Aircraft Operating Instructions

BRISTELL LSA

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BRISTELL LSA

BRM AERO

Aircraft Operating Instructions

BRISTELL LSA

Registration: **N915LM**

Serial Number: **436/2019**

This airplane must be operated in compliance with information and limitations contained in herein.
This AOI must be available on board of the airplane.

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SECTION 0

0 Technical Information

0.1 Record of revisions

0.2 List of effective pages

0.3 Table of contents

0.1 Record of revisions

Any revision of the present manual (except actual weighing data, cockpit description and list of instruments and avionics) must be recorded in the following table.

Revision No.	Affected Section	Affected Pages	Date of Issue	Approved by	Date of approval	Date inserted	Sign.
-	ALL	ALL, Initial	06/2019	Petr Javorský	06/2019	06/2019	P. Javorský

0.2 List of effective pages

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0.3 Table of contents

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SECTION 1

1 General Information

1.1 Introduction

This Aircraft Operating Instructions have been prepared to provide the pilots, instructors, owners and operators with information for safe and efficient operation of BRISTELL aircraft. It also contains supplemental data supplied by the Aircraft Flight Training Supplement.

It is the pilot's responsibility to be familiar with this handbook, the special characteristics of this aircraft, and all other information and legal requirements relevant for the operation in his country. The pilot is responsible to determine the aircraft is safe for flight, and to operate the aircraft with respect to the procedures and limitations provided in this manual.

It is the owner's/operator's responsibility to have the aeroplane registered and insured, according to country-specific regulations. The aircraft owner/operator is also responsible for maintaining the aircraft in airworthy condition.

1.1.1 Certification

BRISTELL LSA is ultralight / light sport category aircraft designed and produced by BRM Aero, s.r.o., Uherske Hradiste, Czech Republic, based on the following airworthiness standards:

- ASTM F2245 Consensus standard for Light Sport Aircraft category plus other applicable ASTM Consensus Standards.
- Czech LAA UL-2
- EASA CS-VLA

BRISTELL LSA uses airframe of BRISTELL ELSA which has been certified by the Light Aircraft Association of the Czech Republic (Czech TC ULL-02/2012 issued on 14.12.2011) for MTOW 600 kg in accordance with the ASTM F2245 Consensus Standard.

1.2 Warnings, cautions and notes

The following definitions apply to warnings, cautions and notes in the Pilot Operating Handbook.

WARNING

Means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety i.e. to injury or death of persons.

CAUTION

Means that the non-observation of the corresponding procedure leads to a minor or possible long term degradation of the flight safety.

NOTE

Draws attention to any special item not directly related to safety, but which is important or unusual.

1.3 Descriptive data

1.3.1 Aircraft description

BRISTELL LSA is an airplane intended especially for recreational and cross-country flying, basic flight training, with limitation to non-aerobatics operation.

BRISTELL LSA is a single-engine, all metal, low-wing monoplane of semi-monocoque construction with two side-by-side seats. The airplane is equipped with a fixed tricycle undercarriage with steerable nose wheel.

1.3.2 Power plant

BRISTELL LSA, S/N 436/2019 is fitted with:

- Rotax 915 iS 3 A engine
- DUC Inconel FLASH propeller, composite, 3-bladed, on-ground adjustable.

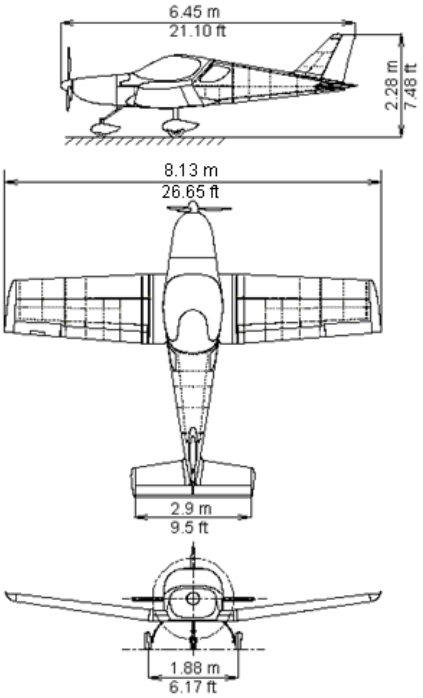
1.3.3 Aircraft dimensions

Wing span	8.13	m	26.65	ft
Length	6.45	m	21.10	ft
Height	2.28	m	7.48	ft
Wing area	10.5	m^2	113.02	sq ft
Wing loading (MTOW 600 kg)	57.14	kg/m^2	11.70	lb/sq ft
Wing loading (MTOW 472.5 kg)	45.00	kg/m^2	9.22	lb/sq ft
Wing loading (MTOW 450 kg)	42.86	kg/m^2	8.78	lb/sq ft
Cockpit width	1.3	m	51.17	in

Deflections:

Rudder deflections	30° to each side
Elevator deflections	+ 30°/-15°
Aileron deflections	+ 24°/-17°
Flap deflections	0°, 10°, 20°and 30°
Aileron trim deflections	+ 15°/- 20°
Elevator trim deflections	+ 10°/- 25°

1.3.4 Aircraft layout



1.4 Definitions and abbreviations

°F	temperature in degree of Fahrenheit
ASI	Airspeed Indicator
ATC	Air Traffic Control
BEACON	anti-collision beacon
CAS	Calibrated Airspeed
CG	Center of Gravity
COMM	communication transmitter
ECU	Engine Control Unit
EFIS	Electronic Flight Instrument System
ELT	Emergency Locator Transmitter
E-LSA	Experimental Light Sport Aircraft
EMS	Engine Monitoring System
ft	foot / feet
ft/min	feet per minute
GPS	Global Positioning System
HIC	Harness Interface Connector (Rotax 915 iS)
hp	power unit
IAS	Indicated Airspeed
IC	Intercom
IFR	Instrument Flight Rules
in	inch
ISA	International Standard Atmosphere
knot	NM per hour
lb	pound
LAA	Light Aircraft Association of the Czech Republi
MAC	Mean Aerodynamic Chord
max.	maximum

min.	minimum or minute
mph	statute miles per hour
NM	Nautical Mile
OAT	Outside Air Temperature
OFF	system is switched off or control element is in off-position
ON	system is switched on or control element is in on-position
POH	Pilot Operating Handbook
psi	pound per square inch - pressure unit
rpm	revolutions per minute
sec.	second
US gal	volume unit
V_A	maneuvering airspeed
V_{FE}	maximum flap extended speed
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
V_{NE}	never exceed speed
V_{NO}	maximum designed cruising speed
V_{S1}	stall speed with wing flaps in retracted position
V_{SO}	stall speed with wing flaps in extended position
V_X	best angle of climb speed
VY	best rate of climb speed

1.5 Summary of performance specifications

Performance	US units	Metric units
Gross weight (Maximum take-off weight)	1320 lb	600 kg
Top speed at sea level MCP: 4700 rpm	120 KCAS	
Cruise speed at sea level 64%: 4700rpm	120 KCAS	
Cruise speed at sea level 64%: 4700 rpm	120 KCAS	
Full fuel range at 4000 ft pressure altitude, at 75 % MCP (5000 rpm), No fuel reserve	570 NM	
Rate of climb at sea level.....**Vx**	1170 fpm at 68 KIAS	
Rate of climb at sea level.....**Vy**	1490 fpm at 75 KIAS	
Stall speed V_{S1} (flaps retracted)	45 KCAS	83 km/h CAS
Stall speed V_{S0} (flaps fully extended)	38 KCAS	71 km/h CAS
Total fuel capacity	31.7 US gal	120 liters
Total usable fuel	31.4 US gal	119 liters
Approved types of fuel **ATTENTION:** Obey the latest edition of Service Instruction SI-912-016, for the selection of the correct fuel.	Min. RON 95 (min. AKI4 91) Mogas: EN 228 super Mogas: EN 228 super plus AVGAS 100LL (ASTM D910)	
Engine Maximum takeoff power	104 kW (140 HP) at 5800 rpm, max.5 min.	
Engine Maximum continuous power	99 kW (127 HP) at 5500 rpm (without governor) NOTE: Max.cont.power is available up to the critical altitude	

SECTION 2

2 Operating Limitation

2.1 Introduction

Section 2 includes operating limitations, instrument markings and basic placards necessary for the safe operation of the aircraft, its engine, standard systems and standard equipment.

2.2 Airspeed

Airspeed limitations and their operational significance are shown below:

Speed		IAS (km/h)	KIAS	Remarks
V_{NE}	Never exceed speed	290	157	Do not exceed this speed in any operation.
V_{NO}	Max. structural cruising speed	240	129	Do not exceed this speed except in smooth air, and then only with caution.
V_A	Maneuvering speed	180	96	Do not make full or abrupt control movement above this speed, because under certain conditions full control movement may overstress the aircraft.
V_{FE}	Maximum Flap Extended Speed	139	75	Do not exceed this speed with flaps extended.

2.3 Airspeed indicator markings

Airspeed indicator markings and their color-code significance are shown below:

Marking	IAS value or range		Significance
	knots	km/h	
White arc	***37-75***	**70-139**	Flap Operating Range.
Green arc	***44-129***	**82-240**	Normal Operating Range.
Yellow arc	***129-157***	**240-290**	Maneuvers must be conducted with caution and only in smooth air.
Red line	***157***	**290**	Maximum speed for all operations.

2.4 Power plant

2.4.1 Engine operating speeds and limits

Engine Model:		**ROTAX 915 iS 3 Sport** 4-cylinder horizontally opposed, turbocharged engine approved to ASTM F2339, propeller shaft with flange for constant speed propeller and drive for hydraulic governor for constant speed propeller
Engine Manufacturer:		**Bombardier-Rotax GMBH**
Power	***Max Take-off:***	**104 kW (140 HP) at 5800 rpm, max.5 min.**
	Max. Continuous:	**99 kW (133 HP) at 5500 rpm (**without governor) NOTE: Max.cont.power is available up to the critical altitude
Engine speed	***Max. Take-off:***	**5800 rpm (max. 5 min)**
	Max. Continuous:	**5500 rpm**
	Idling:	**min 1800 rpm**
Coolant temperature	***Minimum:***	**- 20°C *(-4 °F)*** at ground idle, start, and warm up **40 °C *(104 °F)*** at normal operation
	Maximum:	**90°C *(194 °F)*** at ground idle, start, and warm up **120 °C *(248 °F)*** at normal operation
Oil temperature	***Minimum:***	**- 20°C *(-4 °F)*** at ground idle, start, and warm up **50 °C *(120 °F)*** at normal operation
	Maximum:	**100 °C *(212°F)*** at ground idle, start, and warm up **130 °C *(266 °F)*** *at normal operation*
	Optimum:	**90 – 110 °C *(194 – 230 °F)*** ATTENTION: Operating the engine below these temperatures may lead to formation of condensation water in the lubrication system. To evaporate possibly accumulated water, at least once a day 100 °C (212 °F) oil temperature must be reached.
Oil pressure:	***Minimum:***	**0.8 bar *(11.6 psi)*** *- below 3500 rpm* **2.0 bar *(29 psi)*** *- above 3500 rpm*
	Maximum:	**5 bar (*72.5 psi)*** **7 bar (*102 psi)* - For a short period at cold start**
	Normal:	**2 - 5 bar *(29-73 psi) - above 3500 rpm***
Exhaust gas temp.	***Maximum:***	***950 °C (1742 °F)***
	EGT-split	*EGT-split is the difference between the actual highest EGT value of the actual lowest EGT value* **200 °C *(392 °F)*** *at fuel consumption higher than 3 lph* **500 °C *(932 °F)*** *at fuel consumption less than 3 lph*
Fuel pressure	***Minimum:***	**2.9 bar *(42 psi)*** *at fuel rail* **2.5 bar *(36 psi)*** *acceptable fuel press.exceedance (max.3 sec)* NOTE: Fuel pressure exceedance only allowed after power setting change.
	Maximum:	**3.1 bar *(45 psi)*** *at fuel rail* ***3.5 bar (51 psi)*** *Acceptable Fuel press.exceedance (max. 3 sec.)*
Ambient temperature	***Maximum in flight:***	**60 °C *(140 °F)* (manifold temperature)**
	Maximum at start:	**50 °C *(120 °F)* (ambient temperature)**
	Minimum at start:	**-20 °C *(-13 °F)* (oil temperature)**
Critical altitude	***Maximum:***	**15000 ft** *Manifold temperature max. 50°C (120 °F)*

Operating altitude	***Maximum***	**23000 ft**
Acceleration	***Maximum negative***	**-0.5 g (max. 5 seconds)**
Manifold temperature	***Maximum***	**50 °C *(120 °F)***
Manifold pressure	***Minimum***	**60 hPa *(1.77inHg)***
	Maximum	**1730 hPa *(51 inHg)***
Boost pressure	***Minimum***	**Ambient pressure**
	Maximum	**1730 hPa *(51 inHg)***

2.4.2 Fuel

ATTENTION
Obey the latest edition of Service Instruction SI-915 i-001, for the selection of the correct fuel.

ATTENTION
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:

	Usage/Description
	915 iS
Anti knock properties	Min. RON 95

NOTE

For fuels according to ASTM D4814 specifications following AKI (Anti Knock Index) value has to be observed: min. AKI 91.

MOGAS

	Usage/Description
MOGAS	915 iS
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	915 iS
Aviation Standard	AVGAS 100 LL (ASTM D910)

Fuel volume:

Wing fuel tank volume	2x60 l	2x16	US gal
Unusable fuel quantity	2x0.5 l	2x0.13	US gal

2.4.3 Oil

ATTENTION

Obey 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-915 i-001, latest edition.

Oil type

At the selection of suitable lubricants refer to the additional information in the Service Information SI-915 i-001, latest edition.

Oil consumption

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

Oil specification

- Use only oil with RON 424 classification

NOTE

The ROTAX® Norm 424 (RON 424) is a BRP-Rotax internal standard, which is only available on special request via the ROTAX® authorized distributor and will not be disclosed to third parties without prior consent.

- 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.
- Oils primarily for Diesel engines have **insufficient high temperature properties and additives which favour clutch slipping, and are generally** unsuitable.

Oil viscosity

Use of multi-grade oils is recommended.

NOTE

Multi-viscosity grade oils are less sensitive to temperature variations than single grade oils.
They are suitable for use throughout the seasons, ensure rapid lubrication of all engine components at cold start and get less fluid at higher temperatures.

NOTE

Type of oil used by aircraft manufacturer is shown in Section 10 Supplement No.2.

Oil volume:

Minimum	3.2 l	0.856	US gal
Maximum	3.6 l	0.951	US gal

2.4.4 Coolant

ATTENTION
Obey the latest edition of Service Instruction SI-915 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

ATTENTION
Obey the operating media manufacturer's instructions!

.

NOTE
Type of coolant used by aircraft manufacturer is shown in Section 10 Supplement No.2.

