LEP) List of effective pages

Chapter	Page	Date
	cover page	
INTRO	INTRO-1	01 01 2012
	INTRO-2	01 01 2012
LEP	LEP-1	08 01 2015
	LEP-2	01 01 2012
TOA	TOA-1	08 01 2015
	TOA-2	01 01 2012
	TOA-3	08 01 2015
	TOA-4	01 01 2012
1	1-1	08 01 2015
	1-2	01 01 2012
	1-3	01 01 2012
	1-4	01 01 2012
	1-5	01 01 2012
	1-6	08 01 2015
	1-7	08 01 2015
	1-8	08 01 2015
	1-9	01 01 2012
	1-10	01 01 2012
	1-11	04 01 2014
	1-12	08 01 2015
	1-13	01 01 2012
	1-14	08 01 2015
2	2-1	08 01 2015
	2-2	08 01 2015
	2-3	08 01 2015
	2-4	01 01 2012
	2-5	08 01 2015
	2-6	01 01 2012
	2-7	01 01 2012
	2-8	01 01 2012
3	3-1	08 01 2015
	3-2	01 01 2012
	3-3	01 01 2012
	3-4	01 01 2012
	3-5	01 01 2012
	3-6	08 01 2015
	3-7	10 01 2013
	3-8	08 01 2015
	3-9	08 01 2015
	3-10	04 01 2014
	3-11	08 01 2015
	3-12	08 01 2015
	3-13	08 01 2015
	3-14	08 01 2015
	3-15	08 01 2015
	3-16	04 01 2014
4	4-1	08 01 2015
	4-2	08 01 2015
	4-3	08 01 2015
	4-4	01 01 2012
	4-5	08 01 2015
	4-6	01 01 2012
	4-7	01 01 2012
	4-8	08 01 2015
	4-9	04 01 2014
	4-10	01 01 2012
5	5-1	08 01 2015
	5-2	08 01 2015
	5-3	08 01 2015
	5-4	08 01 2015
	5-5	08 01 2015
	5-6	08 01 2015
6	6-1	01 01 2012
	6-2	01 01 2012
7	7-1	08 01 2015
	7-2	01 01 2012
	7-3	01 01 2012
	7-4	08 01 2015
	7-5	08 01 2015
	7-6	08 01 2015
	7-7	01 01 2012
	7-8	08 01 2015
	7-9	08 01 2015
	7-10	08 01 2015
	7-11	08 01 2015
	7-12	08 01 2015
8	8-1	04 01 2014
	8-2	01 01 2012
9	9-1	08 01 2015
	9-2	01 01 2012
	9-3	01 01 2012
	9-4	01 01 2012
	9-5	08 01 2015
	9-6	08 01 2015
	rear page	

d06215.fm

NOTES

TOA) Table of amendments

Approval*

The technical content of this document is approved under the authority of DOA no. EASA.21J.048

current no.	chapter	page	date of change	remark for approval	date of approval from authorities	date of inclu-sion	signa-ture
0	1 up to 9	all	01 01 2012				
1	LEP	LEP-1	07 01 2012	DOA*			
1	TOA	TOA-1, 3	07 01 2012	DOA*			
1	1	1-11, 11-12	07 01 2012	DOA*			
1	2	2-2, 2-3	07 01 2012	DOA*			
1	4	4-2	07 01 2012	DOA*			
2	LEP	LEP-1	04 01 2014	DOA*			
2	TOA	TOA-1, 3	04 01 2014	DOA*			
2	1	1-6,1-11,1-14	04 01 2014	DOA*			
2	2	2-2, 2-3, 2-5	04 01 2014	DOA*			
2	3	3-1, 3-6,	04 01 2014	DOA*			
		3-8 to 3-16	04 01 2014	DOA*			
2	4	4-8, 4-9	04 01 2014	DOA*			
2	5	5-2 to 5-6	04 01 2014	DOA*			
2	7	7-5, 7-6	04 01 2014	DOA*			
2	8	8-1	04 01 2014	DOA*			
2	9	9-8	04 01 2014	DOA*			
3	LEP	LEP-1	08 01 2015	DOA*			
3	TOA	TOA-1,3	08 01 2015	DOA*			
3	1	1-1 1-6 to 1-8	08 01 2015	DOA*			
		1-12, 1-14	08 01 2015	DOA*			
3	2	2-1 to 2-3,	08 01 2015	DOA*			
		2-5	08 01 2015	DOA*			
3	3	3-1, 3-6, 3-8,	08 01 2015	DOA*			
		3-9, 3-11 bis	08 01 2015	DOA*			
		3-15	08 01 2015	DOA*			
3	4	4-1 to 4-3,	08 01 2015	DOA*			
		4-5, 4-8	08 01 2015	DOA*			
3	5	all	08 01 2015	DOA*			
3	7	7-1,7-4 to 7-6	08 01 2015	DOA*			
		7-8 to 7-12	08 01 2015	DOA*			
3	9	9-1, 9-5, 9-6	08 01 2015	DOA*			

NOTES

TOA) Summary of amendments

Content Summary of the relevant amendments in this context, but without any claim to completeness.

Current No.	Chapter	Page	Date of change	Comments
1	1	1-11	07 01 2012	Standard version corrected
1	1	1-12	07 01 2012	Certification supplemented
1	2	2-2	07 01 2012	Oil pressure
1	2	2-3	07 01 2012	Ambient temperature
1	4	4-2	07 01 2012	Available landing site
2	1	1-11,1-14	04 01 2014	Standard version corrected, Note added
2	2	2-2, 2-3	04 01 2014	Notice added,EGT temperature changed, [psi] values corrected
		2-5	04 01 2014	AVGAS description corrected
2	3	3-8 to 3-16	04 01 2014	Engine Start-, Check-, Take-off-, Shut down procedure changed/updated
2	4	4-8, 4-9	04 01 2014	Text corrected, step added
2	5	5-2 - 5-6	04 01 2014	New charts + POWER/ECO description
2	7	7-5, 7-6	04 01 2014	General note: text added, new grafic
2	8	8-1	04 01 2014	Note added
2	9	9-8	04 01 2014	Distributor for Pakistan added
3	1	1-6,1-7,1-11,	08 01 2015	Change of text
	1	1-12,1-14	08 01 2015	Change of text
3	2	2-1 to 2-5	08 01 2015	Change of text
3	3	3-1, 3-8, 3-9,	08 01 2015	Change of text
	3	3-11 to 3-15	08 01 2015	Change of text
3	4	4-1 to 4-3, 4-5,	08 01 2015	Change of text
	4	4-8	08 01 2015	Change of text
3	5	5-2, 5-5	08 01 2015	New graphics
	5	5-4	08 01 2015	Change of text performance
3	7	7-1, 7-4, 7-5,	08 01 2015	New illustration
		7-9, 7-11	08 01 2015	Change of text
3	9	9-1, 9-5	08 01 2015	Delete of distributor

NOTES

1) General note

Foreword

Before operating the engine, carefully read this Operators Manual. The Manual provides you with basic information on the safe operation of the engine.

If any passages of the Manual are not clearly understood or in case of any questions, please contact an authorized Distributor or Service Center for ROTAX aircraft engines.

We wish you much pleasure and satisfaction flying your aircraft with this ROTAX aircraft engine.

Table of contents

This chapter of the Operators Manual contains general and safety information concerning the operation of the aircraft engine.

1.1) General note

Purpose

The purpose of this Operators Manual is provided to familiarize the owner/user of this aircraft engine with basic operating instructions and safety information.

Documentation

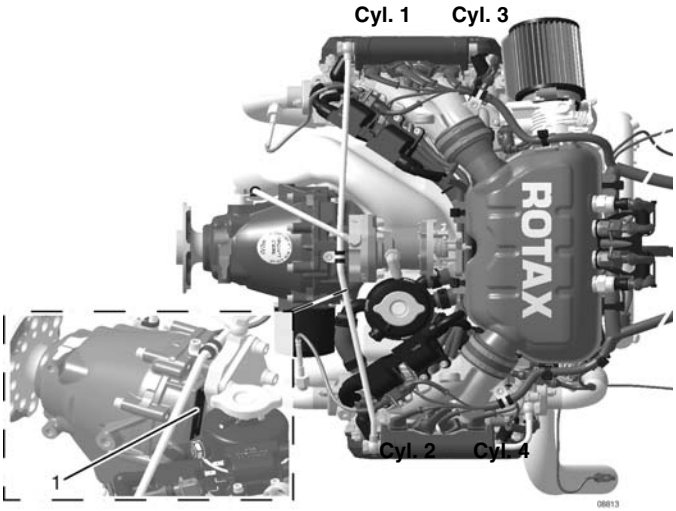
For more detailed information regarding, maintenance, safety- or flight operation, consult the documentation provided by the aircraft manufacturer and/or dealer.

