



SI 2010/3

SERVICE INFORMATION

to all distributors, owners

Proper fuel management procedures

INFORMATION / RECOMMENDATION

Please pay attention to the following safety definitions used in this service information:

WARNING! Disregarding the following instruction leads to severe deterioration of flight safety and hazardous situations, including such resulting in serious injury and loss of life.

CAUTION! Disregarding the following instruction leads to serious deterioration of flight safety, may cause serious damage to the aircraft and suspend warranty.

Applies to all Pipistrel aircraft.

Distributors are to translate this service information into their native language and forward it to all customers as soon as possible

Please see following page(s) for further details.

Proper fuel management procedures

Pipistrel has recently seen reports of fuel starvation and consequent rough engine/engine failure, where there was still enough fuel on board. As every single reported case evidently occurred due to the same reason, we decided to issue this service information in order to caution pilots and improve the safety of flight.

The fuel system of all Pipistrel aircraft is similar – the fuel reservoirs are in the wings, there is one fuel valve per tank and one visual indicator tube per tank, which is visible from the cockpit. On this topic, Pipistrel has already published the SB06 – Fuel indication and tank management (October 2005), and there are clear warnings in the Flight manual and Maintenance manual, however the topic seems not to be respected by the pilots enough.

This is the direct outtake from the SB06 – Fuel indication and tank management (October 2005):

It has come to our attention that there may be a possibility of fuel starvation and engine shut-downs due to misinterpretation of the fuel indication (new visual fuel indicator type, transparent tube).

To prevent this event in the future from happening again, please refer to the following:

- 1. The new style fuel level indication with the clear tube indicates 25 liters/per tank at the top end of the tube (2 x 30 liters reservoirs) or 35 liters/ per tank (2 x 50 liters reservoirs). This happens because of wing dihedral. Each tank can therefore accept an additional 5 (15) liters when indicated full in the cockpit WITH 0° WING PITCH and WINGS LEVEL (other attitudes differ this indication). A visual check of the fuel quantity by opening the top cap is essential to ensure the proper fuel quantity. In flight, flying in a sideslip will also yield wrong indications!***
- 2. The unusable fuel per 30 liter tank is 2 liters, 5 liters per 50 liter tank . (Pilot and Maintenance manual Page 61.***
- 3. Models with the Rotax 912 feature a return fuel line, connected to the left tank. This implies that proper management of fuel in flight is important so as to assure no fuel loss. The procedure recommended is to close right tank fuel valve by 1/2 in cruise flight. This will provide equal flow from both reservoirs.***
- 4. The Brauniger MFD Fuel Flow indication is not entirely accurate due to the single fuel flow meter usage. Although the meter is calibrated to take the return flow into account but may not be entirely accurate in certain conditions. Regard the fuel status indication of the Brauniger as orientative. Also make sure you input the correct fuel quantity into the Brauniger after each refueling.***

Message from the above text:

The visual fuel indicator is accurate only with 0° pitch angle (horizontal flight), wings level and with NO sideslip.

When the visual fuel indicator shows a full tank, the tank is in fact not full yet (due to wing's dihedral!). A visual check by opening the fuel tank cap is necessary to verify (full) fuel status.

Brauniger Alpha MFD (or any other fuel indication on a cockpit instrument) is not entirely accurate because its indication is computed from the user input and the measurement of fuel flow. There are no actual fuel level sensors in the reservoirs.

Further, the SB06 gives the following recommendations, which still stand valid:

- *The average fuel flow of Sinus with Rotax 912, based on experience is approximately 9.5 l/hr.*
- *The average fuel flow of Virus with Rotax 912, based on experience is approximately 11.5 l/hr.*
- *During climb at max power the fuel consumption is increased. Longer climb-outs will yield higher average fuel consumption.*
- *A safer approach to fuel consumption is to perform all flight planning calculations with a 11 l/hr consumption (Sinus) and 13 l/h consumption (Virus).*
- *ALWAYS REMEMBER THAT THE USABLE FUEL IS 56 LITERS FOR THE 60 LITERS VERSION (2+2 liters unusable), 90 LITERS FOR THE 100 LITERS VERSION (5+5 liters unusable).*
- *ALWAYS PLAN YOUR FLIGHTS WITH A 30 MIN FUEL RESERVE i.e. 6 L (Minimum).*
- *Other than Standard atmospheric conditions might have a negative effect in fuel consumption.*
- *TAKE OFF AND LANDING IS TO BE PERFORMED WITH BOTH FUEL VALVES OPEN.*
- *After having established cruise flight, close the right fuel valve by ½. This will provide for equal fuel flow from both reservoirs, compensating for the return flow into the left fuel tank. IN CRUISE THE SITUATION IN THE WITH THE FUEL VALVES SHOULD BE: LEFT – FULL OPEN, RIGHT – ½ OPEN.*
- *Before longer cross country flight check the fuel quantity at the top wing filler neck opening to verify the fuel status.*

