



**SERVICE BULLETIN NUMBER**    **0094**    **ISSUE**    **1**    **PAGE 1 OF 4**

**TITLE**                                Notes on Rotax Service Bulletin 18 U1 97 R-1 D/E

**CLASSIFICATION**    Advisory

**APPLICABILITY**    All Pegasus aircraft powered by the ROTAX 912 engine.

## **INTRODUCTION**

It appears that premature wear has been found in certain Rotax 912/914 engines as a result, Rotax believe, of excessive use of AVGAS with its very high lead content (particularly in the USA, where the currently available AVGAS contains 4 times as much lead as previously) and the use of motor oil types that are unsuitable for operating conditions, mission profiles and type of fuel used. Rotax have taken this opportunity to point out various operating tips to minimise engine wear and maximise engine performance and longevity.

## **THE PROBLEM**

1. Many of the deposits formed in the engine are held in suspension in the oil. If enough of these contaminants reach high temperature areas such as piston rings and exhaust valve guides, they can be baked out as the engine oil evaporates and result in sticking piston rings and valves. Lead deposits can cause glazed cylinder walls.
2. High wear and excessive residues are primarily due to the use of motor oils and oil change intervals that are unsuitable for operating conditions, mission profiles and type of fuel used.
3. Excessive use of carb heat and prolonged idling can cause rich mixture, which accelerates the breakdown and contamination of engine oil.
4. Due to the extremely high lead content of AVGAS, residue formation leading to service difficulties with valve & piston ring sticking and cylinder wall glazing can occur more frequently when engines are primarily operated with AVGAS.



## THE REMEDY

1. SERVICE INTERVALS: If using AVGAS exclusively or even primarily, shorter service intervals and in particular oil change frequency must be implemented immediately (50 hours). If using unleaded fuel (92 RON) or four star leaded (super) MOGAS primarily, the standard service intervals and oil change frequency (100 hours) may be maintained.

2. FUEL USAGE: If possible, use unleaded fuel (92 RON) or MOGAS. If you have to use AVGAS, return to unleaded fuel (92 RON) or four star leaded (super) MOGAS as soon as possible.

3. OIL TYPES: Study the table in paragraph 5 for the best oil type for your operating conditions & fuel usage.

### 4. GENERAL ENGINE OPERATING TIPS:

- Keep oil temperature below 120°C for most of the operating period.
- If mission profiles or climactic conditions mean that the oil temp regularly rises above 120°C, mineral or petroleum based oils are not recommended. Use a fully synthetic oil instead.
- To avoid condensation in the oil, the oil temp must reach 100°C every operational day.
- Always adjust the oil change frequency to avoid excessive build up of sludge in the oil.
- After start-up, raise RPM to 2500-2750 as soon as possible and reduce the amount of choke used. Avoid rapid RPM changes after start-up.
- Where safe and practical, avoid over-use of carb heat.
- Engine vibration can upset the fuel metering system and lead to rich running. Regularly check pneumatic synchronisation of carbs, and check cable adjustment so that the carbs open together. Maintain the correct idle speed (1600RPM) and clean the air filters as per the Manual. In dusty conditions check the air filters regularly, clean as required.
- Avoid rapid engine cooling when descending or running at low power settings. After landing run engine at 2500-2750 until temperatures stabilise.
- Ensure your propeller is properly balanced at all times.

### 5. RECOMMENDED OILS:

#### GENERAL INFORMATION

- USE ONLY OILS WITH API CLASSIFICATION "SF" OR "SG" OR HIGHER.
- Due to high stresses in the reduction gears, Rotax recommend oil with gear additives such as good quality synthetic or semi-synthetic MOTORCYCLE OIL.
- Avoid oils for diesel engines.
- Do **NOT** use oil additives.
- If you are going to use a combination of unleaded, leaded MOGAS and AVGAS, the best oils to use are: Castrol GPS & Shell VSX4 or equivalent (see table on page 4).
- Do **NOT** use S, W or AD type light aircraft engine lubricants.



**WHEN USING UNLEADED FUEL OR FOUR STAR LEADED (SUPER) MOGAS:** The following recommendation codes apply (see table below and match code number to the following descriptions):

1. Where temperatures exceed 120°C, FULLY SYNTHETIC MOTORCYCLE OIL WITH GEAR ADDITIVES is **highly recommended**. Use **ONLY unleaded fuel**.
2. For operations below 120°C and for high temperature operations above 120°C, SEMI-SYNTHETIC MOTORCYCLE OIL WITH GEAR ADDITIVES is **highly recommended**. Use **leaded or unleaded fuel**.
3. Where temperatures exceed 120°C, FULLY SYNTHETIC MOTOR OIL is also recommended, but it does not have the benefit of gear additives. Use **ONLY unleaded fuel**.
4. For operations below 120°C SEMI-SYNTHETIC MOTOR OIL is also recommended, but it does not have the benefit of gear additives. Use **leaded or unleaded fuel**.