Coolant liquid volume:

It is about ..... 2.5 l 0.66 US gal

2.5 Power plant instrument markings

Analogue engine instruments markings and their color-code significance are shown below.

Rotax 912 iS Sport	Minimum Limit (red line)	Normal Operating Range (green arc)	Caution Range (yellow arc)	Maximum Range (red line)
Engine speed [RPM]	1800	1800-5500	5500-5800	5800
Oil Temperature	*50 °C (120 °F)*	*50 – 110 °C (120 – 230 °F)* See ATTENTION below	*110 – 130 °C (230 – 266 °F)*	*130 °C (266 °F)*
Exhaust Gas Temp. (EGT)	-	*800 – 850 °C (1472 – 1562 °F)*	*850 – 950 °C (1562 - 1742 °F)*	*950 °C (1742 °F)*
Coolant Temperature (CT)	40 °C *(122°F)*	40-110°C *(122-230°F)*	110-120 °C *(230 - 248 °F)*	120 °C *(248 °F)*
Oil Pressure	*0.8 bar (12 psi)*	*0.8 - 5 bar (12 - 73 psi)*	*5 - 7 bar (73 - 102 psi)*	*7 bar (102 psi) cold engine starting*

ATTENTION

Operating the engine below oil temperatures 90 – 110 °C *(194 – 230 °F)* may lead to formation of condensation water in the lubrication system. To evaporate possibly accumulated water, at least once a day 100 °C (212 °F) oil temperature must be reached.

2.6 Miscellaneous Instrument Marking

There is not any miscellaneous instrument marking.

2.7 Weight

Empty weight (standard equipment)	325	kg	715	lb

NOTE
Actual empty weight is shown in SECTION 6

Max. design take-off weight	600	kg	1320	lb
Max. design landing weight	600	kg	1320	lb
Max. weight of fuel (120 l)..... ..	87	kg	192	lb
Max. baggage weight:				
Baggage compartment behind seats . …	15	kg	33	lb
Wing lockers (optional)	20	kg	44	lb each
Front locker (optional).....	10	kg	22	lb

2.8 Center of gravity

Operating C.G. range	25 to 35	%	of MAC	
MAC.....	53.819	in	1367	mm

Datum: Wing leading edge between ribs No. 4 and 5, 81.52 in (2071 mm) from plane of symmetry.

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2.9 Approved maneuvers

Airplane Category: UL / LSA (Ultra-light / Light Sport Aircraft)

The BRISTELL LSA is approved for normal and below listed maneuvers:

- Steep turns not exceeding 60° bank
- Lazy eights
- Chandelles
- Stalls (except whip stalls)

WARNING
Aerobatics and intentional spins are prohibited!

2.10 Maneuvering load factors

Maximum positive limit load factor ..... +4 g
Maximum negative limit load factor ..... - 2 g
Maximum negative for the engine ..... -0.5 g (max. 5 seconds)

2.11 Crew

Number of seats 2
Minimum crew..... 1 pilot in the left seat
Minimum crew weight ..... 121 lb 55 kg
Maximum crew weight ..... see SECTION 6

WARNING
Do not exceed maximum take-off weight 1320 lb (600 kg)!

2.12 Kinds of operation

There are permitted Day VFR flights.
Night VFR flights and IFR flights under VMC are permitted if the aeroplane is appropriately equipped (e.g. FAR 91.205) and when the pilot has appropriate rating.

WARNING
IFR flights under IMC and intentional flights under icing conditions are PROHIBITED!

Minimum instruments and equipment list for VFR flights:

- Airspeed indicator
- Altimeter
- Compass (not required by ASTM F 2245)
- Fuel quantity indicator
- Tachometer (RPM)
- Oil temperature indicator
- Oil pressure indicator
- Cylinder head temperature indicator (Coolant temp indicator)

2.13 Other limitations

WARNING
No smoking on board of the aircraft!

CAUTION
FAA Sport Pilot Rule limits Max. Speed in Level Flight (VH)
to 120 knots CAS (222 km/h).

SECTION 3

3 EMERGENCY PROCEDURES

3.1 Introduction

Section 3 provides checklists and amplified procedures for coping with various emergencies that may occur. Emergencies caused by aircraft or engine malfunction are extremely rare if proper pre-flight inspections and maintenance are practiced.
However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem.

3.2 Engine Failure

3.2.1 Engine failure during take-off run

1. Throttle - reduce to idle
2. Ignition (LANE A,B) - switch off
3. Apply brakes

3.2.2 Engine failure during take-off

1. Speed - gliding at 65 KIAS (120 km/h)
2. Altitude - below 150 ft: land in take-off direction
   - over 150 ft: choose a landing area
3. Wind - find direction and velocity
4. Landing area - choose free area without obstacles
5. Flaps - extend as needed
6. Fuel Selector - shut off
7. Ignition (LANE A,B) - switch off
8. Safety harness - tighten
9. Master switch - switch off before landing
10. Land

3.2.3 Engine failure in flight

1. Push control stick forward
2. Speed - gliding at 65 KIAS (120 km/h)
3. Altitude - below 150 ft: land in take-off direction
   - over 150 ft: choose a landing area
4. Wind - find direction and velocity
5. Landing area - choose free area without obstacles
6. Flaps - extend as needed
7. Fuel Selector - shut off
8. Ignition (LANE A,B) - switch off
9. Safety harness - tighten
10. Master switch - switch off before landing
11. Land

3.3 In-flight Engine Starting

Engine Stop

1. 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.
2. Electric pumps - ON
3. Fuel Selector - switch to second fuel tank
4. Throttle lever - to idling position
5. EMS main switch - AUTO
6. LANE select switch A - ON
7. LANE select switch B - ON
8. Start power switch - switch ON
9. Starter button - press until the engine starts to run
10. Start power switch - switch off after 15 sec.

3.4 Smoke and Fire

3.4.1 Fire on ground at engine starting

1. Starter - keep in starting position
2. Fuel Selector - close
3. Throttle - full power
4. Ignition (LANE A,B) - switch off
5. Leave the airplane
6. Extinguish fire by a fire extinguisher (if available) or call for a fire-brigade if you cannot do it.
7. Locate the cause of fire and resolve the error before next flight by qualified staff (authorized by the Aviation Authorities).
8. An entry in the logbook must be made.
9. A maintenance inspection should be carried out.

3.4.2 Fire on ground with engine running

1. Heating - close
2. Fuel selector - close
3. Throttle - full power
4. Ignition (LANE A,B) - switch off
5. Leave the airplane
6. Extinguish fire by a fire extinguisher (if available) or call for a fire-brigade if you cannot do it.
7. Locate the cause of fire and resolve the error before next flight by qualified staff (authorized by the Aviation Authorities).
8. An entry in the logbook must be made.
9. A maintenance inspection should be carried out.

3.4.3 Fire during take-off

1. Speed - 65 KIAS (120 km/h)
2. Heating - close
3. Fuel Selector - close
4. Throttle - full power
5. Ignition (LANE A,B) - switch off
6. Land and stop the airplane

7. Leave the airplane
8. Extinguish fire by a fire extinguisher (if available) or call for a fire-brigade if you cannot do it.
9. Locate the cause of fire and resolve the error before next flight by qualified staff (authorized by the Aviation Authorities).
10. An entry in the logbook must be made.
11. A maintenance inspection should be carried out.

3.4.4 Fire in flight

1. Heating - close
2. Fuel Selector - close
3. Throttle - full power
4. Master switch - switch off
5. Ignition (LANE A,B) - switch off
6. Choose of area - heading to the nearest airport or choose emergency landing area
7. Emergency landing - perform according to 3.6
8. Leave the airplane
9. Extinguish fire by a fire extinguisher (if available) or call for a fire-brigade if you cannot do it.
10. Locate the cause of fire and resolve the error before next flight by qualified staff (authorized by the Aviation Authorities).
11. An entry in the logbook must be made.
12. A maintenance inspection should be carried out

NOTE
Engine will stop immediately after master switch switched off.

WARNING
Do not attempt to re-start the engine!

3.4.5 Fire in the cockpit

1. Master switch - switch off
2. Heating - close

3. Use a fire extinguisher (if available).
4. If not land a leave the airplane as soon as possible

3.5 Glide

An example of the use of gliding is in the case of engine failure

1. Speed - recommended gliding speed 65 KIAS
   120 km/h

3.5.1 Emergency descent

Emergency descent means to get on the ground as quickly as possible. It is used in case of a big problem encountered in flight like engine fire, smoke in the cockpit, or any other serious problem.

1. Throttle lever - fully pulled to set idle
2. Flaps - retracted
3. Control stick - push forward to bring airplane into descent
4. Speed - V_{NO} 129 KIAS (240 km/h)
   Do not exceed this speed except in smooth air, and then only with caution.
   - VNE 157 KIAS (290 km/h)
   Do not exceed this speed in any operation.

Steep spiral dive with max. 60° bank may be used however be careful to not exceed limit load factor during spiral. You can monitor area below you during a spiral.

3.6 Landing Emergencies

3.6.1 Emergency landing

Emergency landings are generally carried out in the case of engine failure and the engine cannot be re-started.

1. Speed - adjust for optimum gliding 65 KIAS
   120 km/h
2. Trim - adjust
3. Safety harness - tighten
4. Flaps - extend as needed
5. COMM - report your location if possible
6. Fuel Selector - close
7. Ignition (LANE A,B) - switch off

8. Master switch - switch off
9. Perform approach without steep turns and land on chosen landing area.

3.6.2 Precautionary landing

A precautionary landing is generally carried out in the cases where the pilot may be disorientated, the aircraft has no fuel reserve or possibly in bad weather conditions.

1. Choose landing area, determine wind direction
2. Report your intention to land and land area location.
3. Perform low-altitude passage into wind over the right-hand side of the chosen area with flaps extended as needed and thoroughly inspect the landing area.
4. Perform circle pattern.
5. Perform approach at increased idling with flaps fully extended.
6. Reduce power to idle when flying over the runway threshold and touch-down at the very beginning of the chosen area.
7. After stopping the airplane switch off all switches, shut off the fuel selector, lock the airplane and seek for assistance.

NOTE

Watch the chosen area steadily during precautionary landing.

3.6.3 Landing with a flat tire

1. During landing keep the damaged wheel above ground as long as possible using the ailerons control
2. Maintain the direction on the landing roll out, applying rudder control.

3.6.4 Landing with a defective landing gear.

1. If the main landing gear is damaged, perform touch-down at the lowest practicable speed and if possible, maintain direction during landing run.
2. If the nose wheel is damaged perform touch-down at the lowest practicable speed and hold the nose wheel above the ground by means of the elevator control as long as possible.

3.7 Recovery from Unintentional Spin

WARNING
Intentional spins are prohibited!

There is no an uncontrollable tendency of the airplane to enter into a spin provided the normal piloting techniques are used.
If an unintentional spin fully develops then the following recovery technique is advised:

1. Throttle - idle
2. Lateral control - ailerons neutralized
3. Rudder pedals - full opposite rudder (to the mechanical stop)
4. Following a short pause - Elevator control – push forward until rotation stops
5. Rudder pedals - neutralize rudder immediately when rotation stops
6. Recover from the dive.

3.8 Other Emergencies

3.8.1 Vibration

If any forced aircraft vibrations appear, it is necessary:

1. To set engine speed to such power rating where the vibrations are lowest.
2. To land on the nearest airfield or to perform a precautionary landing according to 3.6

A maintenance inspection should be carried out.

3.8.2 Autopilot malfunction

In the case, that autopilot starts to not work properly, press immediately red button “AP OFF” on the instrument panel.

WARNING
Take-Off, climb, Approach and landing with AP “ON” or with malfunction AP are PROHIBITED.

3.8.3 Inadvertent icing encounter

WARNING
Intentional flights under icing conditions are PROHIBITED!

If icing is inadvertently encountered then:

1. Pitot heat (if installed) - ON
2. Exit icing conditions - change altitude or turn back.
3. Cockpit heating - pull knob to ON
4. Up/Down knob - pushed forward (UP) to defrost windshield

3.8.4 Loss of primary instruments

If primary instruments are lost and the aircraft is fitted with the backup instruments then use these to safely complete the flight.

If no backup instruments are installed then visually check the aircraft altitude and attitude and land as soon as practicable.

3.8.5 Loss of flight controls

Loss of control may have several reasons like a failure of the control system, jamming, disconnection, strong turbulence, unrecoverable spin, pilot disorientation, etc.

If loss of a control appears e.g. due to jamming or disconnection, then some control might be still possible:

Lost control	Action
Ailerons	Some degree of roll control is available by using the secondary effect of rudder. Effectiveness of rudder may be increased by rapid bursts of power. Aircraft with a jammed aileron can be landed in a slip, preferably against a crosswind.
Elevator	Try to use elevator trim to control airplane longitudinally. Keep in mind that trim control works considerably slower than elevator control. Engine power may be used to pitch up. Before landing, when the airplane will enter ground effect, will be needed to apply a slight nose-up pitch as the airplane enters ground effect. Small shot of power in addition to the trim up may be needed. Wing flap control may be used to pitch down.
Rudder	Some degree of yaw control is available by using the secondary effect of ailerons.
Wing flaps	The flaps are mechanically interconnected and have the electrical control. If the electrical control would fail or if the flaps would jam in any position, then adjust elevator trim to trim flaps pitching moment. If (in spite of flaps mechanical interconnection) one flap would extend and the aircraft rolls then immediately use the opposite ailerons and rudder to eliminate pitching and rolling moment.

WARNING

If the control cannot be regained and the aircraft is fitted with a ballistic rescue system, then activate the system according to **Error! Reference source not found.**.

3.8.6 Runaway pitch trim

Runaway pitch trim is a condition in which the elevator trim control is lost from some reasons (trim servo stuck, trim control failure, etc.).
In event of trim runaway, act as follows:

1. Speed - reduce to 65 KIAS (120 km/h IAS) or speed at which you can control aircraft without excessive stick force
2. Land as soon as possible

3.9 Rotax 915 iS Failures in flight

WARNING

Non-compliance can result in serious injuries or death!
Unless otherwise in this chapter stated, operating an engine with limited airworthiness is not permitted. Unscheduled maintenance action is required. At unusual engine behavior conduct checks as per Maintenance Manual Line Chapter 05-50-00 before the next flight.

ATTENTION

Identifies an instruction which, if not followed, may severely damage the engine or could void any warranty.

3.9.1 Failures indicated by the EMS

EMS **Health Status**

The warning indicators provide basic information on the engine health.