In addition, it needs to be pointed out that other fuel management techniques are also possible. There are however certain considerations that have to be made. These are also mentioned in the Flight Manual and Maintenance Manual, page 63 (Sinus 912), 61 (Virus 912), 61 (Virus SW 80/100), 70 (Taurus 503). The text reads:

WARNING! Visual fuel quantity indicator (tubes) in cockpit do not always provide relevant information about the actual fuel quantity on board. Due to reasons of wing dihedral, angle of attack, sideslip and reservoir supply point the readout may be incorrect. Flying with less than 3 cm (1 Inch) of indicated fuel (measured from the bottom of the tube upwards in any of the reservoirs) is therefore regarded as hazardous any may result in engine fuel starvation and/or engine failure.

CAUTION! Due to the position of the fuel reservoir supply point, flying in considerable sideslip for a longer time may result in fuel starvation to the engine if the fuel tank in the opposite direction of the sideslip is closed. Should this occur, righten the flight and re-open the fuel tank in question immediately to prevent engine failure.

It is understood that when the indication of fuel level in either of the tubes is less than 3 cm (1 inch) tall, there is a possibility of fuel starvation and/or engine failure. This corresponds to the un-usable fuel quantity in a certain tank.

What must be clear is that due to the position of the reservoir supply point (inboard), a considerable sideslip will produce an effect of fuel shifting towards the outboard part of the reservoir, thus exposing the supply point. The result is that instead of fuel, air will be sucked into the tubes and towards the engine. This situation is however noticeable! Even if you are flying in a side-slip condition, the visual fuel indicator (tube) will provide useful information about the fuel supply – note the Warning from the manual – if the tube indicates less than 3 cm (1 inch of fuel) it is possible that the fuel supply from that tank will be interrupted, air will be sucked into the tubes and cause engine failure, EVEN IF there is still fuel in the other fuel reservoir. Considerable side-slip may actually also cause the fuel to escape through the vents!

Message from the above text:

The visual fuel indicator provides useful information about fuel supply, even in sideslip conditions. Situation is hazardous when less than 3 cm (1 inch) of fuel is indicated in either of the fuel tanks, even if the other tank has more fuel inside.

Before checking your fuel status, make sure you are flying straight and level with no side-slip for at least one minute. Only this will provide relevant information about your fuel status.

**Fuel starvation and/or engine failure can occur even if the level of fuel is low in one tank, while the other still contains plenty of fuel.
This is a result of air being sucked into the fuel lines toward the engine.**

There are however recommendations which are the core of this Service Information, which should be respected and will provide for safe operations:

- *Avoid flying in sideslip (incorrect fuel indication, fuel loss through the vents) and check the slip indicator regularly.*
- *Always check the fuel situation before take-off, if necessary by opening the fuel reservoir caps and verifying the fuel level through the filler neck.*
- *In flight, check the fuel situation via the visual indicator tubes when in straight and level flight with no sideslip. Remember that Brauniger AlphaMFD or other instrument that indicated fuel level is for orientation only.*
- *When the fuel level is indicated low (because of sideslip condition or actual low fuel status) in one of the tanks, it is better to shut the fuel valve of that tank completely in order to prevent the air being sucked into the tube and consequent fuel starvation. Continue flying with the remaining fuel from the other tank and land with only one fuel valve open.*
- *When planning your flight, always plan for adequate fuel. The classic aviation formula for fuel calculation is:
(fuel from origin to destination + fuel from destination to alternate airfield)*1.06 + fuel for 30 minutes flight = required total fuel. (1.06 is the wind reserve factor)*

Distributors

As a distributor you are kindly ask to assist your clients should they require/wish to replace their oil sensor.

Pipistrel d.o.o. Ajdovscina
Leon Breclj, Head of Service

THIS IS THE END OF THE SERVICE INFORMATION.