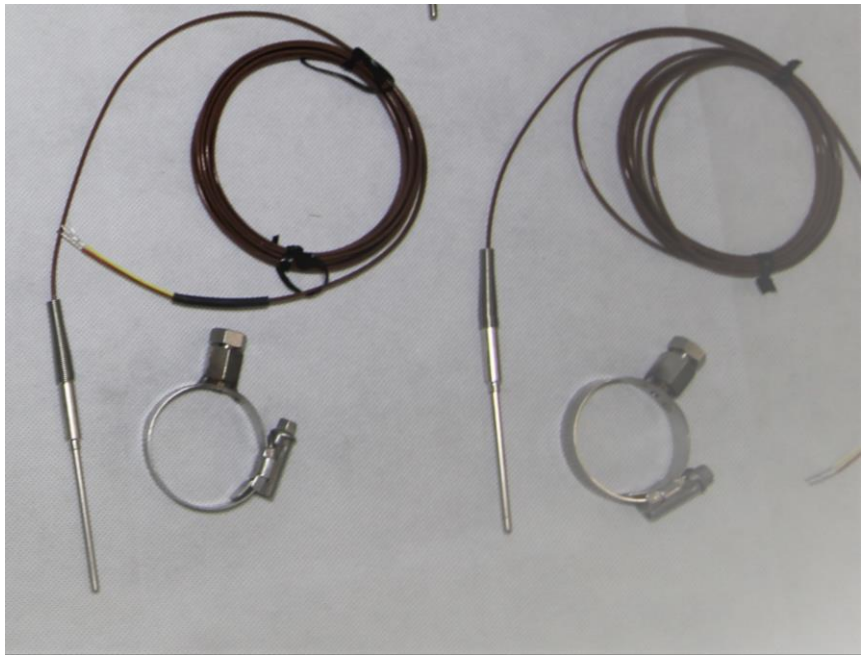
NO SPARK OR NO FUEL INJECTION

EGT is the best parameter to check if the cylinders are working properly. If the EGT value drops out completely and fast, there is no spark or fuel injection

- check ignition system or spark plug
- check fuel injector

BAD VALVE CLEARANCE SETTING

- Check clearance and adjust i.a.w. latest manuals.



Detonation

INCORRECT TYPE OF FUEL : Using fuel with an inferior octane ratio (wrong fuel or old/badly stored fuel) can lead to detonation.
Temperatures inside the cylinder heads rise quickly with a total engine failure as result.
Please read the latest engine manual/SB to know about the minimum octane ratio that is required for your engine.

MIXTURE TOO LEAN: Your ULPower engine is an injection engine. Due to continuous and copious amounts` of fresh fuel (+/- 120liters/hour) pumped through across the fuel rail, there is no risk of vapor lock or icing . However, if air is sucked by the fuel pump, it will lead to a lean mixture and higher temperatures and risk of detonation. How to prevent air suction ?

- Make sure the suction line to the fuel pump can never (whatever attitude your plane is in) suck air from the fuel tanks.
- Make sure fuel tank pickups cannot unport
- Use a fuel header tank where appropriate
- See here for more details on air entering the system

INLET AIR TEMPERATURE TOO HIGH: If the inlet air temperature is too high (max inlet air temperature = ambient air temperature + 10 °C), you not only lose a lot of power but the cylinder head temperature and the oil temperature rise. As a result of this, the detonation risk rises.

- Consider bringing fresh air from outside the cowling, for example using a NACA duct and the ULP air inlet box (K0600001 / K0600002), and scat hose for the filter to fit inside to bring fresh, cooler air to the engine.

Regulator: no power output or voltage drop

<u>No electrical power output</u>

BAD CONNECTION BETWEEN ALTERNATOR AND REGULATOR

Insufficient wire sizing, damaged wires and poor connections can result in increased resistance. This may lead to burned contacts / failure. Check wire, both connectors and replace if necessary