For additional information on engines, maintenance or parts, you can also contact your nearest authorized ROTAX-aircraft engine distributor (Chapter 9.2).

Engine serial number

When making inquiries or ordering parts, always indicate the engine serial number, as the manufacturer makes modifications to the engine for product improvement.

The engine serial number is located on the top of the crankcase, behind of the propeller gearbox. See Fig. 1.



Part	Function
1	Engine serial number

Fig 1

d06217.fm

1.3) Safety

General note

Although the reading of such information does not eliminate the hazard, understanding the information will promote its correct use. Always use common workshop safety practice.
The information and components-/system descriptions contained in this Manual are correct at the time of publication.
BRP-Powertrain, however, maintains a policy of continuous improvement of its products without imposing upon itself any obligation to install them on its products previously manufactured.

Revision

BRP-Powertrain reserves the right at any time, and without incurring obligation, to remove, replace or discontinue any design, specification, feature or otherwise.

Measure

Specifications are given in the SI metric system with the USA equivalent in parenthesis.

Translation

This document has been translated from German language and the original German text shall be deemed authoritative.

Symbols used

This Manual uses the following symbols to emphasize particular information. This information is important and must be observed.

⚠ **WARNING** — **Identifies an instruction which, if not followed, may cause serious injury including the possibility of death.**

⚠ **CAUTION** — **Identifies an instruction which, if not followed, may cause minor or moderate injury.**

NOTICE — **Denotes an instruction which, if not followed, may severely damage the engine or other components.**

NOTES: **Indicates supplementary information which may be needed to fully complete or understand an instruction.**

ENVIRONMENTAL NOTE

Environment note gives you tips and behaviors to environmental protection.

A revision bar outside of the page margin indicates a change to text or graphic.

d06217.fm

1.4) Safety notice

Normal use

⚠ WARNING

Non-compliance can result in serious injuries or death!
Never fly the aircraft equipped with this engine at locations, airspeeds, altitudes, or other circumstances which do not allow a successful no-power landing after sudden engine stoppage.

- This engine is not suitable for aerobatics (inverted flight, etc.). Flight attitudes outside the permissible limits are not allowed.
- This engine shall not be used on rotorcrafts whose rotors are driven by the engine throughout the flight (e.g. helicopters).
- It should be clearly understood that the choice, selection and use of this particular engine on any aircraft is at the sole discretion and responsibility of the aircraft manufacturer, assembler and owner/user.
- Due to the varying designs, equipment and types of aircraft, BRP-Powertrain grants no warranty or representation on the suitability of its engine's use on any particular aircraft. Further, BRP-Powertrain grants no warranty or representation of this engine's suitability with any other part, components or system which may be selected by the aircraft manufacturer, assembler or user for aircraft application.

⚠ WARNING

Non-compliance can result in serious injuries or death!
For each use of VFR or IFR in an aircraft the applicable requirements and other existing regulations must be adhered to.

- Certain areas, altitudes and conditions present greater risk than others. The engine may require humidity or dust/sand preventative equipment, or additional maintenance may be required.
- You should be aware that any engine may seize or stall at any time. This could lead to a crash landing and possible severe injury or death. For this reason, we recommend strict compliance with the maintenance and operation instructions and any additional information which may be given to you by your dealer.

Training

- Whether you are a qualified pilot or a novice, complete knowledge of the aircraft, its controls and operation is mandatory before a solo flight. Flying any type of aircraft involves a certain amount of risk. Be informed and prepared for any situation or hazard associated with flying.
- A recognized training program and continued education for piloting an aircraft is absolutely necessary for all aircraft pilots. Make sure you also obtain as much information as possible about your aircraft, its maintenance and operation from your dealer.
- Engine-specific training courses are provided by authorized distributors according to manufacturer specifications (iRMT).

Regulations

- Respect all legal requirements or local rules pertaining to flight operation in your flying area. Only fly when and where conditions, topography, and airspeeds are safest.
- Consult your aircraft dealer or manufacturer and obtain the necessary information, especially before flying in new areas.

Instrumentation

- Select and use proper aircraft instrumentation. This instrumentation is not included in the ROTAX engine package. Verification to the latest regulations such as FAR or EASA has to be conducted by the aircraft manufacturer.

Engine log book

- Keep an engine log book and respect engine and aircraft maintenance schedules. Keep the engine in top operating condition at all times. Do not operate any aircraft which is not properly maintained or has engine operating irregularities which have not been corrected.

Maintenance (iRMT)

- Before flight, ensure that all engine controls are operative. Make sure all controls can easily be reached in case of an emergency.
- Since special training tools and equipment are required, engine servicing shall only be performed by an authorized ROTAX aircraft engine distributor or its Service Centers. BRP-Powertrain requires that any service or maintenance work must be carried out and verified by a technician that has a current iRMT rating.

- When in storage protect the engine and fuel system from contamination and exposure.

Engine run

- Never operate the engine without sufficient quantities of operating fluids (oil, coolant, fuel).
- Never exceed the maximum permitted operational limits.
- In the interest of safety, the aircraft must not be left unattended while the engine is running.
- To eliminate possible injury or damage, ensure any loose equipment or tools are properly secured before starting the engine.
- Allow the engine to cool at idle for several minutes before turning off the engine.

Vacuum pump

- This engine may be equipped with a vacuum pump. The safety warning accompanying the vacuum pump must be given to the owner/operator of the aircraft into which the vacuum pump is installed.

Governor

- This engine may be equipped with a governor. The safety warning accompanying the governor must be given to the owner/operator of the aircraft into which the governor is installed.

1.6) Standard version

Serial production

- 4-stroke, 4 cylinder horizontally opposed, spark ignition engine, single central camshaft push rods - OHV
- Liquid cooled cylinder heads
- Ram air cooled cylinders
- Dry sump forced lubrication
- Fully redundant electronic engine management (EMS) includes fuel injection, characteristic ignition, etc.
- Propeller drive via gearbox with integrated mechanical shock absorber and overload clutch
- Oiltank
- Electric starter (12 V 0.8 kW)
- Fuel pump assy.

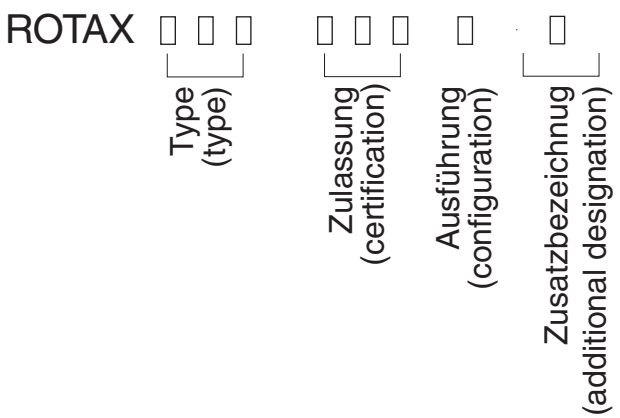
Optional

- Preparation for hydraulic governor for constant speed propeller: (configuration 3 only)
- Exhaust system
- Cooling air baffle
- Engine suspension frame

1.7) Type description

e.g. 912 iSc 3

The type description consists of the following parts:



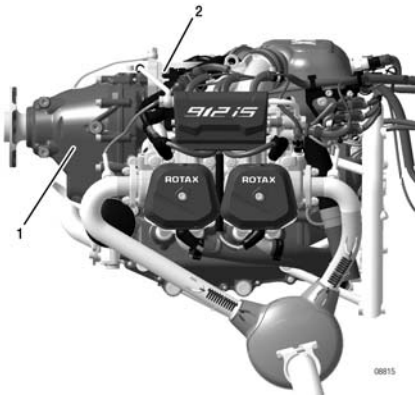
Designation

Designation		Description
Type	**912**	4-cyl. horizontally opposed, normal aspirated engine
Certification	**iSc**	Certified to EASA CS-E (TC No. EASA.E.121)
	iS	Approved according to ASTM F2339
Configuration	**2**	Prop shaft with flange for fixed prop.
	3	Prop shaft with flange for constant speed propeller and drive for hydraulic governor for constant speed propeller.
Additional designation		standard version
	Sport	version with improved torque curve

d06217.fm

1.8) Engine components, engine views, cylinder designation

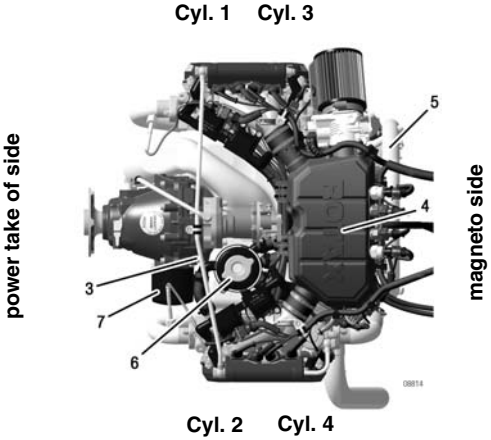
Side view



Part	Function
1	Propeller gear box
2	Vacuum pump or hydraulic governor for constant speed propeller