HIC A: Voltage between Terminal 2 and Terminal 8 (Warning Indicator A)	HIC B: Voltage between Terminal 2 and Terminal 10 (Warning Indicator B)	Action on ground	Action during flight
0 V	Oscillating 0–12 V	One way flight to maintenance hangar permissible	Flight is possible to your destination at your own discretion.
Oscillating 0–12 V	0 V	One way flight to maintenance hangar permissible	Flight is possible to your destination at your own discretion.
0 V	12 V	Flight not permissible	Land the aircraft*
Oscillating 0–12 V	Oscillating 0–12 V	Flight not permissible	Land the aircraft*
Oscillating 0–12 V	12 V	Flight not permissible	Land the aircraft*
12 V	0 V	Flight not permissible	Land the aircraft*
12 V	Oscillating 0–12 V	Flight not permissible	Land the aircraft*
12 V	12 V	Flight not permissible	Land the aircraft*

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

NOTE

If a warning indicator flashes, it indicates an error with lower se- verity (Fault) that has been detected by the internal testing procedures of the ECU. In this case the ECU will continue to operate normally. There will be no transfer of control of the ignition and injection to the error-free Lane.

If a warning indicator 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 CU 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.

3.9.2 Failure of internal generators

3.9.2.1 Failure of Generator 1

If during normal operation (Generator 1 is supplying the EMS) Generator 1 fails, the ECU automatically switches over to sup- ply the EMS by using Generator 2.

If the engine is supplied by Generator 2 the engine is able to de- liver full performance. No performance drop can be recognized while the engine switches the supply from Generator 1 to Generator 2.

ATTENTION
If Generator 2 is used for supplying the EMS, the airframe will not be supplied with electrical power by an internal generator.

This failure condition will be detected by the EMS. Therefore see section “Failures detected by the EMS” for appropriate action.

3.9.2.2 Failure of Generator 2

If during normal operation (Generator 1 is supplying the EMS) Generator 2 fails, the ECU is not able to detect this condition.

ATTENTION
If Generator 2 fails the Airframe will not be supplied with electrical power by an internal generator

Land as soon as practicable.

3.9.2.3 Failure of both Generators

A failure of both Generators (Generator 1/Generator 2) will result in engine stoppage unless the EMS is not powered by an external power source (12 V voltage drop between X3 Terminal 1 and Aircraft ground).
Land as soon as practicable.

3.9.3 Engine not responding on throttle position commands

Possible breakage/blockage of throttle valve actuation/linkage. In case of a breakage of the throttle valve actuation the valve will jump to wide open position.

WARNING

Non-compliance can result in serious injuries or death!

Never attempt starting the engine with a disconnected, broken or blocked throttle valve actuation. This may lead to excessive engine speeds.

For shutting off the engine proceed according to Engine shut- OFF procedure. As part of an abnormal operation, it might be required to shut down the engine at higher engine speeds.

3.9.4 Engine on fire or fire in the engine compartment

ATTENTION

Shut off fuel supply and carry out emergency procedures as prescribed in 3.4

Event has to be entered by the pilot into engine logbook.

3.9.5 Emergency Engine shut-off

Step	Step Description	Procedure
1	Deactivate ECU	HIC A: Disconnect Terminal 1 and Terminal 7 to turn OFF ECU Lane A HIC B: Disconnect Terminal 1 and Terminal 9 to turn OFF ECU Lane B Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Lane select Switch A: OFF Lane select Switch B: OFF

3.9.6 Loss of Display CAN Information

If Display CAN Bus A or B fail, all information's are still available on the working CAN Bus.

In case Display CAN A and B fail and no engine parameters are available land the aircraft.

3.9.7 Loss of power

Perform Emergency landing according to 3.6.1 if engine power is fully lost and cannot be recovered.

If engine power is lost partially then land as soon as possible.

3.9.8 Failures during engine start

3.9.8.1 Engine does not start

Insufficient supply from electrical power source.

Ensure that Engine starter and EMS system is supplied by an external power source until engine reached idle speed

Insufficient fuel supply.

Ensure that Engine is supplied with fuel in appropriate quality

Starting at low oil temperature.

Use high quality oil without friction modifier.

3.9.9 The sprag clutch fails to decouple from the starter

ATTENTION
Shut down engine!
Risk of fire and danger of the electric starter overheating

Follow engine shut OFF procedure according to 4.5.18.

3.9.10 Exceedance of operational limits

ATTENTION
When exceeding an operating limit, adapt engine power setting and land as soon as possible.

Any exceeding of an operating limit has to be entered by the pilot into engine logbook, stating duration and duration of this condition. Unscheduled maintenance action may be required (see Maintenance Manual Line).

3.9.11 Fuel pressure outside range

ATTENTION
Reduce engine power setting to the minimum necessary and carry out precautionary landing according to 3.6.2.

3.9.11.1 High fuel pressure

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.

3.9.11.2 Low fuel pressure

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.

3.9.12 Occurrence of uncharacteristic and severe engine vibrations

- If the vibrations occur in conjuction 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.

3.9.13 Exceeding maximum admissible engine speed

Exceeding engine speed

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

3.9.14 Exceeding of max.coolant temperature

Exceeding coolant temperature

CAUTION
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.

3.9.15 Exceeding of maximum admissible oil temperature

Exceeding oil temperature

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

- Any exceeding of the max.admissible oil 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.

3.9.16 Oil pressure below minimum - during flight

Oil pressure too low

CAUTION
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.

3.9.17 Oil pressure below minimum - on ground

Oil pressure too low

CAUTION
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 of the Engine Manual.
- A maintenance inspection should be carried out.

3.9.18 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.

3.9.19 Maximum permissible exhaust temperatures exceeded

Exceeded exhaust temperatures

CAUTION

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.

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SECTION 4

4 NORMAL PROCEDURES

4.1 Introduction

4.2 Assembly and Disassembly

4.3 Rotax 915 iS Daily Checks:

4.3.1 Coolant level
4.3.2 Check of mechanical/electronic components

4.4 Pre-flight Inspection

4.4.1 Inspection Check List
4.4.2 Rotax 915 iS Pre-flight checks

4.5 Normal procedures

4.5.1 Before engine starting
4.5.2 Engine starting
4.5.3 After engine start
4.5.3.1 Warming up period
4.5.3.2 Engine run-up
4.5.3.3 Ground test
4.5.3.4 Lane and Ignition check
4.5.3.5 Wastegate and PCV check
4.5.3.6 Fuel pump check
4.5.4 Taxiing
4.5.5 Before take-off
4.5.6 Take-off
4.5.7 Short field take-off
4.5.8 Soft field take-off
4.5.9 Climb
4.5.10 Cruise
4.5.11 Descent
4.5.12 Before landing
4.5.13 Balked Landing (Go around)
4.5.14 Landing
4.5.15 Short field landing

4.1 Introduction

Section 4 provides checklists and recommended procedures for normal operation of the aircraft.

4.2 Assembly and Disassembly

Refer to the BRISTELL LSA Maintenance and Inspection Procedures manual.

4.3 Rotax 915 iS Daily Checks:

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!

When performing checks which do not require ignition make sure that the ECU is turned off and the aircraft is secured to prevent form unwanted engine starts.

ATTENTION

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

4.3.1 Coolant level

ATTENTION
Operating media must be observed.
Inappropriate coolant quantity can lead to serious engine damage

The specifications given in 2.4.4 must be adhered to when refilling coolant.

Step	Procedure
1	Verify coolant level in the **expansion tank**, replenish as required up to top. The max. coolant level must be flush with the bottom of the filler neck.
2	Verify coolant level in the **overflow bottle**, replenish as required. The coolant level must be between max. and min. mark.

4.3.2 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.
2	Verify free movement of throttle valve and the complete range.
3	Inspect for damages, leakage and general condition of exhaust system and turbocharger.
4	Visual inspection for mechanical and thermal damages of sensor, actuators and the wiring harness.
5	Visual inspection for mechanical and thermal damages of pressure control valve, fuse box and ECU.

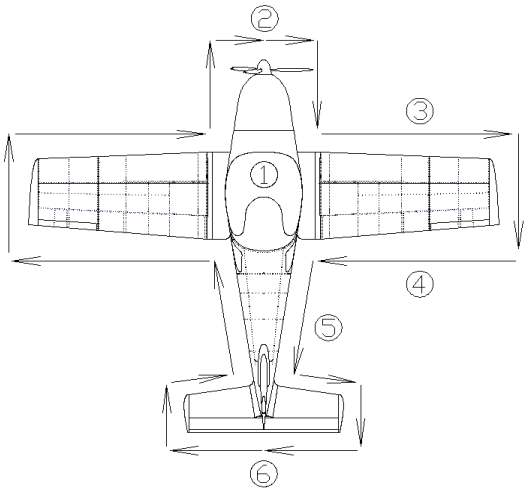
4.4 Pre-flight Inspection

Carry out the pre-flight inspection every day prior to the first flight or after airplane assembly. Incomplete or careless inspection can cause an accident. Carry out the inspection following the instructions in the Inspection Check List.

NOTE

The word "condition" in the instructions means a visual inspection of surface for damage deformations, scratching, chafing, corrosion or other damages, which may lead to flight safety degradation.

The manufacturer recommends carrying out the pre-flight inspection as follows:



4.4.1 Inspection Check List

①	– Ignition (LANE A,B)	- OFF
	– Master switch	- ON
	– Fuel gauge ind.	- check fuel quantity
	– Master switch	- OFF
	– Avionics	- check condition
	– Control system	- visual inspection, function, clearance, free movement up to stops - check wing flaps operation
	– Canopy	- condition of attachment, cleanness
	– Check cockpit for loose objects	
②	– Rotax 915 iS Pre-flight checks according to 4.4.2 – Engine cowling condition – Propeller DUC FLASH: - Manually maintaining the tip of a blade of the propeller, shake it firmly to feel if a too much clearance appears in the setting of the propeller. - Degradation of material: Check visually the entire propeller without dismantling (blade root, Inconel leading edge, surface of the blade, spinner, hub, etc.) - Fixation of the spinner: Check visually the fixation screws of the spinner. A marking paint can be made between each screw and spinner to have a means of visual inspection of proper tightening the screws.. – Engine mount and exhaust manifold condition – Oil and coolant quantity check – Visual inspection of the fuel and electrical system – Fuel system draining – Other actions according to the engine manual	
③	– Wing surface condition – Leading edge condition – Pitot tube condition	
④	– Wing tip	- surface condition, attachment
	– Aileron	- surface condition, attachment, clearance, free movement
	– Flap	- surface condition, attachment, clearance
⑤	– Landing gear	- wheel attachment, brakes, condition and pressure of tires
	– Wing lower surface and fuselage bottom surface condition	
⑥	– Vertical tail unit	- condition of surface, attachment, free movement, rudder stops
	– Horizontal tail unit	- condition of surface, attachment, free movement, elevator stops
	– The check on left side of the fuselage and wing is the same as on right side	

4.4.2 Rotax 915 iS Pre-flight checks

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

ATTENTION
Operating media must be observed.
Inappropriate coolant quantity can lead to serious engine damage.

The specifications given in 2.4.3 must be adhered to when refilling oil.

Step	Procedure
1	***NOTE*** Propeller shouldn't be turned excessively reverse the normal direction of engine rotation. Remove bayonet cap from the oil tank, 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 but the pressure and the amount of gas which is transferred 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. The oil level should be in the upper half (between the “50%“ and the “max“ mark) and should never falls below the “min.“ mark of the oil dipstick. 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 poured out through the venting system. Difference between max.- and min.- mark = 0.45 litre (0.95 liq pt). Oil consumption max 0.06 l/h (0.13 liq pt/h).
5	Re-install bayonet cap.

4.5 Normal procedures

4.5.1 Before engine starting

1. Control system - free & correct movement
2. Canopy - clean
3. Brakes - fully applied
4. Safety harness - tighten
5. Rudder pedals - set to required position

WARNING
Adjusting of rudder pedals position during flight is PROHIBITED.

4.5.2 Engine starting

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

Maintenance CAN Bus (A/B) must not be used during flight. B.U.D.S. aircraft USB-to-CAN converter must be disconnected.

1. Fuel Selector - ON - LEFT or RIGHT FUEL TANK
2. Master switch - ON

Step	Step Description	Procedure
1	Engine Pre-heating (if necessary)	–
	Example (Symbolic)	–
2	Activate Fuel pumps	HIC A: A connection between Terminal 3 and Terminal 9 will power Fuel pump 1. HIC B: A connection between Terminal 3 and Terminal 11 will power Fuel pump 2.
	Example (Symbolic)	Fuel pump 1: **ON** Fuel pump 2: **ON**

ATTENTION
Only switch on one fuel pump when starting the engine. Switching on both fuels pumps can lead to a bad start behavior.

3	Activate ECU	HIC A: A connection between Terminal 1 and Terminal 7 will power ECU Lane A. HIC B: A connection between Terminal 1 and Terminal

		9 will power ECU Lane B.
	Example (Symbolic)	Lane select Switch A: **ON** Lane select Switch B: **ON**
4	Temporary supply engine with external power supply	X3: A connection between Terminal 2 and Terminal 3, and between airframe ground and EMS ground will activate Start Power. The temporary power supply must be maintained during steps 4, 5, 6.
	Example (Symbolic)	Start Power Switch: **HOLD**
5	Check if Warning Indicators illuminate and extinguish after around 3 seconds.	HIC A: 12 V voltage drop between Terminal 2 and Terminal 8 for 3 seconds. HIC B: 12 V voltage drop between Terminal 2 and Terminal 10 for 3 seconds.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check
6	Set Throttle Valve	Set linearized throttle position according to diagram Figure 3. Throttle position below.
	Example (Symbolic)	Set Throttle.

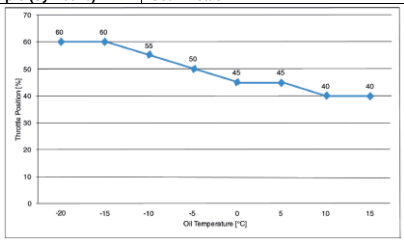


Figure 3: Throttle posiiton

7	Start Engine	HIC B: A connection between Terminal 4 and Terminal 12 actuates the starter. The connec- tion must persist until the engine speed exceeds 1500 rpm.
	Example (Symbolic)	Start Button: **HOLD**

ATTENTION
Activate starter for maximum of 10 seconds only (without interruption), followed by a cooling period of 2 minutes

8	Reduce Throttle Valve as required	Set linearized throttle position so that the engine runs on idle.
	Example (Symbolic)	Reduce Throttle.

ATTENTION
Increasing engine speed is only permitted at steady oil pressure readings above 3 bar.