BRAND	DESCRIPTION	SPEC	Viscosity	Code
Castrol	Formula SLX	API SH/CF	SAE 10 W-30	3
Castrol	GTX Magnatec	API SJ	SAE 10 W-40	4
Castrol	GPS	API SG/CD	SAE 10 W-40	2
Castrol	RS	API SG/CD	SAE 10 W-60	3
Castrol	Superbike	API SG	SAE 5 W-40	1
Castrol	Syntech Full Synthetic	API SJ	SAE 10 W-30	3
Castrol	Syntech Full Synthetic	API SJ	SAE 20 W-50	3
Castrol	Syntech Blend	API SJ	SAE 10 W-30	4
Castrol	Syntech Blend	API SJ	SAE 5 W-50	4
Elf	MotoXT 4	API SG	SAE 10 W-50	1
Mogul	3100 Synthetic Blend	API SJ	SAE 10 W-40	2
Mobil	Mobil 1	API SJCF	SAE 5 W-50	3
Shell	Advance VSX 4	API SG	SAE 20 W-40	2
Shell	Advance Ultra 4	API SG	SAE 10 W-40	1
Shell	Formula Shell Synthetic Blend	API SJ	SAE 10 W-30	4
Shell	Rotella SB High Performance Synthetic Blend	API SH	SAE 10 W-40	4
Pennzoil	Performax 100	API SJ	SAE 5 W-50	3
Valvoline	High Performance Synthetic	API SJ	SAE 5 W-30	3
Valvoline	High Performance Synthetic	API SJ	SAE 20 W-50	3
Valvoline	DuraBlend Synthetic	API SJ	SAE 10 W-40	4

**WHEN USING MAINLY AVGAS:** (mainly = more than 30% operating time)

The following maintenance operations are necessary every 50 HOURS MAX.

- Change oil filter
- Change oil

In addition, compliance with the following operating conditions is required:

- avoid extended or unnecessary use of carb heat
- avoid prolonged periods of low speed idling

Use the following oils and respect the oil specification.



The following recommendation codes apply (see table below and match code number to the following descriptions):

2. For operations below 120°C and for high temperature operations above 120°C, SEMI-SYNTHETIC MOTORCYCLE OIL WITH GEAR ADDITIVES is **highly recommended**. Use **leaded (AVGAS) or unleaded fuel**.
4. For operations below 120°C and for high temperature operations above 120°C, SEMI-SYNTHETIC MOTOR OIL is also recommended, but it does not have the benefit of gear additives. Use **leaded (AVGAS) or unleaded fuel**.
5. PETROLEUM BASED MOTORCYCLE OIL WITH GEAR ADDITIVES is **highly recommended** for use when oil temperatures remain below 120°C.
6. PETROLEUM BASED MOTORCYCLE OIL is recommended for use when oil temperatures remain below 120°C.

BRAND	DESCRIPTION	SPEC	Viscosity	Code
Castrol	GTX Magnatec	API SJ	SAE 10 W-40	4
Castrol	GPS	API SG/CD	SAE 10 W-40	2
Castrol	GP	API SG	SAE 10 W-40	5
Castrol	Syntech Blend	API SJ	SAE 10 W-30	4
Castrol	Syntech Blend	API SJ	SAE 5 W-50	4
Motul	3100 Synthetic Blend	API SJ	SAE 10 W-40	2
Shell	Advance VSX 4	API SG	SAE 20 W-40	2
Shell	Formula Shell Synthetic Blend	API SJ	SAE 10 W-30	4
Shell	Rotella SB High Performance Synthetic Blend	API SH	SAE 10 W-40	4
Shell	Formula Shell	API SJ	SAE 10 W-30	6
Shell	Formula Shell	API SJ	SAE 20 W-50	6
Pennzoil	PZL Turbo Motor Oil	API SJ	SAE 10 W-30	6
Pennzoil	GT Performance	API SJ	SAE 20 W-50	6
Valvoline	Durablend Synthetic	API SJ	SAE 10 W-40	4
Valvoline	All Climate	API SJ	SAE 10 W-40	6
Valvoline	All Climate	API SJ	SAE 20 W-50	6

### CONCLUSION

If you intend to use a combination of unleaded, leaded and AVGAS in your general operations, **CASTROL GPS MOTORCYCLE OIL OR SHELL VSX4** or equivalent are the only oils that are recommended. If using AVGAS reduce oil change intervals to 50 hours. Oil temperature should reach at least 100°C on each days flying. An oil cooler jacket will soon be available to help maintain 100°C oil temperature, but the maximum oil temperature of 140°C must be observed at all times.

<b>ISSUED BY</b>	<b>DATE</b>
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Chief Engineer		Date
Production Director		Date

Sales Director		Date
Managing Director		Date