ALTERNATOR FAILURE

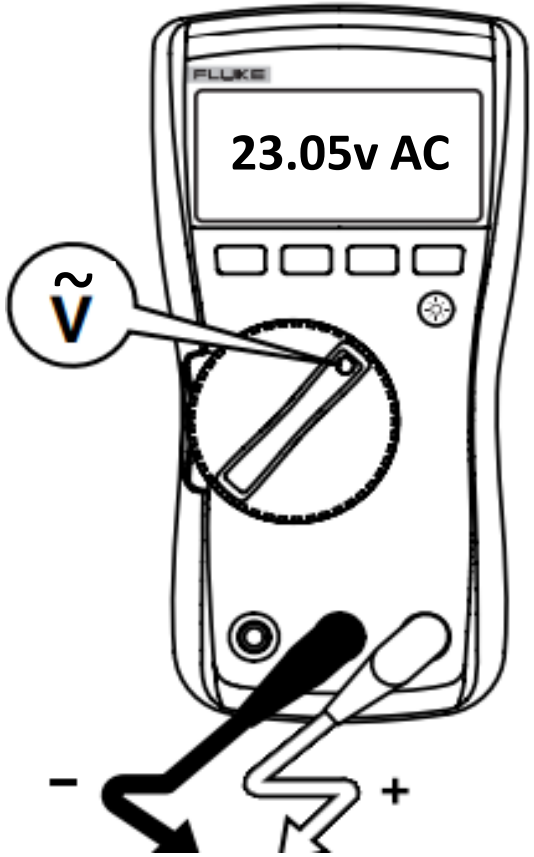
Both (30A and 50A) alternators are 3 phase AC generators.

How to check the 3 phases :

- Disconnect the 3 pin connector on the alternator wiring
- Run the engine (usual safety conditions apply)
- Carefully measure the voltage between wire 1 and 2 ; 1 and 3 ; 2 and 3 at different rpm settings
- All values should be approximately the same at each setting:-

RPM	30A alternator	50A alternator
1000	+/- 23 v	+/- 17 v
2000	+/- 50 v	+/- 34,5 v
2900	+/- 65 v	+/- 52 v

Replace the alternator if not all 3 values are +/- equal

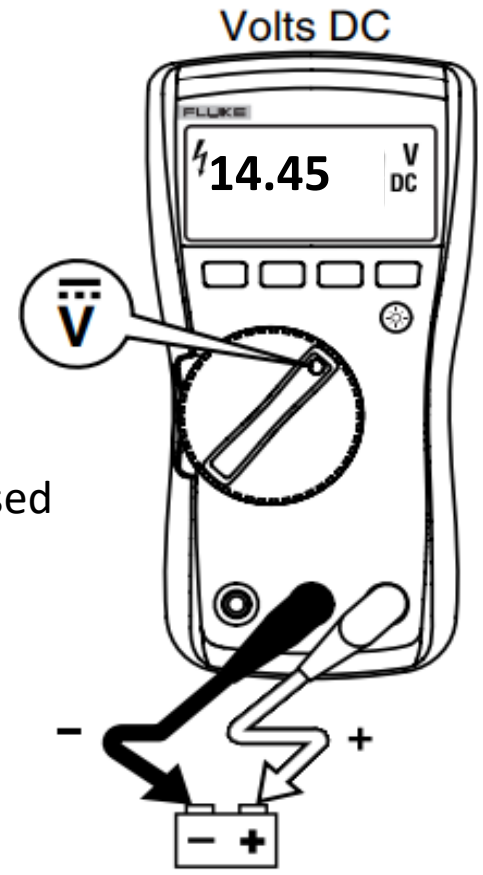


Regulator: no power output or voltage drop

REGULATOR FAILURE

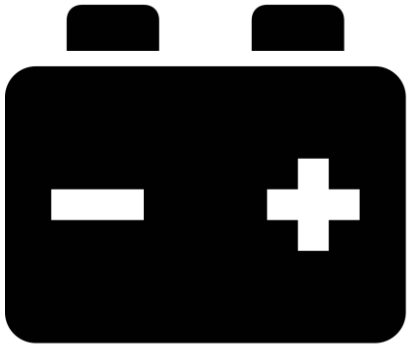
Never run the engine if the regulator is disconnected from the battery !!!!!!

- Output power (volts) depends on RPM (see alternator output)
- Measure across the battery +ve and –ve terminals with a voltmeter on ‘Volts DC’ whilst the regulator is connected and the engine is running
- A fully charged battery should read 14.3 – 14.5 V. (at least 12.5 v is needed to fly safely)



VOLTAGE DROP ON REGULATOR

Field experience has shown that in most cases a voltage drop on the regulator is generally caused by a poor battery. Replace the battery and retest.