9	Check engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits.	HIC A: If a 12 V voltage drop between Terminal 2 and Termi- nal 8 (permanent or oscillating) is detected perform Lane and Ignition Check. See abnormal operation if the voltage drop still persists. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected perform a Lane and Ignition Check. See abnormal operation if the voltage drop still persists. Display CAN A/B: Check if oil pressure has risen within 10 seconds after engine start and monitor oil pressure.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check
10	Generator Switching	Increase engine speed above 2400 rpm and hold for 8 seconds.
	Example (Symbolic)	Increase Throttle Position
11	Check engine instru- ments (Warning Indi- cators and Operational Limits) and ensure compli- ance with the operat- ing limits.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check

4.5.3 After engine start

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

4.5.3.1 Warming up period

Step	Step Description	Procedure
1	Check engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits while step 2 to 4.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check
2	Set Throttle Valve as required.	Set linearized throttle position in a way that the engine runs on approx. 2000 rpm for approx. 2 minutes.
	Example (Symbolic)	Set Throttle
3	Set Throttle Valve as required.	Set linearized throttle position in a way that the engine runs on approx. 2500 rpm until oil temperature reaches 50 °C (120 ° F).
	Example (Symbolic)	Set Throttle
4	Reduce Throttle Valve as required.	Set linearized throttle position so that the engine runs on idle.
	Example (Symbolic)	Reduce Throttle

4.5.3.2 Engine run-up

4.5.3.3 Ground test

CAUTION

The engine check should be performed with the aircraft heading upwind and not on a loose terrain (the propeller may suck grit which can damage the leading edges of blades).

ATTENTION

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

Step	Step Description	Procedure
1	Check engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits while step 2 to 3.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check
2	Set Full Throttle	Set linearized throttle position to WOT and check if maximum performance can be reached.
	Example (Symbolic)	Set Throttle.
3	Set Throttle Valve as required	Set linearized throttle position to reach an engine speed of 2500 rpm and continue with Lane check 2500 rpm and Ignition check.
	Example (Symbolic)	Set Throttle.

4.5.3.4 Lane and Ignition check

During the Lane and Ignition check Engine Speed must always show plausible values no matter if one ore both lanes are ac- tive. Otherwise maintenance is required.

Step	Step Description	Procedure
1	Check engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits while step 2 to 11.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check
2	Set Throttle Valve as required.	Set linearized throttle position so that engine speed is approximately 2500 rpm.
	Example (Symbolic)	Set Throttle
3	Deactivate ECU Lane A	HIC A: Disconnect Terminal 1 and Terminal 7 to turn OFF ECU Lane A.
	Example (Symbolic)	Lane select Switch A: **OFF**
4	Observe engine speed	Display CAN A/B; Check engine speed.
	Example (Symbolic)	Pilot Display: Check

ATTENTION

Engine speed may not drop/increase more than 250 rpm. 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.

Step	Step Description	Procedure
5	Activate ECU Lane A	HIC A: Connect Terminal 1 and Terminal 7 to power ECU Lane A.
	Example (Symbolic)	Lane select Switch A: **ON**
6	Await Warning Indicator A to extinguish and consider slack time.	HIC A: 12 V voltage drop between Terminal 2 and Terminal 8 for 3 seconds.
	NOTE *After the voltage drop between Terminal 2 and Terminal 8 changes back to 0 V wait approx. 3 seconds until continuing with the next step.*	
	Example (Symbolic)	Warning Lamp A: Check
7	Deactivate ECU Lane B	HIC B: Disconnect Terminal 1 and Terminal 9 to turn OFF ECU Lane B.
	Example (Symbolic)	Lane select Switch B: **OFF**

8	Observe engine speed	Display CAN A/B: Check engine speed.
	Example (Symbolic)	Pilot Display: Check

ATTENTION

Engine speed may not drop/increase more than 250 rpm. 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.

Step	Step Description	Procedure
9	Activate ECU Lane B	HIC B: Connect Terminal 1 and Terminal 9 to power ECU Lane B.
	Example (Symbolic)	Lane select Switch B: **ON**
10	Await Warning Indicator B to extinguish and consider slack time.	HIC A: 12 V voltage drop between Terminal 2 and Terminal 10 for 3 seconds.
	NOTE *After the voltage drop between Terminal 2 and Terminal 10 changes back to 0 V wait approx. 3 seconds until continuing with the next step.*	
	Example (Symbolic)	Warning Lamp B: Check
11	Reduce Throttle Valve as required.	Set linearized throttle position to reach an engine speed of 2000 rpm and continue with fuel pump check.
	Example (Symbolic)	Set Throttle

NOTE

Lane A and Lane B have different sensor inputs. During Lane and Ignition check, some sensor values are not displayed, de- pending on the activation of the Lanes

Following sensor values are not available if Lane A is turned OFF and Lane B is activated:

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

Following sensor values are not available if Lane B is turned OFF and Lane A is activated:

- Oil temperature
- Oil pressure

4.5.3.5 Wastegate and PCV check

Manifold Air Temperature (MAT) must be <65 °C during the check procedure. Otherwise the ECU (Engine Control Unit) internal check of the Pressure Control Valve (PCV) and Wastegate will not be executed.

NOTE

If possible the PCV Check and the Lane and Ignition Check might be combined in one check.

Step	Step Description	Procedure
1	Check engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits while step 2 –13.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check
2	Set Throttle valve to WOT	Set linearized throttle position to 100%. Governor must be set in a way that engine speed >4700 rpm.
	Example (Symbolic)	Set Throttle
3	Deactivate ECU Lane A	HIC A: Disconnect Terminal 1 and Terminal 7 to turn OFF ECU Lane A
	Example (Symbolic)	Lane Select Switch A: **OFF**
4	Wait > 15 seconds	–
	Example (Symbolic)	Wait
5	Check engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected, shut OFF
		engine and perform troubleshooting. Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check
6	Activate ECU Lane A	HIC A: Connect Terminal 1 and Terminal 7 to power ECU Lane A
	Example (Symbolic)	Lane Select Switch A: **ON**
7	Await Warning Indicator A	HIC A: If a 12 V voltage drop between Terminal 2 and

Step	Step Description	Procedure
	to extinguish and consider slack time.	Terminal 8 for 3 second.
	NOTE *After the voltage drop between Terminal 2 and Terminal 8 changes back to 0 V wait approx 3 seconds until continuing with the next step.*	
	Example (Symbolic)	Warning Lamp A: Check
8	Deactivate ECU Lane B	HIC B: Disconnect Terminal 1 and Terminal 9 to turn OFF ECU Lane B
	Example (Symbolic)	Lane Select Switch B: OFF
9	Wait > 15 seconds	–
	Example (Symbolic)	Wait
10	Check engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut off engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected, shut off engine and perform troubleshooting. Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check
		Pilot Display: Check
11	Activate ECU Lane B	HIC B: Connect Terminal 1 and Terminal 9 to power ECU Lane B.
	Example (Symbolic)	Lane select Switch B: **ON**
12	Await Warning Indicator B to extinguish and consider slack time.	HIC A: 12 V voltage drop between Terminal 2 and Terminal 10 for 3 seconds.
	NOTE *After the voltage drop between Terminal 2 and terminal 10 changes back to 0 V wait approx 3 seconds until continuing with the next step.*	
	Example (Symbolic)	Warning Lamp B: Check
13	Reduce Throttle Valve as required	Set linearized throttle position to reach an engine speed of 2000 rpm and continue with Fuel pump check
	Example (Symbolic)	Set Throttle

4.5.3.6 Fuel pump check

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.

Step	Step Description	Procedure
1	Check engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits while step 2– 8.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Terminal 10 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. Display CAN A/B: Check and ensure compliance with operational limits.
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check
2	Set Throttle valve as required	Set linearized throttle position so that the engine speed is approx 2000 rpm.
	Example (Symbolic)	Set Throttle
3	Deactivate Fuel pump 1	HIC A: Disconnect Terminal 3 and Terminal 9 to deactivate Fuel pump 1
	Example (Symbolic)	Fuel pump 1: **OFF**
4	Observe Fuel pressure	
	Example (Symbolic)	Pilot Display: Check

ATTENTION

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.

5	Activate Fuel pump 1	HIC A: Disconnect Terminal 3 and Terminal 9 to deactivate Fuel pump 1
	Example (Symbolic)	Fuel pump 1: **OFF**
6	Deactivate Fuel pump 2	HIC A: Disconnect Terminal 3 and Terminal 11 to deactivate Fuel pump 2
	Example (Symbolic)	Fuel pump 2: **OFF**
7	Observe Fuel pressure	
	Example (Symbolic)	Pilot Display: Check

ATTENTION

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.

8	Activate Fuel pump 2	HIC A: Disconnect Terminal 3 and Terminal 11 to deactivate Fuel pump 2.

NOTE

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

4.5.4 Taxiing

Apply power and brakes as needed. Apply brakes to control movement on ground. Taxi carefully when wind velocity exceeds 20 knots (10 m/s). Hold the control stick in neutral position, or in a position that properly deflects a crosswind.

4.5.5 Before take-off

1. Altimeter - set
2. Trim - set neutral position
3. Control system - check free movement
4. Cockpit canopy - closed
5. Safety harness - tighten
6. Fuel Selector - ON (LEFT or RIGHT tank)

NOTE

AIRCRAFT IS EQUIPPED WITH RETURN LINES IN BOTH FUEL TANKS.

7. Ignition (LANE A,B) - ON
8. El. pumps - ON
9. Wing flaps - extend as needed
10. Autopilot - OFF (if installed)

4.5.6 Take-off

1. Brakes - apply to stop wheel rotation
2. Take-off power - throttle fully forward
3. Engine speed - check rpm
4. Instruments - check if within limits
5. Nose wheel unstick - 30 KIAS (55 km/h)
6. Airplane lift-off - 40 KIAS (75 km/h)
7. Wing flaps - retract when speed of 65 KIAS (120 km/h) is reached, at altitude of 300 ft
8. Make transition to climb

WARNING

The Take-off is prohibited if:
- The engine is running unsteadily
- The engine instruments values are beyond operational limits
- The crosswind velocity exceeds permitted limits (see 5.2.8)
- Autopilot is “ON”

4.5.7 Short field take-off

1. Use all available runway
2. Heading - set
3. Flaps - 30°
4. Trim - as required
5. Hold brakes
6. Throttle - fully forward (5800 rpm, max. 5min.)
7. Engine instruments - check within limits
8. Release brakes after rpm increase
9. Accelerate and pull control stick aft to lift off the nose wheel as soon as possible.
10. As aircraft becomes airborne, level off in ground effect to accelerate to:

No obstacle:	Vy (best rate of climb)	76 KIAS (123 km/h)
Obstacle:	Vx (best angle of climb)	68 KIAS (109 km/h)

11. Flaps - set to 10°
12. Climb at:

No obstacle:	Vy (best rate of climb)	76 KIAS (123 km/h)
Obstacle:	Vx (best angle of climb)	68 KIAS (109 km/h)

13. Trim - adjust
14. Flaps - retract at Vy 76 KIAS (123 km/h) or at 150 ft

4.5.8 Soft field take-off

1. Inspect field condition checking for grass height, bumps, holes, debris, wetness.
1. Taxiing - control stick fully aft
2. Heading - set
3. Flaps - 30°
4. Trim - as required
5. Throttle - fully forward (5800 rpm, max. 5min.)
6. Control stick - full aft pressure during T/O run to lift off nose wheel as soon as possible.
7. As aircraft becomes airborne, level off in ground effect to accelerate to:
   No obstacle: Vy (best rate of climb) 76 KIAS (123 km/h)
   Obstacle: Vx (best angle of climb) 68 KIAS (109 km/h)
8. Flaps - set to 10°
9. Climb
   No obstacle: Vy (best rate of climb) 76 KIAS (123 km/h)
   Obstacle: Vx (best angle of climb) 68 KIAS (109 km/h)
10. Trim - adjust
11. Flaps - retract at Vy 76 KIAS (123 km/h) or at 150 ft

4.5.9 Climb

1.	Best ROC speed	- Best rate of climb speed (Vy): 76 KIAS (123 km/h) - Best angle of climb speed (Vx): 68 KIAS (109 km/h)
2.	Throttle	- Max. take-off power - (max. 5800 rpm for 5 minutes) - Max. cont. power 5500 rpm
3.	Trim	- trim the airplane
4.	Instruments	- oil temperature and pressure, coolant temperature within limits

CAUTION

If coolant or oil temperature approach their limits, reduce the climb angle to increase airspeed and thus fulfill the limits.

4.5.10 Cruise

1.	El. pump	- OFF
2.	Fuel selector	- LEFT or RIGHT.

NOTE

It is recommended to switch between tanks from time to time during flight to consume fuel equally from both tanks.

Refer to Section 5, for recommended cruising regimes.

4.5.11 Descent

1. Optimum glide speed - 65 KIAS (120 km/h)

CAUTION

It is not advisable to reduce the engine throttle control lever to minimum on final approach and when descending from very high altitude. In such cases the engine becomes under-cooled and a loss of power may occur. Descent at increased idle (approx. 3000 rpm), speed between 120-1300 km/h (65-70 KIAS) and check that the engine instruments indicate values within permitted limits.

4.5.12 Before landing

1. Approach speed - 60 KIAS (110 km/h)
2. Throttle - as needed
3. Wing flaps - extend as needed
4. Trim - as needed
5. Autopilot - OFF

4.5.13 Balked Landing (Go around)

1. Throttle - full power (max.5800 rpm)
2. Wing flaps - extend as needed
3. Trim - adjust as needed
4. Wing flaps - retract at height of 150 ft after reaching 65 KIAS (120 km/h)
5. Trim - adjust
6. Repeat circuit pattern and landing

4.5.14 Landing

1. Touch-down on main wheels
2. Apply brakes as needed after the nose wheel touch-down

4.5.15 Short field landing

1. Fuel selector - select proper tank
2. Safety harness - check that tightened
3. Approach speed - 55 KIAS (100 km/h)
4. Glide path – just enough to clear obstacle at approach end of runway
5. Throttle - as required
6. Flaps - 30°
7. Trim - as required
8. Landing light(s) - ON
9. Flare - minimum float
10. After touchdown - stick forward
    - Retract flaps
    - Maximum braking

4.5.16 Soft field landing

1. Fuel selector - select proper tank
2. Safety harness - check that tightened
3. Approach speed - 59 KIAS (110 km/h)
4. Throttle - as required
5. Flaps - 20 °
6. Trim - as required
7. Landing light(s) - on
8. Flare - add power before touchdown to keep elevator effective to help keep weight off nose wheel
9. After touchdown - throttle to idle
   gradually increase back elevator to keep weight of nosewheel
   No braking during roll out

4.5.17 After landing

1. Engine speed - set as required for taxiing
2. Wing flaps - retract

4.5.18 Engine shut-off

Step	Step Description	Procedure
1	Check the engine instruments (Warning Indicators and Operational Limits) and ensure compliance with the operating limits while step 2 to 5.	HIC A: If a 12 V voltage drop between Terminal 2 and Terminal 8 (permanent or oscillating) is detected, shut OFF engine and perform troubleshooting. HIC B: If a 12 V voltage drop between Terminal 2 and Termi- nal 10 (permanent or oscillat- ing) is detected, shut OFF engine and perform troubleshooting. Display CAN A/B: Check and ensure compliance with operational limits
	Example (Symbolic)	Warning Lamp A: Check Warning Lamp B: Check Pilot Display: Check
2	Reduce **Throttle** valve as required.	Set linearized throttle position so that the engine runs on **idle**.
	Example (Symbolic)	Reduce Throttle
3	Await cooling down phase.	**Wait > 2 minutes**
4	Deactivate ECU	HIC A: DisconnectTerminal 1 and Terminal 7 to turn OFF ECU Lane A HIC B: DisconnectTerminal 1 and Terminal 9 to turn OFF ECU Lane B
	Example (Symbolic)	Lane select Switch A: **OFF** Lane select Switch B: **OFF**

NOTE

The ECU needs to deactivated first. Shutting of the engine by deactivating the fuel supply may result in fault and failure en- tries in the ECU. Shutting down the engine by shutting of the fuel pumps is only allowed in emergency situations.

