

	<b>Service Notification</b>	
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	Date of Initial Publication: <b>15-May-2015</b> Publication Date of this Revision: <b>15-May-2015</b>	

# Service Notification

## Supporting Information to Engine Start-Up of Rotax 912 iS on Flight Design Aircraft SN-ASTM-CTLS-04

### Repeating Symbols:

Please pay attention to the following symbols throughout this document emphasizing particular information.

- ▲ **Warning:** Identifies an instruction, which if not followed may cause serious injury or even death.
- **Caution:** Denotes an instruction which if not followed, may severely damage the aircraft or could lead to suspension of warranty.
- **Note:** Information useful for better handling.

## 1 Planning Information

### 1.1 Affected Aircraft

Type: CT  
 Model: CTLSi / CTLSi-LSA  
 Serial Number: All aircraft with any version of engine Rotax 912 iS series installed  
 Applicable Countries: Not limited

### 1.2 Concurrent Documents

Operators Manual for Rotax 912 Engine Type 912 i Series, Rotax Document No. OM-912i, Rotax Part No. 898740

### 1.3 Reason

Field experience with the operation of the engine has shown that supporting information to support better handling of the engine may be helpful.

### 1.4 Subject

Background on the operating principle of the engine systems, applicable to the start-up phase of the engine, in the installation applicable to Flight Design aircraft.

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### **1.5 Compliance**

This SN is intended to provide viable information for the safe operation of the aircraft. The information shall be considered by the operator continuously when operating the engine.

**▲ Warning:** Non-compliance with these instructions could result in further damages, personal injuries or death.

### **1.6 Approval**

This SN is approved by the aircraft manufacturer i.a.w. ASTM F2483 for conduct on affected aircraft as defined in 1.1. Subsequent to complete and correct conduct of this SN the aircraft will still meet the requirements of the applicable ASTM design and performance specification.

### **1.7 Type of Maintenance**

Not applicable.

### **1.8 Personnel Qualifications**

Not applicable.

### **1.9 Release to Service**

Not applicable.

### **1.10 Weight and Balance**

Not applicable.

### **1.11 References**

1. Drawings:

Not applicable.

2. Documents:

#### **Latest issues of:**

[1] Supplement to the Aircraft Operating Instructions with Rotax 912 iS engine – relevant document and version applicable to the individual aircraft

### **1.12 Superseded Documents**

- none -

### **1.13 Contact Details**

For further information on conduct of this SN, or to report any Safety of Flight or Service Difficulty issues contact your distributor responsible for your country. Your distributor can be located via the Flight Design website: [www.flightdesign.com](http://www.flightdesign.com) under “Dealer Location”.

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In cases where the local distributor is not known or available contact Flight Design GmbH directly: [airworthiness@flightdesign.com](mailto:airworthiness@flightdesign.com).

### 1.14 Disclaimer

This Service Notification has been generated with utmost care. Nevertheless errors and misunderstandings can never be fully excluded. In case of any doubts the applicant of this Service Notification is requested to contact Flight Design immediately to clarify the issue.

## 2 Resources

Not applicable.

## 3 Instructions

### 3.1 General

All Flight Design aircraft are equipped using a rotary ignition key lock that provides convenient and easy operation of the engine. We have avoided using a row of dedicated toggle switches, as experience has shown that this leads easily to operating errors, especially in stress situations. The Rotax 912iS Operators Manual applicable at the date of issue of this Notification explicitly includes this kind of solution as a valid option and states:

**NOTICE** When using a rotary switch (ignition switch with integrated LANE select options) it must have the following functions.

The EMS main switch has 4 switch positions:

- A "ON", B "ON", AUTO (A+B"ON") and "OFF"

It is used to conduct various tests (e.g. ignition tests).

Switch position	Action	Test
A ON	Activates the LANE A (LANE B is OFF)	LANE A works
B ON	Activates the LANE B (LANE A is OFF)	LANE B works
AUTO	Activates LANE A and LANE B	LANE A for engine run
OFF	Shut-down of the engine	Engine should shut-down

The installation on Flight Design aircraft satisfies this information.

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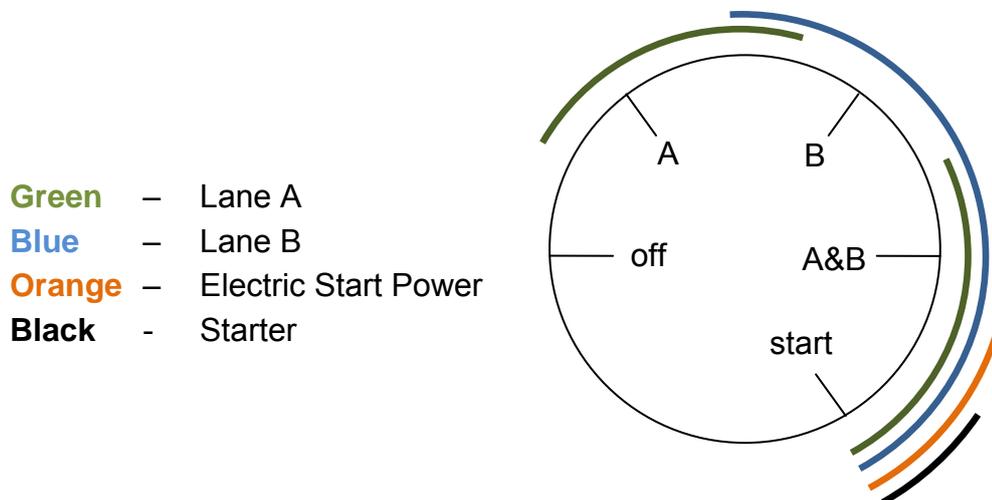
### 3.1 Technical Background

Rotax 912 i series engines differ significantly from conventional aircraft engines. The differences result in an engine with superior economy and ensure a very high level of reliability and availability. To understand the effect on operation, it is necessary to be aware of some of these specific differences.