Fig. 2

Top view



Part	Function
3	Engine serial number
4	Airbox
5	Electric starter
6	Expansion tank with excess pressure valve
7	Oil filter

Fig. 3

1.9) Technical data

See table

Description	912 i Series
Bore	84 mm (3.31 in)
Stroke	61 mm (2.40 in)
Displacement	1352 cm^3 (82.5 in^3)
Compression ratio	10.8:1

1.10) Direction of rotation

Direction of rotation on propeller shaft

Direction of rotation on propeller shaft: counter clockwise, viewed from the front.

normal direction of propeller rotation (engine)

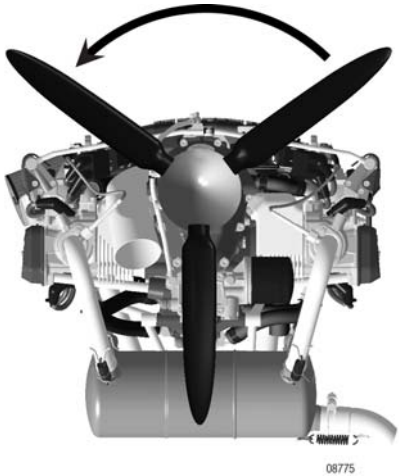


Fig. 4

2) Operating instructions

Introduction

The data of the certified engine are based on the type certificate of engine type 912 iSc and 912 iSc Sport.

NOTE: ROTAX 912 i Series includes 912 iS, 912 iS Sport and 912 iSc Sport.

Table of contents

This chapter of the Operators Manual contains the operating limits that must be observed to ensure the ROTAX aircraft engine and standard systems operate safely.

2.1) Operating limits

Performance

NOTICE

If the limit is exceeded, the engine must be operated so that this value falls back into the allowed range. **Carry out the instructions for abnormal operation!**

- Standard engine (incl. input rating for governor). Without auxiliary equipment (e.g. external alternator).
- Installation in accordance with installation guidelines (e.g. intake and exhaust system). See latest Installation Manual.
- ISA Condition (**I**nternational **S**tandard **A**tmosphere).

Engine type	iS	iS Sport	iSc Sport
Take-off performance	73.5 kW (100 HP) at 5800 rpm	73.5 kW (100 HP) at 5800 rpm	73.5 kW (100 HP) at 5800 rpm
Max. continuos performance	69 kW (93 HP) at 5500 rpm	72 kW (97 HP) at 5500 rpm	72 kW (97 HP) at 5500 rpm

Take-off performance	73.5 kW (100 HP) at 5800 rpm
Max. continuous performance	69 kW (93 HP) at 5500 rpm

Speed

Take-off speed	5800 rpm (max. 5 min)
Max. continuous speed	5500 rpm
Idle speed	min. 1400 rpm

Acceleration

Limit of engine operation at zero gravity and in **negative** ”**g**” condition.

Max.	5 seconds at max. -0.5 g

Oil pressure

Max.	7 bar (102 psi)
NOTICE	For a short period admissible at cold start.
Min.	0.8 bar (12 psi) (below 3500 rpm)
Normal	2.0 to 5.0 bar (29-73 psi) (above 3500 rpm)

d06218.fm

Oil temperature

See also Chapter 2.4).

Max.	130 °C (266 °F)
Min.	50 °C (120 °F)
Normal operating temperature	approx. 90 to 110 °C (190 - 230 °F)

EGT

Exhaust gas temperature

Max.	950 °C (1742 °F)

Coolant temperature

Coolant temperature	
Max.	120 °C (248 °F)

Ambient temperature

Max. in flight	60 °C (140 °F) (manifold temperature)
Max. at start	50 °C (120 °F) (ambient temperature)
Min. at start	-20 °C (-13 °F) (oil temperature)

Fuel pressure

Max.	3.2 bar (46.5 psi)
Min.	2.8 bar (40.5 psi)

Propeller governor

Power consumption of the hydraulic propeller governor	
Max.	600 W

External alternator

Power consumption of the external alternator	
Max.	600 W

Bank angle

Deviation from bank angle	
Max.	40°

NOTE: Up to this value the dry sump lubrication system warrants lubrication in every flight situation.

2.2) Operating media-Coolant

General note

NOTICE Obey the latest edition of Service Instruction SI-912 i-001 for the selection of the correct coolant.

Conventional coolant

Conventional coolant mixed with water has the advantage of a higher specific thermal capacity than water-less coolant.

Application

When correctly applied, there is sufficient protection against vapor bubble formation, freezing or thickening of the coolant within the operating limits.

Use the coolant specified in the manufacturers documentation.

Mixture

NOTICE Obey the coolant manufacturers instructions about the coolant mixture.

	mixture ratio %	
designation	**concentrate**	**water**
Conventional e.g. BASF Glysantine Protect Plus G48 anticorrosion	50	50

d06218.fm

2.3) Operating media-Fuel

General note

NOTICE Obey the latest edition of Service Instruction SI-912 i-001 for the selection of the correct fuel.

NOTICE Use only fuel suitable for the respective climatic zone.

NOTE: Risk of vapour formation if using winter fuel for summer operation.

Antiknock properties

Fuels with following specification can be used:

Fuel specification	
	Usage/Description
Anti-knock properties	**912 i Series**
	Min. RON 95

NOTE: For fuels according to ASTM D4814 and/or fuels with RON instead of AKI (Anti Knock Index) specifications, following AKI value has to be observed: min. AKI 91

MOGAS

	Usage/Description
MOGAS	**912 i Series**
European standard	EN 228 Super
	EN 228 Super plus

AVGAS

AVGAS 100LL places greater stress on the valve seats due to its high lead content and forms increased deposits in the combustion chamber and lead sediments in the oil system.

	Usage/Description
AVGAS	**912 i Series**
Aviation Standard	AVGAS 100 LL (ASTM D910)

d06218.fm

2.4) Operating media-Lubricants

General note

NOTICE

Follow the manufacturers instructions about the lubricants.
If the engine is mainly run on AVGAS more frequent oil changes will be required. See Service Information SI-912 i-001, latest edition.

Oil type

Motorcycle oil of a registered brand with gear additives.

NOTICE

At the selection of suitable lubricants refer to the additional information in the Service Information SI-912 i-001, latest edition.

Oil consumption

Max. 0.06 l/h (0.13 liq pt/h).

Oil specification

- Use only oil with API classification **"SG"** or higher!
- Due to the high stresses in the reduction gears, oils with gear additives such as high performance motor cycle oils are required.
- Because of the incorporated overload clutch, oils with friction modifier additives are unsuitable as this could result in clutch slippage during normal operation.
- Heavy duty 4-stroke motor cycle oils meet all the requirements. These oils are normally not mineral oils but semi- or full synthetic oils.
- Conventional aircraft oils (a.d.= ashless dispersant) are not suitable. Oils with ashless dispersant do not have suitable cleaning agents for modern designs such as the ROTAX 912 i Series.
- Oils primarity for Diesel engines have **insufficient high temperature properties and additives which favour clutch slipping, and are generally unsuitable.**

---

d06218.fm

3) Standard operation

Introduction

To warrant reliability and efficiency of the engine, meet and carefully observe all the operating and maintenance instructions.

Table of content

This chapter of the Operators Manual contains expanded operating and maintenance instructions.

The following description of procedures depends on the respective type of installation in the aircraft and shall therefore only be seen functionally.

d06219.fm

3.1) Daily checks

General note

To warrant reliability and efficiency of the engine, meet and carefully observe all the operating and maintenance instructions.

⚠ WARNING

Risk of burnings and scalds!
Hot engine parts!
Conduct checks on the cold engine only!

⚠ WARNING

Non-compliance can result in serious injuries or death!
Ignition “OFF”
Before moving the propeller switch off the ECU and secure the aircraft. The main switch (EMS-switch) has to be deactivated. If a key switch is used, then pull out the key.

NOTICE

If established abnormalities (e.g. excessive resistance of the engine, noises etc.) inspection in accordance with the relevant Maintenance Manual is necessary. Do not release the engine into service before rectification.

Mech./electronic components

Check of mechanical/electronic components

Step	Procedure
1	Turn propeller slowly by hand in direction of engine rotation several times and observe engine for odd noises or excessive resistance and normal compression.

Throttle valve

Step	Procedure
1	Verify free movement of throttle valve and the complete range.

Exhaust system

Step	Procedure
1	Inspect for damages, leakage and general condition.