5	Deactivate Fuel pumps	HIC A: Disconnect Terminal 3 and terminal 9 to turn OFF Fuel pump 1 HIC B: Disconnect Terminal 3 and terminal 11 to turn OFF Fuel pump 2
	Example (Symbolic)	Fuel pump 1: **OFF** Fuel pump 2: **OFF**
6	Circuit breakers	switch off
7	Master switch	switch off

4.5.19 Aircraft parking and tie-down

1. Ignition check - OFF
2. Master switch check - OFF
3. Fuel selector - OFF
4. Parking brake - use it as necessary (if installed)
5. Canopy - close, lock as necessary
6. Secure the airplane

NOTE

It is recommended to use parking brake (if installed) for short-time parking only, between flights during a flight day. After ending the flight day or at low temperatures of ambient air, do not use parking brake, but use the wheel chocks instead.

NOTE

Use anchor eyes on the wings and fuselage rear section to fix the airplane. Move control stick forward and fix it together with the rudder pedals. Make sure that the cockpit canopy is properly closed and locked. The anchoring before leaving the airplane is important if the airplane is not equipped with a parking brake.

4.5.20 Flight in rain

When flying in the rain, no additional steps are required. Aircraft qualities and performance are not substantially changed. However Visual Meteorological Condition (VMC) must be maintained.

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SECTION 5

5 PERFORMANCE

5.1 Introduction

5.2 Performance

5.2.1 **Airspeed indicator system calibration**
5.2.2 **Stall speeds**
5.2.3 **Take-off performance**
5.2.4 **Landing distances**
5.2.5 **Climb performance**
5.2.6 **Cruise**
5.2.7 **Endurance and Range**
5.2.8 **Demonstrated crosswind performance**
5.2.9 **Optimum glide speed**
5.2.10 **Ceiling**

5.1 Introduction

Section 5 provides data for airspeed calibration, stall speeds, take-off performance and additional information.

The presented data has been computed from actual flight tests with the aircraft and engine in good conditions and using average piloting techniques.

If not stated otherwise, the performance stated in this section is valid for maximum take-off weight and under ISA conditions.

The performance shown in this section is valid for aircraft fitted with given power plant.

5.2 Performance

5.2.1 Airspeed indicator system calibration

	KIAS	KCAS
	35	36
VS0	37	38
	40	41
VS1	44	45
	50	51
	55	55
	60	60
	65	65
	70	70
VFE,	75	75
	80	80
	85	85
	90	90
VA	96	96
	100	100
	105	105
	110	109
	115	114
	120	119
	125	124
VN0	130	129
	135	134
	140	139
	145	144
	150	149
VNE	157	156

	IAS (km/h)	CAS (km/h)
	65	66
VS0	70	71
	80	81
VS1	82	83
	90	91
	100	101
	110	111
	120	120
	130	130
VFE	139	139
	150	150
	160	160
	170	170
VA	180	179
	190	189
	200	199
	210	209
	220	219
	230	229
VN0	240	238
	250	248
	260	258
	270	268
	280	278
VNE	290	287

5.2.2 Stall speeds

Conditions: Max.takeoff-off weight 1320 lb Engine idle run	Wing flaps pos.	*KIAS*	*KCAS*	IAS [km/h]	CAS [km/h]	Altitude loss at recovery [ft]
Wing level stall	0°	44	45	82	83	100
	20°	42	43	78	79	120
	30°	37	38	70	71	160
Co-ordinated turn 30° bank	0°	47	48	88	89	120
	20°	45	46	84	85	160
	30°	40	41	75	76	200

5.2.3 Take-off performance

ISA Conditions

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Takeoff Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Takeoff Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	15,0	59	660	1500	920	1760
2000 ft ISA	11,0	52	740	1690	1040	1980
4000 ft ISA	7,1	45	840	1900	1170	2230
6000 ft ISA	3,1	38	940	2150	1320	2520
8000 ft ISA	-0,8	30	1070	2430	1490	2850
10000 ft ISA	-4,8	23	1210	2750	1690	3230

ISA + 10 °C

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Takeoff Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Takeoff Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	25,0	77	710	1610	980	1880
2000 ft ISA	21,0	70	800	1810	1110	2120
4000 ft ISA	17,1	63	900	2040	1250	2390
6000 ft ISA	13,1	56	1010	2310	1410	2710
8000 ft ISA	9,2	48	1150	2610	1600	3060
10000 ft ISA	5,2	41	1300	2960	1820	3470

ISA + 20 °C

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Takeoff Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Takeoff Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	35,0	95	750	1720	1050	2010
2000 ft ISA	31,0	88	850	1930	1190	2270
4000 ft ISA	27,1	81	960	2180	1340	2560
6000 ft ISA	23,1	74	1090	2470	1510	2900
8000 ft ISA	19,2	66	1230	2800	1720	3280
10000 ft ISA	15,2	59	1400	3180	1950	3730

ISA -10 °C

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Takeoff Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Takeoff Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	5,0	41	610	1400	860	1640
2000 ft ISA	1,0	34	690	1570	960	1840
4000 ft ISA	-2,9	27	780	1770	1080	2080
6000 ft ISA	-6,9	20	880	1990	1220	2340
8000 ft ISA	-10,8	12	990	2250	1380	2640
10000 ft ISA	-14,8	5	1120	2550	1560	2990

ISA -20 °C

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Takeoff Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Takeoff Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	-5,0	23	570	1300	800	1520
2000 ft ISA	-9,0	16	640	1460	890	1710
4000 ft ISA	-12,9	9	720	1640	1010	1920
6000 ft ISA	-16,9	2	810	1850	1130	2170
8000 ft ISA	-20,8	-6	920	2080	1280	2450
10000 ft ISA	-24,8	-13	1040	2360	1450	2760

5.2.4 Landing distances

ISA Conditions

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Landing Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Landing Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	15,0	59	300	950	360	1020
2000 ft ISA	11,0	52	320	1010	380	1080
4000 ft ISA	7,1	45	340	1070	410	1150
6000 ft ISA	3,1	38	360	1140	430	1220
8000 ft ISA	-0,8	30	380	1210	460	1300
10000 ft ISA	-4,8	23	410	1290	490	1380

ISA + 10 °C

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Landing Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Landing Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	25,0	77	310	980	370	1060
2000 ft ISA	21,0	70	330	1040	400	1120
4000 ft ISA	17,1	63	350	1110	420	1190
6000 ft ISA	13,1	56	370	1180	450	1260
8000 ft ISA	9,2	48	400	1250	470	1350
10000 ft ISA	5,2	41	420	1330	510	1430

ISA + 20 °C

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Landing Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Landing Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	35,0	95	320	1020	390	1090
2000 ft ISA	31,0	88	340	1080	410	1160
4000 ft ISA	27,1	81	360	1150	430	1230
6000 ft ISA	23,1	74	380	1220	460	1310
8000 ft ISA	19,2	66	410	1300	490	1390
10000 ft ISA	15,2	59	440	1380	520	1480

ISA -10 °C

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Landing Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Landing Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	5,0	41	290	920	350	980
2000 ft ISA	1,0	34	310	970	370	1040
4000 ft ISA	-2,9	27	330	1030	390	1110
6000 ft ISA	-6,9	20	350	1100	420	1180
8000 ft ISA	-10,8	12	370	1160	440	1250
10000 ft ISA	-14,8	5	390	1240	470	1330

ISA -20 °C

Airport altitude H [ft]	Temperature tH [°C]	Temperature tH [°F]	CONCRETE Landing Run [ft]	CONCRETE Distance over 50 ft obstacle [ft]	GRASS Landing Run [ft]	GRASS Distance over 50 ft obstacle [ft]
0 ft ISA	-5,0	23	280	880	340	950
2000 ft ISA	-9,0	16	300	940	350	1010
4000 ft ISA	-12,9	9	310	990	380	1070
6000 ft ISA	-16,9	2	330	1050	400	1130
8000 ft ISA	-20,8	-6	350	1120	420	1200
10000 ft ISA	-24,8	-13	380	1190	450	1280

5.2.5 Climb performance

CONDITIONS: MCP MTOW	BEST RATE OF CLIMB					BEST ANGLE OF CLIMB				
	IAS	IAS	KIAS	RATE OF CLIMB	RATE OF CLIMB	IAS	IAS	KIAS	RATE OF CLIMB	RATE OF CLIMB
ALTITUDE	[mph]	[km/h]	[knots]	[m/s]	[fpm]	[mph]	[km/h]	[knots]	[m/s]	[fpm]
0 ft ISA	76	123	66	7,6	1490	68	109	59	5,9	1170
2000 ft ISA	76	123	66	7,3	1440	67	108,6	59	6,1	1190
4000 ft ISA	76	122	66	7,1	1390	67	108,2	58	6,2	1220
6000 ft ISA	76	122	66	6,9	1350	67	107,8	58	6,4	1260
8000 ft ISA	75	121	66	6,7	1310	67	107,4	58	6,6	1300
10000 ft ISA	75	121	65	6,5	1270	66	107	58	6,9	1350

5.2.6 Cruise

CAUTION
FAA Sport Pilot Rule limits Max. Speed in Level Flight (VH) to 120 knots CAS (222 km).

		55%	65%	75%	MCP	T/O
		4300 rpm	4800 rpm	5000 rpm	5500 rpm	5800 rpm
0 ft	KIAS	98 knots	122 knots	129 knots	143 knots	147 knots
	KCAS	99 knots	122 knots	129 knots	142 knots	146 knots
	KTAS	99 knots	122 knots	129 knots	142 knots	146 knots
2000 ft	KIAS	91 knots	119 knots	127 knots	141 knots	143 knots
	KCAS	92 knots	119 knots	127 knots	140 knots	142 knots
	KTAS	95 knots	123 knots	131 knots	144 knots	146 knots
4000 ft	KIAS	84 knots	116 knots	125 knots	138 knots	139 knots
	KCAS	85 knots	117 knots	125 knots	138 knots	139 knots
	KTAS	91 knots	124 knots	133 knots	146 knots	147 knots
6000 ft	KIAS	77 knots	113 knots	123 knots	136 knots	136 knots
	KCAS	78 knots	114 knots	123 knots	135 knots	135 knots
	KTAS	86 knots	124 knots	135 knots	148 knots	148 knots
8000 ft	KIAS	70 knots	110 knots	121 knots	134 knots	132 knots
	KCAS	71 knots	111 knots	121 knots	133 knots	131 knots
	KTAS	81 knots	125 knots	137 knots	150 knots	148 knots
10000 ft	KIAS	63 knots	107 knots	119 knots	132 knots	128 knots
	KCAS	64 knots	108 knots	119 knots	131 knots	128 knots
	KTAS	75 knots	126 knots	139 knots	153 knots	149 knots

5.2.7 Endurance and Range

The table below shows fuel consumption, endurance and range

Fuel qty. = 120 l
Unusable fuel = 1 l

NO FUEL RESERVE CONSIDERED !

		55% 4300 rpm	65% 4800 rpm	75% 5000 rpm	MCP 5500 rpm
0 ft	KIAS	98 knots	122 knots	129 knots	143 knots
	KCAS	99 knots	122 knots	129 knots	142 knots
	KTAS	99 knots	122 knots	129 knots	142 knots
	Fuel consumption	10,3 l/h *2,7 USgal/h*	23,9 l/h *6,3 USgal/h*	29,0 l/h *7,7 USgal/h*	40,4 l/h *10,7 USgal/h*
	Endurance	11:30	4:58	4:06	2:56
	Range	2120 km *1150 NM*	1130 km *610 NM*	980 km *530 NM*	770 km *420 NM*
2000 ft	KIAS	91 knots	119 knots	127 knots	141 knots
	KCAS	92 knots	119 knots	127 knots	140 knots
	KTAS	95 knots	123 knots	131 knots	144 knots
	Fuel consumption	8,8 l/h *2,3 USgal/h*	23,1 l/h *6,1 USgal/h*	28,5 l/h *7,5 USgal/h*	40,5 l/h *10,7 USgal/h*
	Endurance	13:32	5:08	4:10	2:56
	Range	2390 km *1290 NM*	1170 km *630 NM*	1010 km *550 NM*	780 km *420 NM*
4000 ft	KIAS	84 knots	116 knots	125 knots	138 knots
	KCAS	85 knots	117 knots	125 knots	138 knots
	KTAS	91 knots	124 knots	133 knots	146 knots
	Fuel consumption	7,2 l/h *1,9 USgal/h*	22,4 l/h *5,9 USgal/h*	28,0 l/h *7,4 USgal/h*	40,5 l/h *10,7 USgal/h*
	Endurance	16:27	5:19	4:14	2:56
	Range	2760 km *1490 NM*	1220 km *660 NM*	1040 km *560 NM*	790 km *430 NM*
6000 ft	KIAS	77 knots	113 knots	123 knots	136 knots
	KCAS	78 knots	114 knots	123 knots	135 knots
	KTAS	86 knots	124 knots	135 knots	148 knots
	Fuel consumption	5,7 l/h *1,5 USgal/h*	21,6 l/h *5,7 USgal/h*	27,5 l/h *7,3 USgal/h*	40,5 l/h *10,7 USgal/h*
	Endurance	20:56	5:30	4:19	2:56
	Range	3330 km *1800 NM*	1270 km *690 NM*	1080 km *580 NM*	810 km *430 NM*
8000 ft	KIAS	70 knots	110 knots	121 knots	134 knots
	KCAS	71 knots	111 knots	121 knots	133 knots
	KTAS	81 knots	125 knots	137 knots	150 knots
	Fuel consumption	4,1 l/h *1,1 USgal/h*	20,8 l/h *5,5 USgal/h*	27,0 l/h *7,1 USgal/h*	40,6 l/h *10,7 USgal/h*
	Endurance	4:49	5:42	4:24	2:56
	Range	4300 km *2320 NM*	1320 km *710 NM*	1110 km *600 NM*	820 km *440 NM*
10000 ft	KIAS	63 knots	107 knots	119 knots	132 knots
	KCAS	64 knots	108 knots	119 knots	131 knots
	KTAS	75 knots	126 knots	139 knots	153 knots
	Fuel consumption	2,6 l/h *0,7 USgal/h*	20,1 l/h *5,3 USgal/h*	26,6 l/h *7,0 USgal/h*	40,6 l/h *10,7 USgal/h*
	Endurance	22:09	5:55	4:28	2:55
	Range	6410 km *3460 NM*	1380 km *750 NM*	1150 km *620 NM*	830 km *450 NM*

5.2.8 Demonstrated crosswind performance

Max. permitted head wind velocity for take-off and landing	30	knots	15	m/s
Max. permitted cross wind velocity for take-off and landing	16	knots	8	m/s

5.2.9 Optimum glide speed

Optimum glide speed	60-65	KIAS	110-120	m/s

5.2.10 Ceiling

Service ceiling	20.000	ft	6.000	m

SECTION 6

6 WEIGHT AND BALANCE

6.1 Introduction

6.2 Weight and Balance Record

6.2.1 Weight and Balance Report

6.2.1.1 Empty Aircraft Weight and CG
6.2.1.2 Loaded Aircraft Weight and CG
6.2.1.3 Weight and CG Blank Form

6.3 Permitted payload range

6.4 Operational Weight and Balance Computation

6.4.1 Airplane Loading Schedule Chart
6.4.2 Table of static moments
6.4.3 Airplane loading graph
6.4.4 CG Moment envelope
6.4.5 CG limits

6.5 Equipment list

6.1 Introduction

This section contains the payload range within which the BRISTELL LSA may be safely operated.