All functions on the engine are fully controlled by computers. This means, any time when you control the engine, you give a command to a computer. You do not directly operate an electric circuit. This is done in response to your input by the computer. Related to the start-up sequence of the engine, this means:

- When switching Lanes, you do not switch Magnetos like other conventional aircraft engine designs.
- When switching Lanes, you actually start or stop computers. As typical for computers, when you start them, they run through a boot sequence. Even though it is very short (~100ms), it needs a certain minimum time.
- Lane A and Lane B computers utilize a multitude of sensor parameters. When switching from one Lane computer to the other Lane computer, the values need to be handed over, to avoid “stumbling” of the controller.

Our ignition key switch is designed as follows. The arcs on the diagram show the logic, at what positions the individual functions are switched on.



- When you position the key to the first notch, the computer that controls Lane A is switched on. Lane B is off.
- When you move from here to the second notch, then the computer of Lane B is started, before the computer of Lane A is switched off. It is important to understand that this allows the Lane B computer to run its boot sequence, and to receive data from Lane A computer, before Lane A is switched off. The time needed to boot and to hand over data is extremely short, but the overlap is needed.
- When you move on to the third notch, Computer Lane B stays on and computer Lane A is booting again.

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When the engine is not yet running, the move through notches 1, 2 and 3 has no effect, as the engine computers do not yet receive electrical power. So, when the engine is not running, you need to provide dedicated power to the engine computers. This happens when you move the key beyond position 3 towards the spring-loaded “start” position.

- After about half of the rotation needed to activate the starter, both computers and the fuel pump will be provided with this dedicated power. The computers will boot and run a very short verification of several sensor signals. The time needed to complete this is again very short, but needed.
- When this is completed, the engine is ready for start-up. When you complete the rotation to the end stop, the starter will kick in and start the engine.

This rotary key logic described here is ensuring proper sequence of operation, as required by the engine manufacturer.

### **3.2 Information for Better Handling**

With the technical information above, the following information is given for better engine handling during start-up procedure.

1. All key rotation is to be done in a smooth move, but do not pull rapidly through to the desired position. Always rotate with a constant, not too fast and not too slow move, that allows the computers to run their boot sequence and data hand-over.
  2. To start the engine, rotate from “Lane A and B” into the spring-loaded position, but not immediately to the end. After some 15° of rotation both Lane computers get power and switch on. You can notice this point very easily, as it is exactly when the primary fuel pump starts to operate. You can hear the pump operating easily. The pump gets its power from one of the computers. Also the Dynon EMS starts to receive and display data while the computers are booted.
  3. When the Lane computers power up you can also see that both Lane lights get on. When the Lane lights are off again you can be sure the boot sequence is completed. The lights take longer to go off than the boot sequence takes.
  4. Now rotate further to the end stop, until the starter kicks in.
  5. When you test the Lanes, do not operate the key like you did learn to do the Magneto check on conventional aircraft engines. Think of the computers behind that boot and exchange data. Smoothly move from both lanes to B, then to A, then back through B to both, as needed by the engine start sequence. Take your time when doing it, this does not harm the engine.
- ➔ In summary: When you switch like everyone did learn this for the old style Magneto engines, means to “rip” as fast as possible from “both” through “right” to “left”, you do exactly the wrong thing for these computers. Correct is, to move the key switch in a continuous and smooth transition that is no rush, but also does not hold in-between. So just a normal smooth move, no ripping, no slow motion. This allows for the computers to properly boot and hand-over the parameters. Always remember: You trigger computer boot sequences, you do not switch an electric circuit.

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Further information regarding Lane checking sequence:

- To check the Lanes prior to take-off, one time each you must operate the engine on one lane only.
- The sequence that we show in the POH Supplement (Both – B – Both – through B to A – back through A to Both) ensures this. When switched in the smooth way as described above, it will lead to a correct result with no warnings.
- We have noticed that the start sequence in the POH Supplement does more than required.
- The reduced sequence where you go from Both to B, check Lane B and then go smooth to A, check Lane A and then go smooth back though B to Both is as well providing all that is needed, and is therefore fully acceptable.

Flight Design will provide a POH Supplement update that will reflect the simplified check sequence.

The Lane Check is completed when the engine operates in each Lane within the limits provided by the POH Supplement, and when the warning lights are off after completion of the checks. In case you get a warning light, re-do the check and ensure that you do it in a smooth way, as described in this SN.

## 4 Appendix

### 4.1 Changes to Previous Revision

Original Issue – no changes

### 4.2 Feedback Template

No specific feedback required.