Check light comes up

ECU "OFF" If your ECU is "off", the LED is off (you may have a test button to test your LEDs function)

ECU "ON" If there is a sensor failure TPS , oil temperature, inlet air temperature, altitude temperature or crankshaft position sensor the ULCheck light will be illuminated, indicating a sensor disconnection or failure.

- Install "UL CHECK" or "ULRead" on your PC and use the "UL CHECK CABLE"/"ULRead CABLE" to find out which sensor is causing the error.

Procedure:

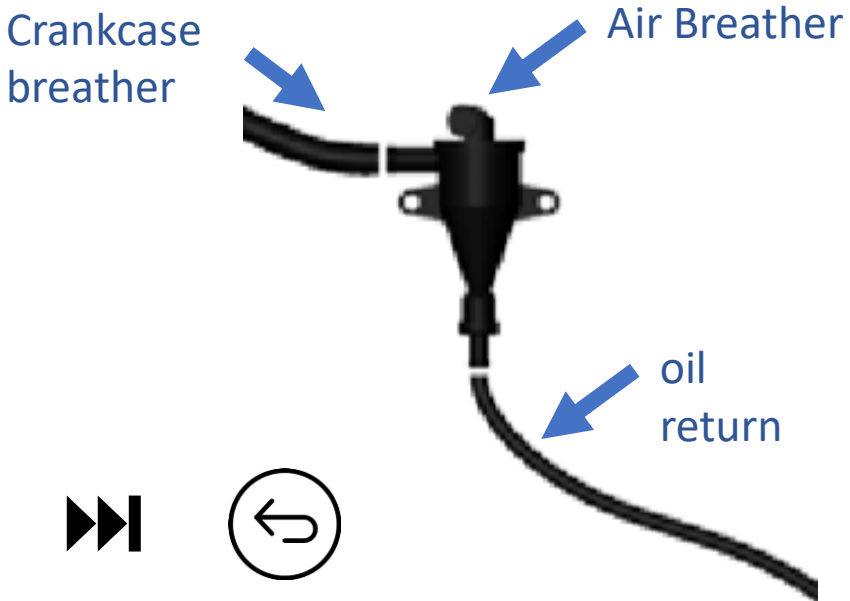
connect PC to ECU
Power "ON" to ECU
Activate the ULCHECK/ULRead PROGRAM
Indications on your PC screen are visible
Find out which sensor failed and replace.

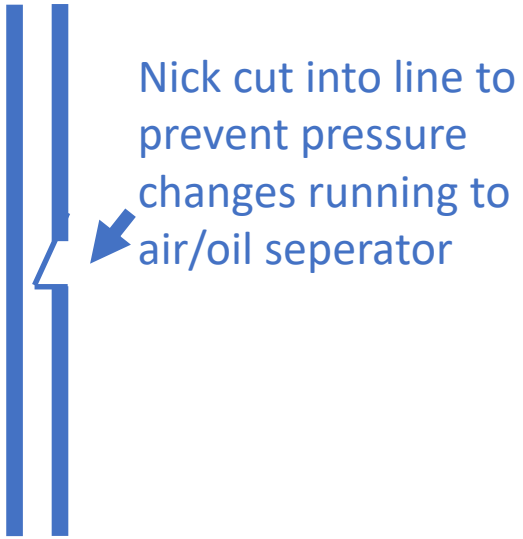
Oil leaks/Consumption

OIL/AIR BREATHER LINES BLOCKED

Under normal circumstances, a mixture of air and oil is pushed through the crankcase breather line into the oil/air separator as part of the normal venting of the crankcase. The oil flows back into the oil sump trough the oil return line. Avoid ‘loops’, blockage or misrouting of either of these lines, as this can cause oil to leak.

Air leaves the separator through the air breather line. For safety reasons, we advise to install an air breather vent line yourself. Make sure this line cannot touch the muffler or can get blocked for some reason and is installed in such a way that there is no ‘suction’ or pressure on the line. If the air cannot escape it may lead to high pressure in the engine. Likewise, if there is suction on the line (routed to a low-pressure zone without appropriate ‘line nick’) crankcase pressure may drop. In either case you may experience oil leaks as a result of these conditions.