Procedures for weighing the aircraft and the calculation method for establishing the permitted payload range are contained in last revision of FAA Aviation Advisory Circular AC.43.13 – 1B.

6.2 *Weight and Balance Record*

The table is intended to record continuous history of changes of equipment affecting weight and balance.

Type	BRISTELL ~~S-LSA~~LSA			Serial. No.: ~~237/2017~~387/2019							
Date	Item No.		Description of part or modification	Weight change						Basic weight of empty airplane	
				Added (+)			Removed (-)				
	+	-		Weight (lb)	Arm (in)	Moment (lb.in)	Weight (lb)	Arm (in)	Moment (lb.in)	Weight (lb)	Moment (lb.in)
21.6.2019			Manufactured airplane							~~777~~852	~~12483~~11430

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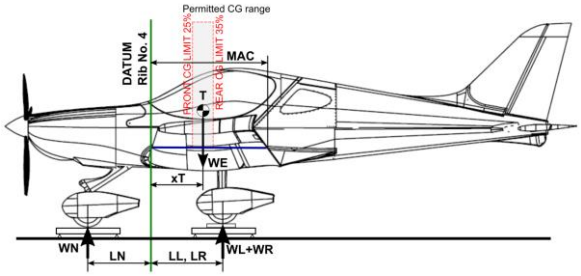
6.2.1 Weight and Balance Report

6.2.1.1 Empty Aircraft Weight and CG



MAC (in): 53,8

	ITEM	WEIGHT (lb)	ARM (in)	MOMENT = WEIGHT x ARM (lb.in)
EMPTY AIRCRAFT WEIGHT AND CG	RIGHT MAIN WHEEL	WR= 323	LR= 27,6	MR= 8900,9
	LEFT MAIN WHEEL	WL= 319	LL= 27,6	ML= 8779,3
	NOSE WHEEL	WN= 211	LN= -29,7	MN= -6249,9
	EMPTY AIRCRAFT	EMPTY WEIGHT (lbs) **WE= 852,1**	**CG (in) = 13,41** **CG (%MAC) = 24,9**	EMPTY ACFT TOTAL MOMENT (lbs.in) **MT= 11430,33**

$$CG(in) = \frac{\text{Total Moment}}{\text{Total Weight}}$$

$$CG(\%MAC) = CG(in) \times \frac{100}{MAC}$$

Serial No.: 436/2019
Date: 21.6.2019
By: BRM Aero

6.2.1.2 Loaded Aircraft Weight and CG

	ITEM	WEIGHT (lb)	ARM (in)	MOMENT = WEIGHT x ARM (lb.in)
	EMPTY AIRCRAFT	852,1	13,41	11430,3
LOADED AIRCRAFT WEIGHT AND CG	PILOT		23,6	
	PASSENGER		23,6	
	BAGGAGE - BEHIND SEATS		55,1	
	BAGGAGE - WING LOCKERS		24,8	
	FUEL TANKS		7,9	
	LOADED AIRCRAFT	TAKEOFF WEIGHT (lbs) TOW=	CENTER OF GRAVITY CG (in)= CG (%MAC) =	LOADED ACFT TOTAL MOMENT (lb.in) MT=

Max.Takeoff Weight:	1320,0	lb
CG Range:	25	35
Forward limit:	13,5	in
Rearward limit:	18,8	in

$$CG(in) = \frac{\text{Total Moment}}{\text{Total Weight}}$$

$$CG(\%MAC) = CG(in) \times \frac{100}{MAC}$$

Serial No.: 436/2019
Date:
By:

6.2.1.3 Weight and CG Blank Form

	ITEM	WEIGHT (lb)	ARM (in)	MOMENT = WEIGHT x ARM (lb.in)
EMPTY AIRCRAFT WEIGHT AND CG	RIGHT MAIN WHEEL	WR=	LR= 27,6	MR=
	LEFT MAIN WHEEL	WL=	LL= 27,6	ML=
	NOSE WHEEL	WN=	LN= -29,7	MN=
	EMPTY AIRCRAFT	EMPTY WEIGHT (lbs) WE=	CG (in) = CG (%MAC) =	EMPTY ACFT TOTAL MOMENT (lbs.in) MT=

	ITEM	WEIGHT (lb)	ARM (in)	MOMENT = WEIGHT x ARM (lb.in)
	EMPTY AIRCRAFT			
LOADED AIRCRAFT WEIGHT AND CG	PILOT		23,6	
	PASSENGER		23,6	
	BAGGAGE - BEHIND SEATS		55,1	
	BAGGAGE - WING LOCKERS		24,8	
	FUEL TANKS		7,9	
	LOADED AIRCRAFT	TAKEOFF WEIGHT (lbs) TOW=	CENTER OF GRAVITY CG (in)= CG (%MAC) =	LOADED ACFT TOTAL MOMENT (lb.in) MT=

Max.Takeoff Weight:	1320	lb
CG Range:	25	35
Forward limit:	13,5	in
Rearward limit:	18,8	in

$$CG(in) = \frac{\text{Total Moment}}{\text{Total Weight}}$$

$$CG(\%MAC) = CG(in) \times \frac{100}{MAC}$$

Serial No.: 436/2019
Date:
By:

Max.useful load:

WU (lb) =	MTOW	-	WE
WU (lb) =	1320	-	
WU (lb) =			

WARNING
DO NOT EXCEED MAXIMUM TAKEOFF WEIGHT!

6.3 Permitted payload range

PERMITTED PAYLOAD RANGE OF BRISTELL (lb)								
S/N:	436/2019				Empty weight (lb):	852	MTOW (lb):	1320,0
FUEL								
	VOLUME	(US gal)	5,0	10,0	15,0	20,0	25,0	31,7
	WEIGHT	(lb)	30,3	60,5	90,8	121,0	151,3	191,8
			PERMITTED CREW WEIGHT (lb)					
BAGGAGE (lb)	NO BAGGAGE	0	**438** *31,0 %MAC*	**407** *30,3 %MAC*	**377** *29,6 %MAC*	**347** *29,0 %MAC*	**317** *28,3 %MAC*	**276** *27,4 %MAC*
	1/2 REAR	17	**421** *31,7 %MAC*	**391** *31,0 %MAC*	**361** *30,4 %MAC*	**330** *29,7 %MAC*	**300** *29,0 %MAC*	**260** *28,1 %MAC*
	MAX REAR	33	**405** *32,4 %MAC*	**374** *31,8 %MAC*	**344** *31,1 %MAC*	**314** *30,4 %MAC*	**284** *29,8 %MAC*	**243** *28,9 %MAC*
	1/2 WING LOCKERS	44	**394** *31,1 %MAC*	**363** *30,4 %MAC*	**333** *29,7 %MAC*	**303** *29,0 %MAC*	**273** *28,4 %MAC*	**232** *27,5 %MAC*
	1/2 REAR + 1/2 WING	61	**377** *31,8 %MAC*	**347** *31,1 %MAC*	**317** *30,4 %MAC*	**286** *29,8 %MAC*	**256** *29,1 %MAC*	**215** *28,2 %MAC*
	MAX REAR + 1/2 WING	77	**361** *32,5 %MAC*	**330** *31,8 %MAC*	**300** *31,2 %MAC*	**270** *30,5 %MAC*	**240** *29,8 %MAC*	**199** *28,9 %MAC*
	MAX WING LOCKERS	88	**349** *31,1 %MAC*	**319** *30,5 %MAC*	**289** *29,8 %MAC*	**259** *29,1 %MAC*	**228** *28,4 %MAC*	**188** *27,5 %MAC*
	1/2 REAR + MAX WING	105	**333** *31,9 %MAC*	**303** *31,2 %MAC*	**272** *30,5 %MAC*	**242** *29,8 %MAC*	**212** *29,2 %MAC*	**171** *28,3 %MAC*
	MAX REAR + WING	121	**316** *32,6 %MAC*	**286** *31,9 %MAC*	**256** *31,2 %MAC*	**226** *30,6 %MAC*	**195** *29,9 %MAC*	**155** *29,0 %MAC*

Permitted crew weight with regard to CG limits.
"X" (if present) means computed crew weight less than minimum crew weight

6.4 Operational Weight and Balance Computation

An important part of preflight planning is to determine that the aircraft is loaded so its weight and CG location are within the allowable limits.
This is possible by using hereafter explained Loading graph method, using weights, arms, and moment indexes.

Procedure:

1. Record into the 6.4.1 Airplane Loading Schedule Chart current empty weight and static moment of the airplane, which you read from 6.2 Weight and Balance Record.
2. Record the weight of crew, fuel, and baggage into 6.4.1 Airplane Loading Schedule Chart.
3. See the 6.4.2 Table of static moments or 6.4.3 Airplane loading graph to read static moments for given weights of crew, fuel, and baggage.
4. Record found moments into the 6.4.1 Airplane Loading Schedule Chart.
5. Determine Take-off weight of the airplane – add together the airplane empty weight, crew, fuel, and baggage and record the result into the 6.4.1 Airplane Loading Schedule Chart.
6. Check, whether the calculated Take-off weight does not exceed Airplane Maximum Take-off Weight 1320 lb, 600 kg.
   If yes, then it is necessary to reduce weight of some of the useful load items (fuel, baggage).

WARNING
EXCEEDING MTOW MAY LEAD TO DETERIORATION OF SAFETY OF FLIGHT!

7. Determine Total Static Moment of loaded airplane – add together the static moment of empty airplane, crew, fuel, and baggage and record the result into the 6.4.1 Airplane Loading Schedule Chart.
8. Plot Takeoff Weight and Total Static Moment into the 6.4.4 CG Moment envelope.
9. Check, whether the intersection of Take-off weight horizontal line and Total Static Moment vertical line is inside the envelope.
   If **YES**, then the flight may be safely performed as regards weight and

balance.
If **NOT**, then it is necessary to change weight of some of the useful load items (crew, fuel, baggage) so that after a repeated computation the intersection of Take-off Weight and Total Static Moment will be inside the CG Moment envelope.

WARNING
SAFETY OF FLIGHT PERFORMED WITH THE AIRPLANE LOADED OUTSIDE PERMITTED LIMITS OF WEIGHT AND STATIC MOMENTS MAY BE DETERIORATED!

6.4.1 Airplane Loading Schedule Chart

Aircraft Type/Model:	BRISTELL LSA	Airplane S/N:	436/2019	Registration:	N915LM

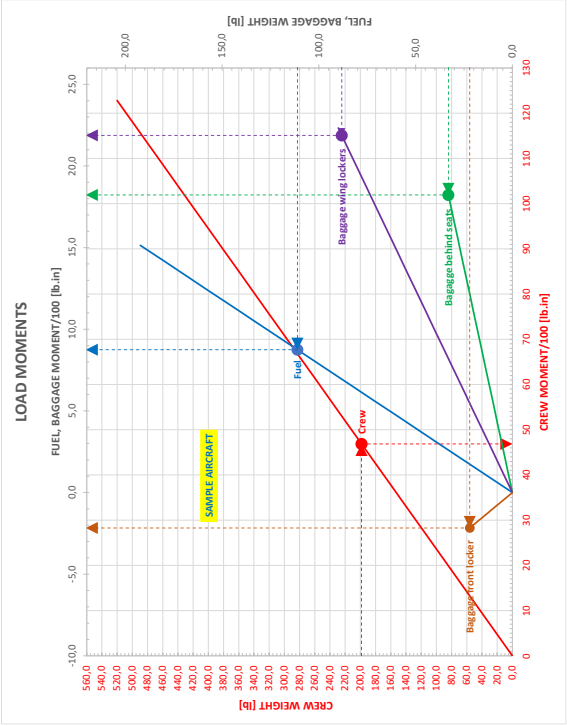
LOADING SCHEDULE CHART		SAMPLE AIRCRAFT			YOUR AIRCRAFT		436/2019
# ITEM	WEIGHT LIMIT [lb]	WEIGHT [lb]	ARM [in]	MOMENT/100 [lb.in]	WEIGHT [lb]	ARM [in]	MOMENT/100 [lb.in]
1. Einpty aeroplane		771,6	15,1	116,3	852,1	13,41	114,303
2. Crew		198,4	23,6	46,9		23,6	
3. Fuel	190,5	111,1	7,9	8,7		7,9	
4. Baggage behind seats	33,1	33,1	55,1	18,2		55,1	
5. Baggage wing lockers	88,2	88,2	24,8	21,9		24,8	
6. Baggage front locker	22,0	22,0	-9,8	-2,2		-9,8	
	MTOW [lb]	TAKEOFF WEIGHT [lb] = sum of weights 1 to 6		TOTAL MOMENT/100 [lb.in] = sum of moments 1 to 6	TAKEOFF WEIGHT [lb] = sum of weights 1 to 6		TOTAL MOMENT/100 [lb.in] = sum of moments 1 to 6
	1320	1224,4		209,8			

FRONT CG LIMIT 13,5	CG POSITION TOTAL MOMENT/100 x 100		CG POSITION TOTAL MOMENT/100 x 100
AFT CG LIMIT 18,8	[in] = TAKEOFF WEIGHT		[in] = TAKEOFF WEIGHT
	= 20982,4 / 1224,4		=
	= 17,136		=
FRONT CG LIMIT	CG POSITION CG POS. [in] x 100		CG POSITION CG POS. [in] x 100
25,0 %MAC	[%MAC] = MAC		[%MAC] = MAC
AFT CG LIMIT	= 1713,6 / 53,8		=
35,0 %MAC	= 31,8		=
			MAC [in]= 53,8