Sensors/wiring harness

Step	Procedure
1	Visual inspection for mechanical and thermal damages.

3.2) Before engine start

Carry out pre-flight checks.

3.3) Pre-flight checks

Safety

⚠ WARNING

Non-compliance can result in serious injuries or death!
MASTER SWITCH, LANE A and LANE B switch "OFF". Before moving the propeller anchor the aircraft.

⚠ WARNING

Risk of burnings and scalds!
Hot engine parts!
Carry out pre-flight checks on the cold or luke warm engine only!

Operating media

Step	Procedure
1	Check for any oil-, coolant- and fuel leaks. If leaks are evident, rectify and repair them before next flight.

Oil level

NOTICE

The oil specifications of the section Chapter 2.4) Operating media are to be observed!

Step	Procedure
1	NOTE: Propeller shouldn't be turned reverse the normal direction of engine rotation. Remove oil tank cover, turn the propeller slowly by hand in direction of engine rotation several times to pump oil from the engine into the oil tank.
2	It is essential to build up compression in the combustion chamber. Maintain the pressure for a few seconds to let the gas flow via the piston rings into the crankcase. The speed of rotation is not important as the pressure and the amount of gas which is transfered into the crankcase.
3	This process is finished when air is returning back to the oil tank and can be noticed by a gurgle from the open oil tank.
4	Check oil level and add oil if necessary.
5	Install oil tank cap.

d06219.fm

Oil level (oil dip-stick)

NOTE: The oil level should be in the upper half (between the “50%“ and the “max“ mark) and should never falls below the “min“ mark. Prior to long flights oil should be added so that the oil level reaches the “max“ mark.

Avoid oil levels exceeding the “max“ mark, since excess oil could be forced out through the venting system.

Difference between max.- and min.- mark = 0.45 litre (0.95 liq pt).

ENVIRONMENTAL NOTE

Protect the environment and never spill any oil.

d06219.fm

3.4) Engine start

Safety

⚠ WARNING Non-compliance can result in serious injuries or death!
Do not start the engine if any person is near the aircraft.

Engine start

Step	Designation	Procedure
1	Fuel valve	**ON**
2	Accomplish aircraft specific startup	**activate Flight Display**
3	Master Switch	**ON**
4	Fuel pump	**ON**
	NOTICE **Only use one fuel pump when starting the engine.** Using both fuel pumps can lead to a bad start behavior.	
5	LANE select switch A LANE select switch B	**ON**
6	Start Power Switch	**Activate Start Power Switch** during steps 7,8,9 and 10.
7	Check of Warning Lamps	**Check if Warning Lamps** illuminate and **extinguish** after around 3 seconds.
	NOTICE When the voltage supply is switched on, both lamps are automatically subject to a function test. Both lamps illuminate for around 3 seconds and then extinguish. If one of the two warning lamps start to flash, fail to illuminate, or still illuminates after a few secounds, then this indicates an anomaly. See therefore Chapter 4).	
8	Engine instruments	**Check** if **fuel pressure** has reached its fuel pressure **of 3 bar**.
9	Throttle valve	Put throttle **between 1 to 2 cm throttle opening** (correlates with 55 %-65 % throttle valve opening).
	NOTICE For more and detailed information on the throttle opening during engine start up see the diagram. See Fig. 3	

d06219.fm

Step	Designation	Procedure
10	Start button	**Press** until the engine runs and release after engine has reached 1500 rpm or more (stable engine run).
	NOTICE Activate starter for **maximum of 10 seconds** only (without interruption), followed by a **cooling period of 2 minutes**.	
11	Throttle valve	**Reduce throttle valve position as required.**
12	Engine instruments	**Check status of warning lamps** and ensure compliance with the operating limits using the engine instruments. Check if **oil pressure** has risen within 10 seconds after engine start and **monitor** oil pressure.
	NOTICE Increasing engine speed is only permitted at **steady oil pressure readings above 3 bar**.	
13	Throttle valve	**Increase engine speed above 2500 rpm** and **hold for 5 seconds**. (Gen B shifts to Gen A).
	NOTICE If, after the engine start, a warning lamp flashes or lights up, perform a LANE and IGNITION check. After the LANE and IGNITION check both warning lamps must be deactivated, otherwise there is an error. If one of the lamps illuminates or flashes: **abnormal operation**. See Chapter: Abnormal Operation.	
14	Engine instruments	**Check status of warning lamps** and ensure compliance with the operating limits using the engine instruments.

⚠ WARNING

Non-compliance can result in serious injuries or death!
Monitor oil temperature, cylinder head temperature and oil pressure. Limits must not be exceeded. See also Chapter 2.1).

Engine start performance

Good engine start behavior will be achieved when setting the throttle at 50 % (± 5 %) during engine start. In the aircraft this number approximately corresponds to a throttle lever travel of 1-2 cm.

NOTE: These numbers depend strongly on the design and the actuation mechanism of the throttle leverage and will vary from aircraft to aircraft.

NOTICE

Throttle must be reduced as required right after the engine start to avoid unnecessary high engine rpm, while the engine is still cold.

For detailed information see following diagram.

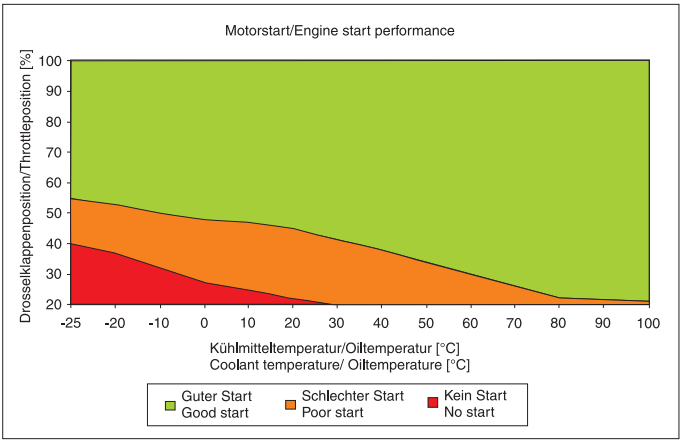


Fig. 3 *08252*

3.5) After engine start

Safety

⚠ WARNING

Non-compliance can result in serious injuries or death!
Do not take the engine into operation if any person is near the aircraft.

d06219.fm

Warming up period

Step	Procedure
1	Start warming up period at approx. 2000 rpm for approx. 2 minutes.
2	Continue at 2500 rpm, duration depending on ambient temperature, until oil temperature reaches 50 °C (120 °F).
3	Check temperatures and pressures.

3.6) Holding point control

Ground test

NOTICE

After a full-load ground test allow a short cooling run at idle speed to prevent vapour formation in the cylinder head.

Step	Procedure
1	**Short** full throttle ground test (consult Aircraft Operators Manual since engine speed depends on the propeller used).

Ignition check

Check the double ignition

Check the two ignition circuits at **4000 rpm** (approx. 1700 rpm propeller).

LANE and Ignition Check:

NOTICE

If the engine speed drops or any error messages are present from the EMS then find out what the cause is and take corresponding action to rectify the problem.

Step	Procedure
1	Rise engine speed up to **4000 rpm**.
2	Turn **"OFF" LANE selector switch A.** Observe the rev counter.
NOTICE	The speed drop may not exceed **180 rpm engine speed**, which corresponds 75 rpm propeller speed.
3	Turn **„ON" LANE selector switch A**.
4	Turn **„OFF" LANE selector switch B.** Perform checks in same way as LANE A.
5	Turn **"ON" LANE selector switch B**.
6	Reduce to idle speed.

d06219.fm

NOTE: LANE A and LANE B have different sensor inputs. During LANE and IGNITION check, some sensor values are not displayed, depending on the activation of the LANES.

Not available sensor values if LANE A = OFF and LANE B = ON:

- Coolant temperature
- Exhaust gas temperatures from cyl. 1-4
- Ambient temperature
- Ambient pressure
- Throttle lever position

Not available sensor values if LANE B = OFF and LANE A = ON:

- Oil temperature
- Oil pressure

Check of fuel pumps (fuel pump modules)

It must be ensured, that both fuel pumps are working and no loss of power or irregular running by deactivation of one fuel pump occurs. The limits for fuel pressure must not be exceeded.

Activate both fuel pumps (MAIN and AUX) for the take-off.

Step	Procedure
1	Set engine speed to **2000 rpm**.
2	Deactivate auxiliary fuel pump for 5 seconds.
3	Check fuel pressure, then activate auxiliary fuel pump.
4	Deactivate main fuel pump for 5 seconds.
5	Check fuel pressure, then activate main fuel pump.
NOTICE	If the fuel pressure is not within the limits, the cause must be determined. The engine must not be put into service until the problem is rectified.