Oil leaks/Consumption

SEALING PROBLEM

Oils seals on the front and the rear of the crankshaft or O-rings can get damaged.

- clean the engine thoroughly
- Run the engine and try to find out the exact location of the oil leak.
- Change the seal i.a.w. the latest maintenance manuals

OIL CONSUMPTION: The engine will only CONSUME oil when oil can enter the combustion chamber. Check compression for piston/ piston rings – procedure here – cracked pistons/damaged piston rings can lead to increased oil consumption. Sometimes this can be reflected in spark plug condition and oil coming out of the oil/air separator air breather line.

High oil consumption should be reported to ULPower before further flights.

Compression loss

Check the compression i.a.w. the latest manuals using an appropriate differential cylinder pressure tester/leak-down tester.
In most cases you can hear air escaping

1. Into crankcase (piston/piston rings)
2. Into exhaust (exhaust valve)
3. Into admission (inlet valve)

BAD VALVE CLEARANCE SETTING

When a valve doesn't close completely, exhaust gasses may burn the valve
Adjust clearance i.a.w. the latest maintenance manual.

BUILD UP OF LEAD DEPOSIT

100LL AVGAS contains TEL (Tetra Ethyl Lead). Consequently, when running on 100LL, lead deposits may build up on the valves and valve seats. If the valves / valve seats become contaminated, they may not close properly, resulting in a loss of compression.

- Remove the cylinder heads
- Clean the valve and valve seats carefully.
- Re install the cylinder heads i.a.w. the latest manuals, always use new cylinder gaskets.

Field experience has shown that MOGAS and other suitable unleaded fuels results in a much cleaner combustion chamber.

Compression loss

PARTIALLY BURNED VALVE

Lead deposits may prevent the valve from closing completely. When there is no longer contact between the valves and the valve seats, there is no heat transfer between the valve and the valve seats, consequently the exhaust valves are no longer cooled down. These exhaust gasses can burn away the exhaust valve.

- Check valve and replace if necessary
- Remachine/lap the valve seats as required, i.a.w. the maintenance manuals.

PISTON PROBLEM

A cracked or pitted piston and/or damaged piston rings can also result in compression loss. This can increase blow-by gasses in the crankcase and result in oil being pushed into to the oil/air separator, and leaks.

- Check pistons, piston rings and cylinder

If you have been through all of the above steps and still cannot identify the issue, contact your ULPower dealer .

Fuel pump is not working normally

Anti return valve in fuel pump is blocked / Return line is blocked

NOTE: As described in the installation manual, the return line must not be shut off even with a ‘fuel off tap’ (such as a duplex fuel tap) to allow the fuel rail to breathe. After a flight , the engine is hot but fresh fuel is in the fuel circuit. After shutting down the engine, the heat from the engine warms up the fuel inside the lines.

If the return line has been shut off, fuel cannot “escape” resulting in pressures of up to 30 bar. Such high pressure pushes the rubber anti-return valve in the fuel pump and can ‘jam’ or ‘block’ the system. On the next engine run, the fuel pump may not be able to unblock this condition. Consequently, the pump makes a strange noise and there is little or no fuel pressure in the fuel lines.

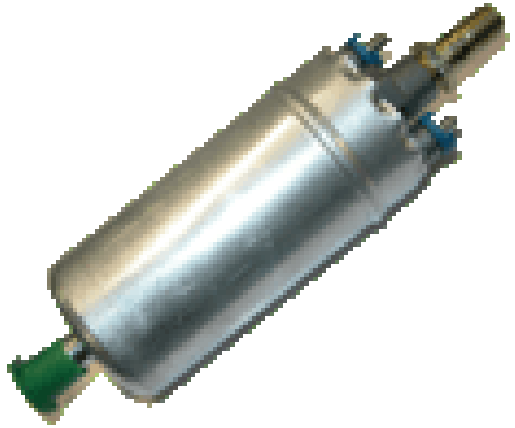
- make you sure the fuel return line cannot be shut off.
- Rectify your installation
- Change the fuel pump

Fuel supply is restricted

Check that there is a supply of fuel to the pump (fuel tap/fuel lines,etc)

Check filters

Electrical connections:

Check that the FPCR (Fuel Pump Control Relay) is working (replace if necessary)

Check electrical installation including switch function