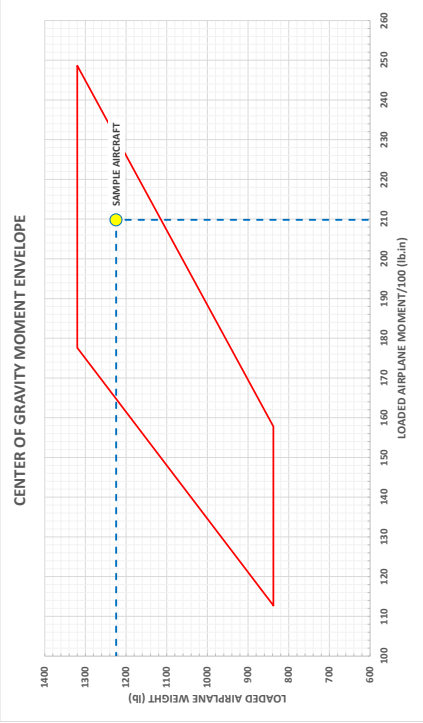
6.4.2 Table of static moments

CREW		FUEL		BAGGAGE BEHIND SEATS		BAGGAGE WING LOCKERS		BAGGAGE FRONT LOCKER	
Weight [lb]	Moment/100 [lb.in]	Quantity [US gal]	Weight [lb]	Moment/100 [lb.in]	Weight [lb]	Moment/100 [lb.in]	Weight [lb]	Moment/100 [lb.in]	Weight [lb]	Moment/100 [lb.in]
0,0	0,0	0,0	0,0	0,0	0	0,0	0	0,0	0	0,0
121,0	28,6	2,0	12,0	0,9	2	1,1	5	1,2	1	-0,1
140,0	33,1	4,0	24,0	1,9	4	2,2	10	2,5	2	-0,2
160,0	37,8	6,0	36,1	2,8	6	3,3	15	3,7	3	-0,3
180,0	42,5	8,0	48,1	3,8	8	4,4	20	5,0	4	-0,4
200,0	47,2	10,0	60,1	4,7	10	5,5	25	6,2	5	-0,5
220,0	51,9	12,0	72,1	5,7	12	6,6	30	7,4	6	-0,6
240,0	56,7	14,0	84,1	6,6	14	7,7	35	8,7	7	-0,7
260,0	61,4	16,0	96,1	7,6	16	8,8	40	9,9	8	-0,8
280,0	66,1	18,0	108,2	8,5	18	9,9	45	11,2	9	-0,9
300,0	70,9	20,0	120,2	9,5	20	11,0	50	12,4	10	-1,0
320,0	75,6	22,0	132,2	10,4	22	12,1	55	13,6	11	-1,1
340,0	80,3	24,0	144,2	11,4	24	13,2	60	14,9	12	-1,2
360,0	85,0	26,0	156,2	12,3	26	14,3	65	16,1	13	-1,3
380,0	89,8	28,0	168,2	13,2	28	15,4	70	17,4	14	-1,4
400,0	94,5	30,0	180,3	14,2	30	16,5	75	18,6	15	-1,5
420,0	99,2	32,0	192,3	15,1	32	17,6	80	19,8	16	-1,6
440,0	103,9				33	18,2	85	21,1	17	-1,7
460,0	108,7						90	22,3	18	-1,8
480,0	113,4								19	-1,9
500,0	118,1								20	-2,0
520,0	122,8								21	-2,1
									22	-2,2

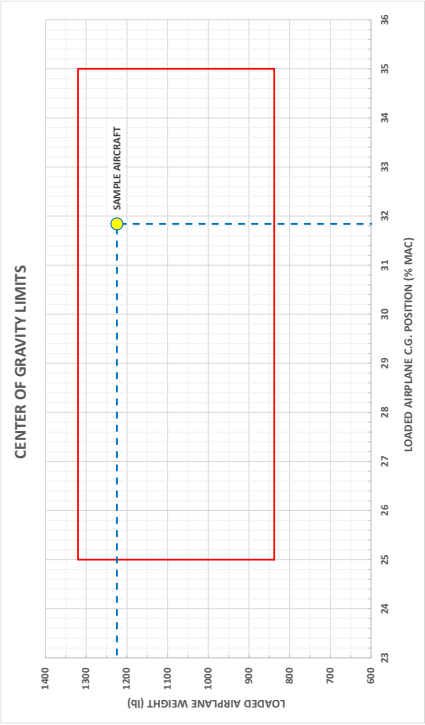
6.4.3 Airplane loading graph



6.4.4 CG Moment envelope



6.4.5 CG limits



6.5 Equipment list

List of equipment installed in BRISTELL LSA, S/N 436/2019:

1. 12V/5V socket between seats, and on instrument panel
2. 3-pos.adjustable rudder pedals on both sides
3. Aileron + elevator electric trim - control on both control sticks
4. AMSAFE 4-point safety belts
5. Anderson plug-External connection to power for jump start
6. Arm rest box
7. Automotive net in baggage compartment (P/N 42084)
8. Beringer 5,00-5 wheels
9. Beringer hand brake on central console, ABS
10. BOSCH M6 023 12V 18 AH YTX20L-4 battery
11. Bracket for EARTH X battery installation
12. Cabin heat
13. Canopy glass grey
14. Carpets in the cockpit
15. Coolant thermostat not installed
16. DUC INCONEL FLASH propeller
17. ELT Kannad AF Integra 406 MHz + RC 200 control unit
18. Fixed landing gear, steerable nose wheel
19. Fuel selector on console between seats
20. Garmin G3X flight display system
21. Garmin G5 EFIS
22. Garmin GA 26C GPS antenna for G3X
23. Garmin GA 35 External active GPS antenna
24. Garmin GA 57X combo GPS / XM antenna for G3X
25. Garmin GAD 29 ARINC 429 Interface
26. Garmin GAP 26 angle of attack heated probe
27. Garmin GDL 51R Remote-mount SiriusXM® Receiver
28. Garmin GDU 460, 10,6" dual displays
29. Garmin GEA 24 Engine Interface Module
30. Garmin GMA 345 digital audio panel
31. Garmin GMC 507 Autopilot Control Module without Yaw damper
32. Garmin GMU 22 Magnetometer
33. Garmin GSA 28 autopilot servos installation (roll+pitch)
34. Garmin GSU 25 ADHRS (2x)

35. GARMIN GTN 650 GPS/NAV/COM
36. Garmin GTP 59 Temperature Probe
37. Garmin GTX 45R mode S transponder with ADS-B out
38. Governor P-110-030/A for hydraulic prop
39. Grey interior RAL 7016
40. LAMBERT ARROW FLASH wingtip lights
41. Lambert Flaps V4_0 LED light +LINAK electric flaps actuator
42. Landing lights in both wings, WIG-WAG
43. Large square eye-ball vents 3275
44. Leather glareshield, middle size
45. Leather grips of the control sticks
46. LED strip on glareshield + dimmer
47. LEMO Connector with power supply
48. Lockable canopy
49. Long HTU (2.9 m) with long trim and horn balance
50. Middle size instrument panel for G3X CARBON
51. Noise insulation on firewall
52. Nose gear doubled flexible rod (Teleflex)
53. Paint scheme: #00, own design
54. RAMI AV-10 comm antenna
55. RAMI AV-17 COM antenna
56. RAMI AV-525 VOR, LOC & GS „V" Dipole Antenna
57. RAMI AV-74 transponder DME antenna
58. Red Loctite to seal exhaust system spring connection
59. Rotax 915 iS 3 A engine
60. Seats padded textile
61. SHILTEK LG fire sleeves on the oil hoses
62. Short control sticks for Tosten grips
63. Swith with fuse for fuel pump
64. TCW IBBS-12V-3AH 2 backup batteries (2x) for Garmin G3X
65. Tosten CS-6 grips
66. USB port(s) on the instrument panel
67. Wheel fairings (pants) for wheels 5,00"-5"
68. Wing lockers
69. Winter QM 2 Art. 1120 bank indicator

SECTION 7

7 AIRPLANE AND SYSTEMS DESCRIPTION

7.1 Introduction

This section provides description and operation of the aircraft and its systems.

7.2 Airframe

All-metal construction, single curvature metal skins riveted to stiffeners. Construction is of 6061-T6 aluminum sheet metal riveted to aluminum angles with Avex rivets. This high strength aluminum alloy construction provides long life and low maintenance costs thanks to its durability and corrosion resistance characteristics.

The wing has a high lift airfoil equipped by fowler flaps controlled by the electric servo operated by the pilot.

7.3 Control system

The plane is equipped with a dual stick control and classic rudder pedals, with pedal hydraulic brakes for easy ground control.

The elevator and aileron trim control, as well as wing flaps are electrically operated from the rocker switches located on the instrument panel or on the control stick.

7.4 Landing gear

Tricycle landing gear with the steerable nose wheel. Main landing gear uses two fiberglass spring elements.

7.5 Seats and safety harness

Side-by-side seating. Seat cushions are removable to make easier cleaning and drying. Four point safety belts provided to each seat. Optional, is additional seat upholstery to raise the small pilot or move him forward.

NOTE

Prior to each flight, ensure that the seat belts are firmly secured to the airframe, and that the belts are not damaged. Adjust the buckle so that it is centered on the body.

7.6 Baggage compartment

The rear baggage compartment is located behind the seats. It may accommodate up to 33 lb (15 kg). This space is divide on two sections – baggage compartment A and B. Is not recommended give too heavy things into baggage compartment B.

The baggage may also be loaded into the baggage compartment inside each wing up to 44 lb (20 kg), in each wing locker.

Make sure that baggage does not exceed maximum allowable weight, and that the aircraft CG is within limits with loaded baggage.

All baggage must be properly secured.

7.7 Canopy

Access to the cabin is from both sides. Make sure that the canopy is latched and mechanism is securely locked into position on both sides before operating the aircraft.

7.8 Power plant

Engine:

ROTAX 915 iS 3 A is 4-cylinder horizontally opposed, turbo- charged engine having propeller shaft with flange for constant speed propeller and drive for hydraulic governor for constant speed propeller.

Rotax 915 iS is 4-cylinder, 4-stroke liquid/air-cooled engine with horizontally opposed cylinders, Dry sump forced lubrication with separate oil tank, automatic adjustment by hydraulic valve tappet, Redundant electronic fuel injection and ignition, Engine management system (EMS), Electric starter (12 or 24 volt), Propeller speed reduction gearbox, Air intake system with intercooler, Turbocharger with stainless steel exhaust, TBO (Time between overhauls) 1,200 hours.

Propeller:

DUC Inconel FLASH, composite, 3-bladed, on-ground adjustable propeller.

NOTE

For technical data refer to documentation supplied by the propeller manufacturer.

7.8.1 Throttle

Engine power is controlled by means of the THROTTLE lever. THROTTLE lever is positioned in the middle channel between the seats. Lever is mechanically connected (by cables) to the flaps on the carburetors. Spring is added to the throttle push rod to ensure that the engine will go to full power if the linkages fail.

7.8.2 Heating

Heating consists of a heat exchanger on the exhaust manifold and control mechanism located on the right hand side of instrument panel.

CAUTION

Incidents involving exhaust gases entering the heating or ventilation system may result in fatal accidents due to carbon monoxide poisoning of the aircraft occupants. A carbon monoxide detector is recommended.

7.9 Fuel system

Wing tanks volume: 2x16 US gallons (2x60 l)

Each tank is equipped with a vent outlet and screen filter.

Drain valve located in the lowest point of the each tank and on the bottom edge of the firewall, on the gascolator.

Main fuel selector valve is on the central console in the cockpit.

The fuel pumps are located under cockpit floor accessible from outside after demounting cover on fuselage bottom.

CAUTION

Do not overfill the tanks to avoid fuel overflow through venting tubes.

7.10 Electrical system

7.10.1 Battery

The battery is mounted on the forward side of the firewall.

7.10.2 Master switch

Master switch connects the electrical system to the 12 Volt battery and charger/coils, controlled by the regulator. See Engine Manual for electrical system details.

NOTE

Ignition system is independent on the power source and will operate even with Master switch and/or breaker off.

7.10.3 Lane Switches

There are instaled two independent LANE select switches A and B on the instrument panel to connect the engine control unit ECU for the relevant LANE to the EMS power supply. The switches are used for LANE and ignition check after engine starting. LANE A and LANE B have different sensor inputs. During LANE and Ignition Check, some sensors values are not displayed, depending on activation of the LANES. Refer to Engine Operator's Manual for more details.

NOTE

All switches and or engine controls are "up" or "push forward" for operation, except the cabin heat which is "Pull" for "on". Optional equipment, switches and/or fuses are subject to change or installed as requested. See Aircraft Equipment List and Photo and Description of equipment and controls in the cockpit.

7.10.4 Start Power Switch

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.

7.10.5 Battery Backup Switch

If necessary (e.g. in case of supply failure by the internal generator) the EMS system can by powered by the onboard battery by activating the Battery Backup Switch.

7.10.6 Start Button

The Red Start Button on the instrument panel activates the starter motor.

7.11 Pitot and static pressure system

Pitot tube (optionally heated) is located below the wing.

Pressure distribution to the instruments is through flexible plastic hoses.

Static ports are located on both sides of the fuselage at the tail.

Keep the Pitot tube and static ports clean to ensure proper function of the system.