Check the power output

To check the acceleration and available power, run the engine at full load with the aircraft stationary for a maximum of 10 seconds (refer to the Operators Manual of the aircraft for speed information, as it depends on the type of propeller being used).

Performance

Step	Procedure
1	Set performance as per performance specifications Chapter 5) and respect operating limits as per Chapter 2.1).
2	Carry out performance checks in accordance with the aircraft manufacturer regulations.

Propeller governor

Check control of the hydraulic propeller governor according to specifications of the manufacturer.

NOTE: Cycling the propeller governor puts a relatively high load on the engine. Unnecessary cycling should be avoided.

3.7) Take-off

Safety

⚠ WARNING Non-compliance can result in serious injuries or death!

- Monitor oil temperature, oil pressure (**LANE select switch B** has to be **activated**) and coolant temperature (**LANE select switch A** has to be **activated**). Limits must not be exceeded! See Chapter 2.1) Operating limits.
- Respect “cold weather operation” recommendations, see Chapter 3.10).

Climb

Climbing with engine running at take-off performance is permissible (max. 5 minutes) (see Chapter 2.1).

3.8) Cruising

Oil temperature

Step	Procedure
1	Avoid operation below normal operation oil temperature (90 to 110 °C/194 to 230 °F), as possible formation of condensation water in the lubrication system badly influences the oil quality. To evaporate possibly accumulated condensation water, at least once a day 100 °C (212 °F) oil temperature must be reached.

3.9) Engine shut-off

General note

Normally the cooling down of the engine during descending and taxiing will be sufficient to allow the ECU to be shut off as soon as the aircraft is stopped.

At increased operating temperatures make an engine cooling run of at least minimum 2 minutes.

Step	Procedure
1	Check the engine instruments.
2	Reduce engine speed down to idling.
3	**Deactivate** LANE select switch B.
4	**Deactivate** LANE select switch A.
5	Switch the fuel pumps “**OFF**“.
6	Shut-off according to the aircraft manufacturer regulations.
7	Set **master switch** to “**OFF**“.

d06219.fm

3.10) Cold weather operation

General note

Generally, an engine service should be carried out before the start of the cold season.

Coolant

For selection of coolant and mixing ratio, see "Coolant", Chapter 2.2).

Lubricant

For selection of oil, see table of Lubricants Chapter 2.4).

Cold start

- As performance of electric starter is greatly reduced when hot, limit starting to periods not much longer than 10 sec.

Remedy - Cold start

Step	Procedure
1	Use of multigrade oil with the low end viscosity code of 5 or 10.
2	Preheat engine.

Icing due to water in fuel

Icing due to water in fuel

NOTICE

Fuels containing alcohol always carry a small amount of water in solution. In case of temperature changes or increase of alcohol content, water or a mixture of alcohol and water may settle and could cause troubles.

Water in fuel will accumulate at the lower parts of the fuel system and leads to freezing of fuel lines, filters or jets.

Remedy

- Use non-contaminated fuel
- Generously sized water separators
- Fuel lines routing inclined
- Prevent condensation of humidity, i. e avoid temperature differences between aircraft and fuel.

NOTES

4) Abnormal operation

Introduction

⚠ WARNING Non-compliance can result in serious injuries or death!
At unusual engine behaviour conduct checks as per Maintenance Manual Line Chapter 05-50-00 before the next flight.

NOTE: Further checks - see Maintenance Manual.

Table of contents

This chapter of the Operators Manual contains expanded operating and maintenance instruction at abnormal operation.

The following description of procedures depends on the respective type of installation in the aircraft and shall therefore only be seen functionally.

4.1) Fault indicated by the warning lamps

Warning lamps

NOTICE Reduce engine power setting to the minimum necessary and curry out precautionary landing.

.

LANE A	LANE B	Action on ground	Action during flight
OFF	Flashing	One way flight to maintenance hangar permissible.	Flight is possible to your destination at your own discretion.
Flashing	OFF	One way flight to maintenance hangar permissible.	Flight is possible to your destination at your own discretion.
OFF	ON	Flight not permissible	Land the aircraft
Flashing	Flashing	Flight not permissible	Land the aircraft
Flashing	ON	Flight not permissible	Land the aircraft
ON	OFF	Flight not permissible	Land the aircraft
ON	Flashing	Flight not permissible	Land the aircraft
ON	ON	Flight not permissible	Land the aircraft

ON = permanently on

Landing: Take the next landing opportunity (airfield, airport) at your own discretion.

NOTE: If a warning lamp flashes, it indicates an error with lower severity (Fault) that has been detected by the internal testing procedures of the ECU. In this case, the ECU continues to operate normally. There will be no transfer of control of the ignition and injection to the error-free LANE.

If a warning lamp remains on permanently, it indicates that a fatal error with higher severity (Failure) has been detected by the internal testing procedures of the ECU. In this case, the ECU will continue to operate in an alternative control mode, which will transfer the control of ignition and injection to the error-free LANE.

Regular operation as well as alternative control modes of the ECU are able to represent the full engine power. Differences arise only in the efficiency of the engine.

d06220.fm

4.2) Engine not responding to power inputs

Engine not responding

- Possible breakage of throttle valve actuation/linkage.
- Limited flight operation with available power possible.
- A maintenance inspection should be carried out.

4.3) Occurence of uncharacteristic and severe engine vibrations

Engine vibrations

- If the vibrations occur in conjunction with a loss of power then the engine may only be firing on 3 cylinders.
- Limited flight operation.
- A maintenance inspection should be carried out.

4.4) Re-Start during flight

Engine stop

- If the propeller continues to rotate during flight by windmilling, but the speed is not sufficient to start the engine, the electric starter can be used without problems. You must not wait until the propeller stands still.

4.5) Failure of the EMS power supply

Failure of the EMS

- If the EMS power supplies (alternator A) fails then the ECU automatically switches one-time over to the second EMS power supply (alternator B).

NOTICE No charging of battery!

- While alternator B runs, no power drop is recognizable.
- Failure of both EMS power supplies (alternator A/B) result in engine stoppage.
  Remedy: Switch “ON“ the **backup battery switch**. In this case the power supply is provided by the aircraft battery.
- Land the aircraft at the next available opportunity.
- A maintenance inspection should be carried out.

4.6) Exceeding max. admissible engine speed

Exceeding engine speed

- Reduce the engine speed. Any exceeding of the max. admissible engine speed has to be entered by the pilot into logbook, stating duration and extent of over engine speed.

4.7) Exceeding of max. coolant temperature

Exceeding coolant temperature

NOTICE

Reduce engine power setting to the minimum necessary and carry out precautionary landing.

- Any exceeding of the max. admissible coolant temperature has to be entered by the pilot into logbook, stating duration and extent of over-temperature condition.
- A maintenance inspection should be carried out.
- Check the ECU error log file.

4.8) Exceeding of max. admissible oil temperature

Exceeding oil temperature

NOTICE

Reduce engine power setting to the minimum necessary and carry out precautionary landing.

- Any exceeding of the max. admissible cylinder head temperature has to be entered by the pilot into logbook, stating duration and extent of over-temperature condition.
- A maintenance inspection should be carried out.
- Check the ECU error log file.

4.9) Oil pressure below minimum - during flight

Oil pressure too low

NOTICE

Reduce engine power setting to the minimum necessary and carry out precautionary landing.

- Check oil system.
- A maintenance inspection should be carried out.
- Check the ECU error log file.

4.10) Oil pressure below minimum - on ground

Oil pressure too low

Immediately stop the engine and check for reason. Check oil system.

- Check oil quantity in oil tank.
- Check oil quality. See also Chapter 2.4).
- A maintenance inspection should be carried out.

d06220.fm

4.11) Oil pressure above permitted range at low ambient temperatures

Oil pressure too high

- Reduce engine speed and check the oil pressure again once it has reached a higher oil temperature.
- A maintenance inspection should be carried out.
- Check the ECU error log file.

4.12) Engine on fire or fire in the engine compartment

Engine on fire

NOTICE

Carry out emergency procedures as prescribed in the flight manual of the engine manufacturer.

- After landing locate the cause of fire and resolve the error before next flight by qualified staff (authorized by the Aviation Authorities).
- An entry in the logbook must be made.
- A maintenance inspection should be carried out.

4.13) Fuel pressure outside range

Exceeding fuel pressure

NOTICE

Reduce engine power setting to the minimum necessary and carry out precautionary landing.

- If the pressure is too high, switch the AUX-pump OFF. If this has no effect then limited flight operation with reduced power is possible.
- If the pressure is too low, switch the AUX-pump ON. If this has no effect then limited flight operation with reduced power is possible.
- A maintenance inspection should be carried out.

4.14) Maximum permissible exhaust temperature exceeded

Exceeded exhaust temperature

NOTICE

Reduce engine power setting to the minimum necessary and carry out precautionary landing.

- Check the exhaust temperature.
- Oil and coolant limits must not be exceeded.
- A maintenance inspection should be carried out.

4.15) EMS voltage supply below the minimum required level

Voltage supply below level

- Limited flight operation is possible if the voltage (alternator A or B) is OK here.
- Proceed according to section: „Failure of the EMS power supply“ if this shows no effect.

NOTICE

Reduce engine power setting to the minimum necessary and carry out precautionary landing.

- A maintenance inspection should be carried out.

4.16) The sprag clutch decouples not from the starter

Spag clutch is permanently in engagement position

NOTICE

Switch the engine “**OFF**“. Risk of fire and danger of the electric starter overheating.

- Move the throttle lever to the idle position.
- Set the **Master switch** to **“OFF“**.
- Switch both **LANE select switches** to **“OFF“**.
- A maintenance inspection should be carried out.

4.17) Trouble shooting

Introduction

All checks in accordance with the Maintenance Manual (current issue/revision).

⚠ WARNING

Non-compliance can result in serious injuries or death!
Only qualified staff (authorized by the Aviation Authorities) trained on this particular engine, is allowed to carry out maintenance and repair work.

NOTICE

If the following hints regarding remedy do not solve the problem, contact an authorized workshop. The engine must not be operated until the problem is rectified.

Table of content

This chapter of the Operators Manual contains possible cause and remedy in case of trouble shooting.

Starting problems

Engine does not start

Possible cause	Remedy
Turn **OFF** the LANE select switch A/B.	Turn **ON** the LANE select switch A/B.
Turn **OFF** the **Master switch**.	Turn **ON** the **Master switch** to.
Closed fuel selector/valve.	Open valve or clean filter, alternatively renew filter. Check fuel system for leakage.
No fuel in tank.	Refuel.
Fuel pumps	Set both to **"ON".**
Starting speed too low, faulty or discharged battery.	Fit fully charged battery.
Starting speed too low, starting problems on cold engine.	Use top quality, low friction oil; allow for sufficient cooling period to counter for performance drop on hot starter; preheat engine.
Wrong fuel (Jetfuel or Diesel).	Change of fuel.

Knocking under load

Possible cause	Remedy
Octane rating of fuel too low.	Use fuel with higher octane rating.
Intake air temperature to high.	Reduce the power. Check air filter according to Maintenance Manual Line Chapter 12-20-00.

Oil pressure

Low oil pressure

Possible cause	Remedy
Not enough oil in oil tank.	Refill oil.

Oil level

Oil level is increasing

Possible cause	Remedy
Oil too cold during engine operation.	Cover oil cooler surface, maintain the oil temperature prescribed.
Contamination with diesel fuel.	Check fuel.

5) Performance data

Introduction

The performance tables and performance graphs on the next few pages are intended to show you what kind of performance to expect from your engine in terms of power output. The indicated power can be achieved by following the procedures laid out in the Operators Manual and ensuring that the engine is well-maintained.

Table of content

This chapter of the Operators Manual contains performance table and performance graphs.

Performance data for standard conditions (ISA)

Full load curve 912 iSc/iS

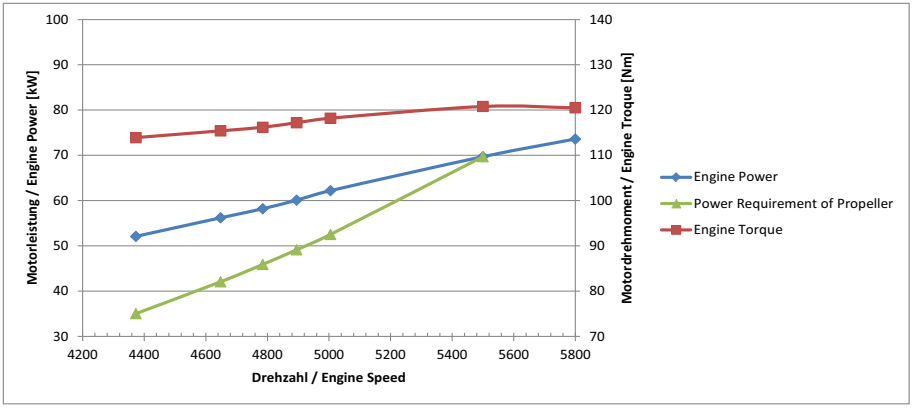


Fig. 1 *10245*

Full load curve 912 iSc/iS Sport

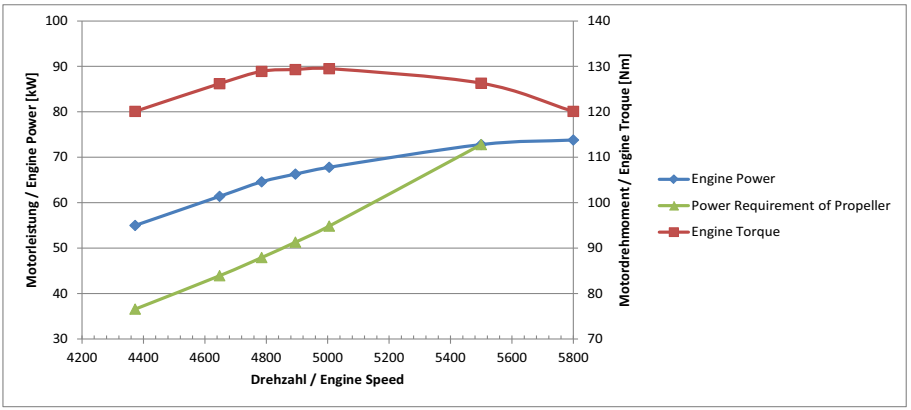


Fig. 2 *10244*

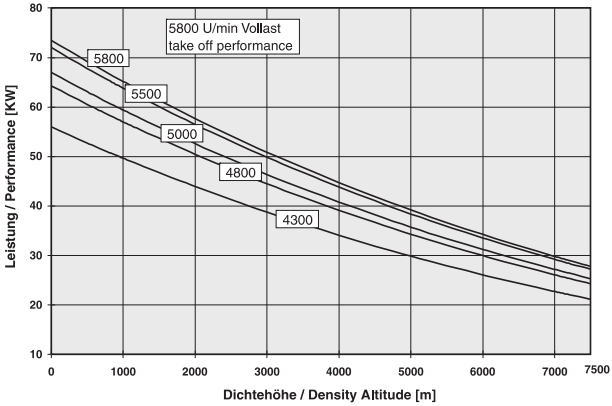
d06221.fm

Performance graph Engine 912 iSc/iS

Performance graph for non-standard conditions

The following graph shows the performance drop with increasing flight altitude. The curves show the performance at 5800, 5500, 5000, 4800 and 4300 rpm, at full throttle.

At deviation of temperature conditions from standard atmosphere conditions the engine performance to be expected can be calculated from the performance indicated, multiplied by standard temperature, divided by actual temperature in °K.



$$P_{akt.} = P_{stand.} \frac{T_{standard}}{T_{aktuell}}$$

T [K] = t [°C]+273

Fig. 3 *08636*

d06221.fm

Performance data Engine 912 iSc/iS

Performance data for variable pitch propeller

Engine speed over 5500 rpm is restricted to 5 minutes.
Run the engine in accordance with the following table.

Power setting	Engine speed (rpm)	Performance (kW)/(HP)	Torque	
			(Nm)	(ft.lb)
Take-off power	5800	73.5/100	121.0	89.24
max. continuous power	5500	69.0/92	119.8	88.36
75 %	5000	51.8/69	98.7	72.79
65 %	4800	44.9/60	89.5	66.01
50 %	4300	34.5/46	75.3	55.53

Performance data Engine 912 iSc/iS Sport

Power setting	Engine speed (rpm)	Performance (kW)/(HP)	Torque	
			(Nm)	(ft.lb)
Take-off power	5800	73.5/100	121,4	89.54
max. continuous power	5500	72.0/97.9	126,4	93.23
75 %	5000	54.0/73.4	103,1	76.04
65 %	4800	46.7/63.5	93,3	68.81
50 %	4300	35.9/48.8	78,5	57.90