7.12 Miscellaneous equipment

BRISTELL LSA, S/N 436/2019 is fitted with:

1. 12V/5V sockets, USB port between seats, and on instrument panel
2. 3-pos.adjustable rudder pedals on both sides
3. Aileron + elevator electric trim - control on both control sticks
4. AMSAFE 4-point safety belts
5. Anderson plug-External connection to power for jump start
6. Arm rest box
7. Automotive net in baggage compartment (P/N 42084)
8. Beringer 5,00-5 wheels + wheel pants
9. Beringer hand brake on central console, ABS
10. BOSCH M6 023 12V 18 AH YTX20L-4 battery
11. Bracket for EARTH X battery installation
12. Cabin heat
13. Canopy glass grey
14. Carpets in the cockpit
15. Fuel selector on console between seats
16. Governor P-110-030/A for hydraulic prop
17. LAMBERT ARROW FLASH wingtip lights
18. Lambert Flaps V4_0 LED light +LINAK electric flaps actuator
19. Landing lights in both wings, WIG-WAG
20. Large square eye-ball vents 3275
21. Leather glareshield, middle size
22. Leather grips of the control sticks
23. LED strip on glareshield + dimmer
24. LEMO Connector with power supply
25. Noise insulation on firewall
26. Nose gear doubled flexible rod (Teleflex)
27. Red Loctite to seal exhaust system spring connection
28. Seats padded textile
29. SHILTEK LG fire sleeves on the oil hoses
30. Tosten CS-6 grips
31. Wing lockers

7.13 Instruments and Avionics

BRISTELL LSA, S/N 436/2019 is fitted with:

Flight instruments:

1. Garmin G5 EFIS
2. Winter QM 2 Art. 1120 bank indicator
3. Garmin G3X flight display system including:
4. Garmin GDU 460, 10,6" dual displays
5. Garmin GEA 24 Engine Interface Module
6. Garmin GA 26C GPS antenna for G3X
7. Garmin GA 35 External active GPS antenna
8. Garmin GA 57X combo GPS / XM antenna for G3X
9. Garmin GAD 29 ARINC 429 Interface
10. Garmin GAP 26 angle of attack heated probe
11. Garmin GDL 51R Remote-mount SiriusXM® Receiver
12. Garmin GMA 345 digital audio panel
13. Garmin GMC 507 Autopilot Control Module without Yaw damper
14. Garmin GMU 22 Magnetometer
15. Garmin GSA 28 autopilot servos installation (roll+pitch)
16. Garmin GSU 25 ADHRS (2x)
17. Garmin GTP 59 Temperature Probe
18. TCW IBBS-12V-3AH 2 backup batteries (2x) for Garmin G3X

Engine instruments:

1. Garmin GEA 24 Engine Interface Module

COM/NAV, and Other instruments:

1. GARMIN GTN 650 GPS/NAV/COM RAMI + RAMI AV-10 comm antenna+ AV-17 COM antenna + AV-525 VOR antenna
2. Garmin GTX 45R mode S transponder with ADS-B out + RAMI AV-74 transponder DME antenna
3. ELT Kannad AF Integra 406 MHz + RC 200 control unit

NOTE

For operating instructions refer to the documentation supplied with the instruments.

7.14 Cockpit

7.14.1 Cockpit layout

BRISTELL LSA, S/N 436/2019 has the following cockpit layout:

7.14.2 Instrument panel

BRISTELL LSA, S/N 436/2019 has the following instrument panel:

SECTION 8

8 Airplane handling, servicing and maintenance

8.1 Introduction

8.2 Aircraft inspection periods

8.3 Aircraft alterations or repairs

8.4 Ground handling

8.4.1 Towing
8.4.2 Parking
8.4.3 Mooring
8.4.4 Jacking
8.4.5 Road transport

8.5 Cleaning and care

8.1 Introduction

This section contains factory-recommended procedures for proper ground handling and servicing of the airplane. It also identifies certain inspection and maintenance requirements, which must be followed if the airplane is to retain that new-plane performance and dependability.

8.2 Aircraft inspection periods

Periods of overall checks and contingent maintenance depends on the condition of the operation and on overall condition of the airplane.

Inspections and revisions should be carried out in the following periods, at least:

a) after the first 25 flight hours
b) after every 50 flight hours
c) after every 100 flight hours or at least annual inspection

Refer to the Engine Operator's Manual for engine maintenance.

Maintain the prop according to its manual.

All repairs and maintenance should be made in accordance with AC 43.13-1B.

8.3 Aircraft alterations or repairs

It is recommended to contact the airplane manufacturer prior to any alternations to the aircraft to ensure that the airworthiness of the aircraft is not violated. Always use only the original spare parts produced by the airplane (engine, prop) manufacturer.

If the aircraft weight is affected by that alternation, a new weighing is necessary, then record the new empty weight into the Weight and Balance record / Permitted payload range in SECTION 6 and up-date the placard showing weights in the cockpit.

8.4 Ground handling

8.4.1 Towing

To handle the airplane on the ground, use the Tow Bar, or the fuselage rear pushed down in the place of a bulkhead.

CAUTION

Avoid excessive pressure at the airplane airframe-especially at control surfaces. Keep all safety precautions, especially in the propeller area.

8.4.2 Parking

It is advisable to park the airplane inside a hangar or alternatively inside any other suitable space (garage) with stable temperature, good ventilation, low humidity and dust-free environment.

It is necessary to moor the airplane when it is parked outside a hangar. Also when parking for a long time, cover the cockpit canopy, possibly the whole airplane by means of a suitable tarpaulin.

8.4.3 Mooring

The airplane should be moored when parked outside a hangar after the flight day. The mooring is necessary to protect the airplane against possible damage caused by wind and gusts.

For this reason the aircraft is equipped with mooring eyes located on the lower surfaces of the wings.

Mooring procedure:

1. Check: Fuel Selector shut off, Circuit breakers and Master switch switched off, Switch box switched off.
2. Fix the hand control using e.g. safety harness
3. Close air vent
4. Close and lock canopy
5. Moor the aircraft to the ground by means of a mooring rope passed through the mooring eyes located on the lower surfaces of the wings and below rear fuselage

NOTE

In the case of long term parking, especially during winter, it is recommended to cover the cockpit canopy or possibly the whole aircraft by means of a suitable tarpaulin attached to the airframe.

8.4.4 Jacking

Since the empty weight of this aircraft is relatively low, two people can lift the aircraft easily.

First of all prepare two suitable supports to support the aircraft.

It is possible to lift the aircraft by handling the following parts:

- By pushing the fuselage rear section down in the place of a bulkhead the fuselage front section may be raised and then supported under the firewall.

- By holding the fuselage rear section under a bulkhead the fuselage rear may be raised and then supported under that bulkhead.
- To lift up a wing, push from underneath that wing only at the main spar area. Do not lift up a wing by handling the wing tip.

8.4.5 Road transport

The aircraft may be transported after loading on a suitable car trailer. It is necessary to dismantle the wings before road transport. The aircraft and dismantled wings should be attached securely to protect these parts against possible damage.

8.5 Cleaning and care

Use efficient cleaning detergents to clean the aircraft surface. Oil spots on the aircraft surface (except the canopy!) may be cleaned with gasoline.
The canopy may only be cleaned by washing it with a sufficient quantity of lukewarm water and an adequate quantity of detergents. Use either a soft, clean cloth sponge or deerskin. Then use suitable polishers to clean the canopy.

CAUTION
Never clean the canopy under "dry"conditions and never use gas or chemical solvents!

Upholstery and covers may be removed from the cockpit, brushed and eventually washed in lukewarm water with an adequate quantity of detergents. Dry the upholstery thoroughly before insertion into the cockpit.

CAUTION
In the case of long term parking, cover the canopy to protect the cockpit interior from direct sunshine.

SECTION 9

9 REQUIRED PLACARDS AND MARKINGS

9.1 Limitation placards

9.2 Miscellaneous placards and markings

9.1 Limitation placards

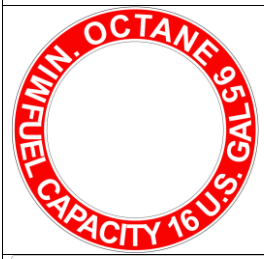
The airplane must be placarded with:

- All fuses
- Ignition switches (LANE A,B)
- Starter
- Trim: Nose heavy and Tail heavy
- Flaps: 0°, 10°, 20°, 30°
- Maximum rear baggage weight 15 kg, 33 lb
- Maximum weight in each wing locker 20 kg, 44 lb, if installed
- Instruments
- Canopy: Open - Close
- Fuel capacity: 60 litres, 15.87 US gallons / min. 95 Octane - at filler neck
- Fireproof Identification plate attached to the fuselage port side, in front of the horizontal tail unit

PASSENGER WARNING! THIS AIRCRAFT WAS MANUFACTURED IN ACCORDANCE WITH LIGHT SPORT AIRCRAFT AIRWORTHINESS STANDARDS AND DOES NOT CONFORM TO STANDARD CATEGORY AIRWORTHINESS REQUIREMENTS.	Passenger warning for LSA category aeroplanes. Located on the instrument panel.
PASSENGER NOTICE THIS AIRCRAFT CONFORMS TO ASTM CONSENSUS STANDARDS OF AIRWORTHINESS DEVELOPED AND MAINTAINED BY THE AVIATION COMMUNITY UNDER ASTM TECHNICAL COMMITTEE F37.	Passenger notice for LSA category aeroplanes. Located on the instrument panel.
ALL AEROBATIC MANEUVERS, INCLUDING SPINS ARE PROHIBITED	Operation limitation. Located on the instrument panel.
WARNING IFR FLIGHTS AND INTENTIONAL FLIGHTS UNDER ICING CONDITIONS ARE PROHIBITED!	Operation limitation. Located on the instrument panel.
BAGGAGE COMPARTMENT - A	Main baggage compartment behind the seats.
BAGGAGE COMPARTMENT - B	Additional baggage compartment behind the Baggage compartment A. NOT TO BE USED FOR HEAVY ITEMS!
MAX. 33 LB	Maximum weight of baggage in the Baggage compartment – A, behind the seats.
MAX. 44 LB	Maximum weight of baggage in each wing locker, if installed.
MAX. 22 LB	Maximum weight of baggage in fuselage front locker, if installed.
UNUSABLE FUEL QUANTITY 0.13 US GAL	Unusable quantity of fuel in each tank
V_{FE} 75 kt V_A 96 kt V_{NE} 157 kt	Airspeed limitations. Located on the instrument panel or fuselage side.
NO OPS ABOVE 120 KTS	No operations above 120 knots. (Sticker based on Sport Pilot Rule)

ENGINE RPM: Max. take-off (max. 5 min.) 5800 rpm Max. continuous 5500 rpm Idle 1400 rpm	Engine speed limitations. Located on the instrument panel or fuselage side.
WARNING **DO NOT EXCEED MAXIMUM TAKE-OFF WEIGHT 1320 LBS**	Maximum Takeoff Weight Limitation. 1320 lb limit for Light sport aeroplanes. Located on the instrument panel or fuselage side.

9.2 Miscellaneous placards and markings

	Wing flap root area
	Areas to avoid pushing on them. Wing trailing edge, control surfaces trailing edges, etc.
	Located on wing upper skin around the fuel tank filler neck.
	Throttle and Choke placard located on the Throttle-choke quadrant.
	Located on the fuselage right/left side under the instrument panel. Placard point to the lever to adjust pedals position.
	Located between the seat backs, at the headphone sockets.
	Located on the fuselage left side at the button to release canopy locks.
	Located inside the cockpit on the left and right side of the tip-up canopy frame.

	Located on the top of the canopy inside.
	Located on the lever between seats.
	**If a ballistic rescue parachute system is installed:** Placard located on the both sides of fuselage between canopy and rear window
	Placard located in place of rocket egress

CAUTION
The owner (operator) of this airplane is responsible for the readability of placards during the aircraft service life.

SECTION 10

10 SUPPLEMENTS

10.1 Introduction

10.2 List of inserted supplements

10.3 Inserted Supplements

10.1 Introduction

This section contains the appropriate supplements necessary to safely and efficiently operate the aircraft when equipped with various optional systems and equipment not provided with the standard airplane.

10.2 List of inserted supplements

Date	Suppl. No.	Title of inserted supplement
07/2011	01	Aircraft Flight Training Supplement
06/2019	02	Description of the aircraft S/N 436/2019

10.3 Inserted Supplements

BRISTELL LSA

BRM aero

Aircraft Operating Instructions

SUPPLEMENT No. 01

Aircraft Flight Training Supplement

The BRISTELL LSA flying characteristics and behavior are similar to single engine aircraft.
Following training procedure is applicable if the pilot is holder of UL, PPL or LSA Pilot License. The training flight hours are recommended minimum and depends on the Flight Instructor if student pilot is ready to continue on in next training step. Training can be performed by Flight Instructor or by the experienced pilot who has minimum 20 hours on the BRISTELL LSA.

Type Rating Training Procedure:

Ground Training - *before practical Flight Training the pilot has to get familiar with following procedures and documentation*

- *Aircraft Operating Instructions (AOI)*
- *Aircraft Maintenance and Inspection Procedures*
- *Aircraft preflight inspection procedure*
- *Control Checklists*
- *Radio, avionics, aircraft and engine controls procedures*
- *Differences in control and aircraft handling*
- *Emergency procedures*

Flight training program - *recommended*

Flight Training Procedure		*Dual*		*Solo*	
		Flights	*hr/min*	*Flights*	*hr/min*
1.	*Check flight*	1	30’		
2.	*Pattern training flights up to 1000 ft AGL*	4	20’	3	15’
3.	*Pattern training flights up to 500 ft AGL*	4	20’	3	15’
4.	*Stall speed, 45°turns, side slips*	1	30’	1	20’
5.	*Emergency landing training*	4	20’	3	10’
Total		***14***	***2 hr***	***10***	***1 hr***

Flight Training Procedure - *description*

1. ***Check flight –*** *Student Pilot will fly the airplane in local flight, instructor is giving advice as necessary.*

2. ***Pattern training flights up to 1000 feet AGL -*** *high pattern procedures, instructor is giving advice as necessary.*

3. ***Pattern training flights up to 500 feet AGL -*** *high pattern procedures, instructor is giving advice as necessary.*

4. ***Stall speed, 45°turns, sideslips –*** *stall speed flaps retracted and extended (landing configuration), sideslips at landing configuration.*

5. ***Emergency landing training –*** *emergency procedures and landing to 1/3 of runway.*

NOTE

During solo flights instructor is observing the student pilot on pattern and can advise by radio as necessary.

Endorsement:

Instructor will endorse the Type Rating to the Pilots Logbook, if required.

BRISTELL LSA

BRMAERO

Aircraft Operating Instructions

SUPPLEMENT No. 02

AIRCRAFT DESCRIPTION

Registration: **N915LM**

Serial Number: **436/2019**

This Supplement must be contained in the Aircraft Operating Instructions during operation of the airplane.

Information contained in this Supplement add or replace information from the basic Aircraft Operating Instructions in the further mentioned parts only. Limitations, procedures and information not mentioned in this Supplement are contained in the basic Aircraft Operating Instructions.

0 TECHNICAL INFORMATION

This Supplement adds information necessary for airplane operation with equipment installed in the airplane **BRISTELL LSA, S/N 436/2019**.

0.1 Record of revisions

No changes.

1 GENERAL INFORMATION

No changes.

2 OPERATING LIMITATION

2.4 Power plant

2.4.3 Oil

Type of oil used by aircraft manufacturer :
Aeroshell OIL SPORT PLUS 4

2.4.4 Coolant

Type of used coolant:
Castrol Radicool NF
Mixture ratio coolant / water 1:1.5 litres (40%) (-25 °C)
Max. Coolant temperature : 120 °C (248 °F)

3 EMERGENCY PROCEDURES

No changes.

4 NORMAL PROCEDURES

No changes.

5 PERFORMANCE

No changes.

6 WEIGHT AND BALANCE

No changes.

7 AIRPLANE AND SYSTEMS DESCRIPTION

No changes.

8 AIRPLANE HANDLING, SERVICING AND MAINTENANCE

No changes.

9 REQUIRED PLACARDS AND MARKINGS

NO OPS ABOVE 120 KTS