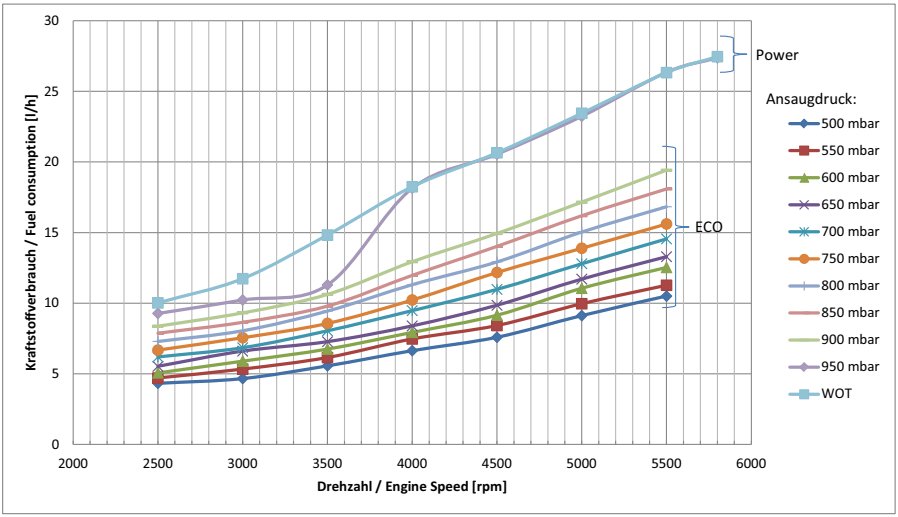


Fig. 4 *06370*

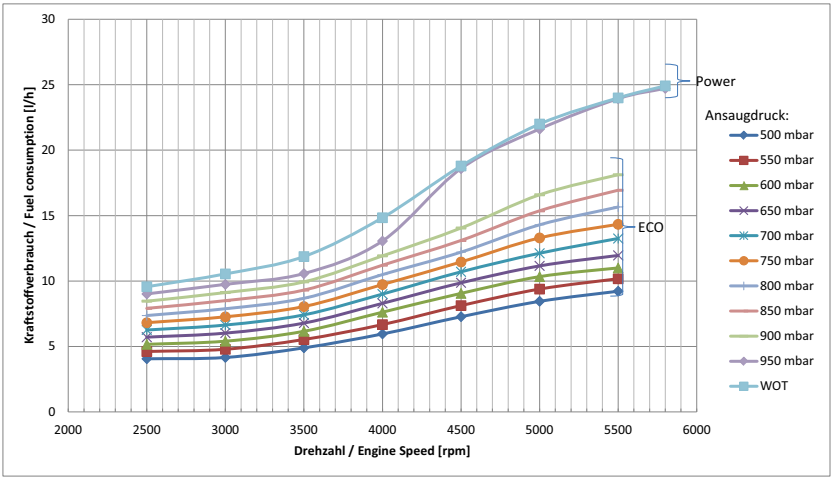


Fig. 5 *10246*

The indicated fuel consumption was determined at 974 hPa and is only valid for an error-free operation of the engine. Error may lead to a higher fuel consumption.

POWER vs. ECO mode

The 912 iSc/iS engine has two different modes, the POWER and ECO mode which differ significantly in fuel consumption. See from Fig. 4 to Fig. 6.

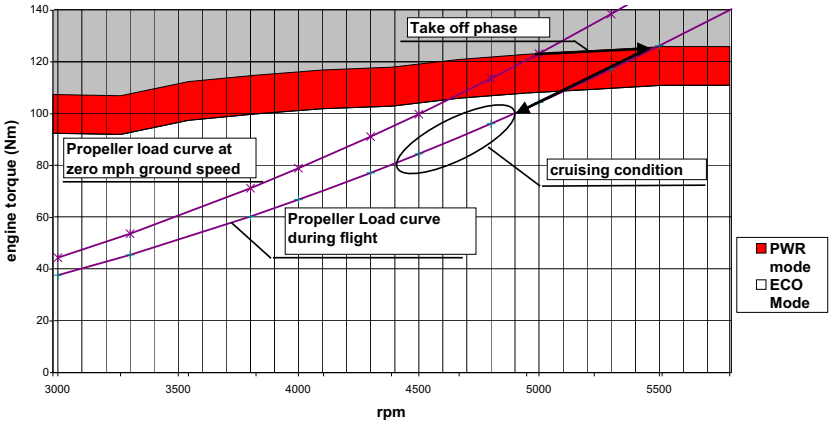


Fig. 6 *09857*

NOTE: The switchover between ECO and RICH mode is about 97% of throttle position. Appropriate display instruments indicate this threshold.

d06221.fm

7) Description of systems

Introduction

This chapter of the Operator Manual contains the description of cooling system, fuel system, lubrication system, electric system and the propeller gearbox.

Table of content

As already mentioned in the preface, the system descriptions only apply to the engine, not to a specific application in a particular aircraft. The aircraft manufacturers Operators Manual is therefore definitive in terms of the operation of the engine, as it contains all the aircraft specific instructions.

7.1) Cooling system of the engine

General note

See Fig. 1.

Cooling

The cooling system of the engine is designed for liquid cooling of the cylinder heads and ram-air cooling of the cylinders. The cooling system of the cylinder heads is a **closed** circuit with an expansion tank.

Coolant

The coolant flow is forced by a water pump, driven from the camshaft, from the radiator to the cylinder heads. From the top of the cylinder heads the coolant passes on to the expansion tank (1). Since the standard location of the radiator (2) is below engine level, the expansion tank located on top of the engine allows for coolant expansion.

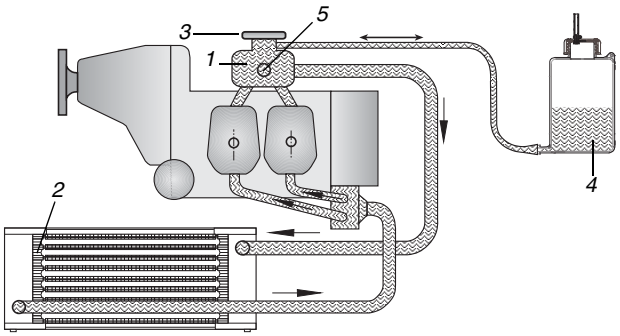
Expansion tank

The expansion tank is closed by a pressure cap (3) (with excess pressure valve and return valve). At temperature rise of the coolant the excess pressure valve opens and the coolant will flow via a hose at atmospheric pressure to the transparent overflow bottle (4). When cooling down, the coolant will be sucked back into the cooling circuit.

Coolant temperature measuring

NOTE: The temperatur sensor at delivery is located in cylinder head 4.

d06222.fm



Part	Function
1	Expansion tank
2	Radiator
3	Pressure cap
4	Overflow bottle
5	Level glass

Fig. 1 *06339*

7.2) Fuel system

General note

See Fig. 2.

Fuel

The fuel flows from the tanks via a water separator/coarse filter to the electric fuel pumps (connected in series) from where it is pumped thru the fine filter to the fuel rails, the fuel injectors and to the fuel pressure regulator.

Fuel pump switches

The fuel pumps are activated directly through the switch OFF/ON. During take off both switches (main and aux.) must be ON.

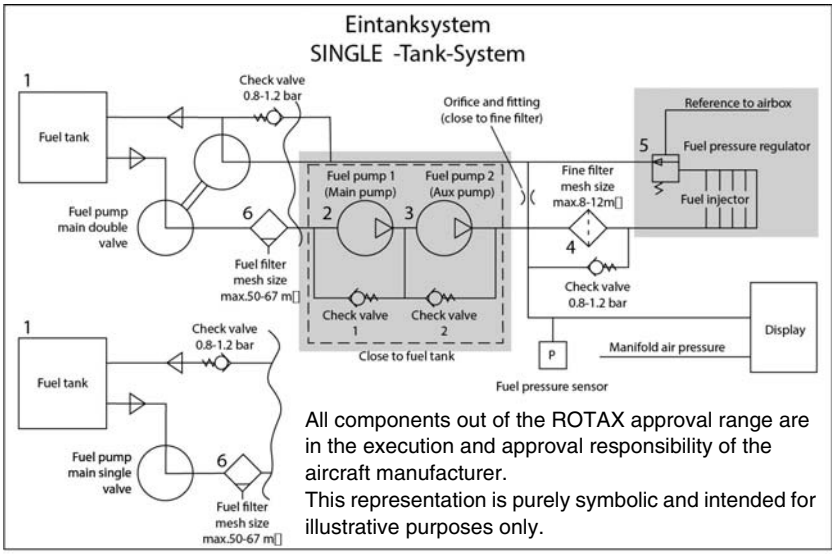
Fuel pressure regulator

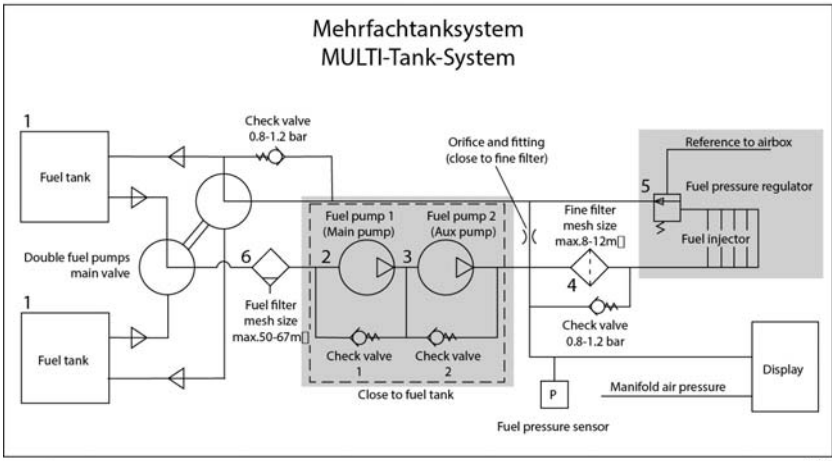
A fuel pressure regulator ensures that the pressure differential between the fuel injectors and the intake manifold remains constant. This enables the fuel injection system to inject the same quantity of fuel at any point given the same injection period.

Return line

Through the return line surplus fuel flows back to the fuel tank and suction side of fuel system.

NOTE: The return line must be always returned into the tank, from which fuel is sucked in to the oil pump.



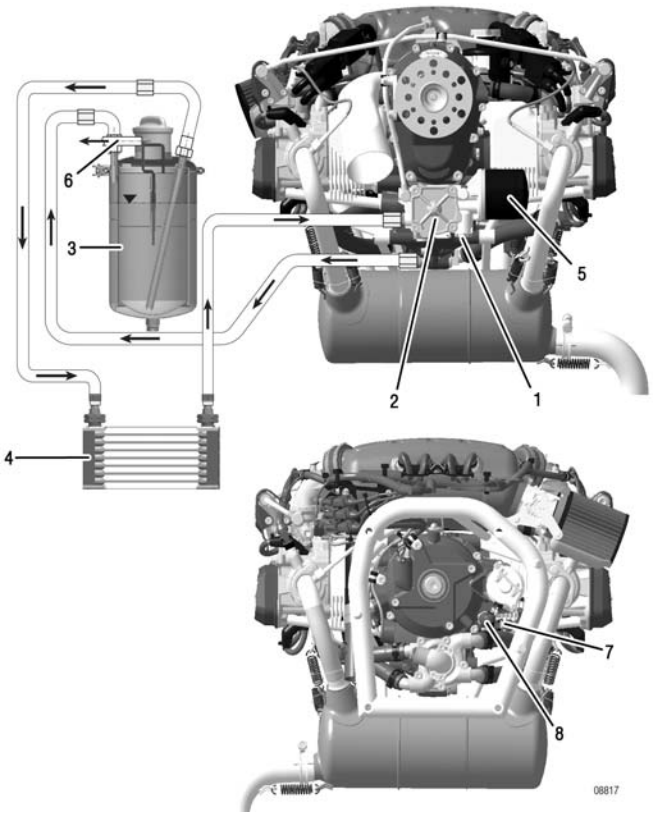


Part	Function
1	Fuel tank
2	Fuel pump 1 (Main pump)
3	Fuel pump 2 (Aux pump)
4	Fine filter
5	Fuel pressure regulator
6	Coarse filter/Water trap

Fig. 2 *06293*

7.3) Lubrication system

General note	See Fig. 3. The engines are provided with a dry sump forced lubrication system with a main oil pump with integrated pressure regulator (1).
Lubrication	The oil pump (2) sucks the motor oil from the oil tank (3) via the oil cooler (4) and forces it through the oil filter (5) to the points of lubrication in the engine.
Crankcase	The surplus oil emerging from the points of lubrication accumulates on the bottom of crankcase and is forced back to the oil tank by the piston blow-by gases.
Oil pump	The oil pump is driven by the camshaft.
Oil venting system	The oil circuit is vented via bore (6) on the oil tank.
Oil temperature sensor	The oil temperature sensor (7) for reading of the oil inlet temperature is located on the crankcase.
Oil pressure sensor	The oil pressure sensor (8) for reading of the oil pressure is located on the ignition housing.



Part	Function
1	Pressure regulator
2	Oil pump
3	Oil tank
4	Oil cooler
5	Oil filter
6	Venting tube
7	Temperature sensor (oil)
8	Pressure sensor (oil)

Fig. 3

7.4) Electric system

General note

The ROTAX 912 iSc/iS Sport is equipped with an electronic guided dual ignition unit with integrated generator.
The ignition unit is easy to maintain and needs (except for start the engine) no external power supply.

EMS overview

The EMS primarily comprises:

- High-voltage ignition components (connectors, spark plugs, ignition cables, double ignition coils)
- ECU
- ECU (actuators) - OUTPUT
    - 4 doublesignition coils
    - Lamps
    - Fuel injection 2 per cylinder
    - CAN data for an indicating instrument
- ECU (signals) - INPUT
    - Sensors
- EMS power supply
    - Regulator rectifier
    - Generator
- FUSE BOX (all power supply components, including the fuses, etc., can be found in the power supply unit)
- Switches
- Cables/wiring

EMS power supply

The EMS power supply primarily comprises 2 alternators with permanent magnets. It also comprises an external rectifier, voltage stabilizer and overvoltage protection, which are integrated in the FUSE BOX. The two 3-phase A/C current generators (alternators) are physically separated in the engine integrated power supply units. One is used for the ECU and the other one is available for the aircraft. They are driven by the crankshaft and require no external supply once the engine has reached its idle speed.

NOTE: Until the idle speed is reached, the EMS requires an external 12 V supply from the onboard system of the aircraft.

d06222.fm

Control elements

The following description of control elements depends on the respective type of installation in the aircraft and shall therefore only be seen functionally.
The two independent LANE select switches A and B connect the ECU for the relevant LANE to the EMS power supply.

The start power switch makes a connection only during the start-up procedure between the ECU, ignition system and the EMS lamps with the external onboard battery

NOTICE

If only one LANE is turned “ON“, the engine is powered by one ignition circuit, depending on which ignition circuit was choosen.

- By pressing the **Start Power Switch**, the EMS system of the engine is powered externally by the onboard battery for a short time during start-up.
- If necessary (e.g. in case of supply failure by the internal generator) the EMS system can be powered by the onboard battery by activating the **Battery Backup Switch**.
- The **Start Button** activates the starter motor.
- The **switches** for the two fuel pumps are used for active the respective fuel pump.

NOTE: Choose “AUTO” as in flight position of the LANE selector switch.

Ignition system

The 912 iSc/iS Sport is equipped with 4 double ignition coils. The ignition system is almost entirely wear-free, as the ECU generates and processes the ignition signal electronically.

Firing sequence: 1-4-2-3.

Fuel injection

The engine is equipped with an electronic fuel injection system. This system is controlled by the ECU and enables highly accurate metering of the fuel according to operating and load conditions, whilst at the same time also taking ambient conditions into account.
The key input variables are throttle valve position, engine speed signal, intake air temperature, ambient pressure, boost pressure and exhaust temperature.
Ultimately, the required fuel quantity or injection period is determined on the basis of the calculated air density in the airbox. It is monitored continuously.

ECU

The ECU is a digital engine control unit which contains the LANE A and the LANE B in a single housing. In principle, each LANE represents an independent computer.

In the "**AUTO**" (both LANE select switch "**ON**") setting, the ECU decides which LANE takes control (redundancy management) according to the health level of the EMS.

Any errors or values outside the operating limits are indicated by an EMS lamp for each lane.

NOTE: The ECU also contains an databus system (CANaerospace). A large number of engine parameters and warnings can be displayed on a separate display. Usage is up to the aircraft manufacturer.

Main functions of the ECU

Other main functions of the ECU include:

- Ignition control
- Fuel injection control
- Indication of faults and values that are outside operating limits
- Storing faults
- Power supply monitoring

---

d06222.fm

7.5) Propeller gearbox

Reduction ratio

For the engine type 912 iSc/iS Sport one reduction ratio is available.

Reduction ratio	912 iSc/iS Sport
crankshaft: propeller shaft	2.43:1

Torsional shock absorber

The design incorporates a torsional shock absorber. The shock absorbing is based on progressive torsional cushioning due to axial spring load acting on a dog hub.

Governor

Alternatively a hydraulic governor for constant speed propeller can be used. The drive is via the propeller reduction gear.

NOTES

9) Supplement

Introduction

According to the regulation of EASA part 21 A.3 / FAR 21.3 the manufacturer shall evaluate field information and report to the authority. In case of any relevant occurrences that may involve malfunction of the engine, the form on the next page should be filled out and sent to the responsible authorized ROTAX® distributor.

NOTE: The form is also available from the official ROTAX® AIRCRAFT ENGINES Website in electronic version.

www.FLYROTAX.com

Table of content

This chapter of the Operators Manual contains a form for feedback.

NOTES

9.2) Authorized Distributor

General note

Overview of authorized distributors for ROTAX aircraft engines. Refer to the official ROTAX® AIRCRAFT ENGINES Website www.FLYROTAX.com

NOTES