Aircraft Operating Instructions

BRISTELL ELSA

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NOTE

This Aircraft Operating Instructionsis a draft which needs to be updated by the kit builder.

Performance data are valid for Rotax 912 ULS engine and Fiti 3LR 158, on-ground adjustable propeller.

The Sections/paragraphs to be updated at least:

- Title page – picture of the airplane, builder's name
- Section 6. – Weight and balance
- 7.12 Miscellaneous equipment
- 7.13 Instruments and avionics
- 7.14.1 Cockpit layout picture
- 7.14.2 Instrument panel picture
- Supplement No. 02 Aircraft description

Aircraft Operating Instructions

BRISTELL ELSA

Registration: **N312LM**

Serial Number: **312/2018**

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 issue	11/2017	Petr Javorský, BRM Aero	11/2017	11/2017	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

1.1.1 Certification

1.2 Warnings, cautions and notes

1.3 Descriptive data

1.3.1 Aircraft description
1.3.2 Power plant
1.3.3 Aircraft dimensions
1.3.4 Aircraft layout

1.4 Definitions and abbreviations

1.5 Summary of performance specifications

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 a light sport category airplane made by
BRM AERO s.r.o., Letecká 255, 686 04 Kunovice, Czech Republic,
phone: +420 773 984 338, e-mail : info@brmaero.com
based on the following airworthiness requirements:

- ASTM Consensus Standards:
  F2245
  F2279
  F2295
  and other to LSA category applicable ASTM Consensus Standards.
- Czech LAA UL-2
- EASA CS-VLA

BRISTELL LSA is on the list of FAA approved light sport airplanes – refer to FAA Make/Model Directory for SLSA on
https://www.faa.gov/aircraft/gen_av/light_sport/

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 ELSA is airplane intended especially for recreational and cross-country flying, basic training, and non-aerobatics operation.
BRISTELL ELSA 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

The standard power plant is composed of ROTAX 912 ULS (98.6 hp), 4-cylinder, 4-stroke engine and FITI three blade ground adjustable propeller.
BRISTELL ELSA, S/N 312/2018 is fitted with:

- Rotax 912 ULS 2
- FITI ECO COMPETITION 3 LR 158, 3-bladed, on-ground adjustable propeller.

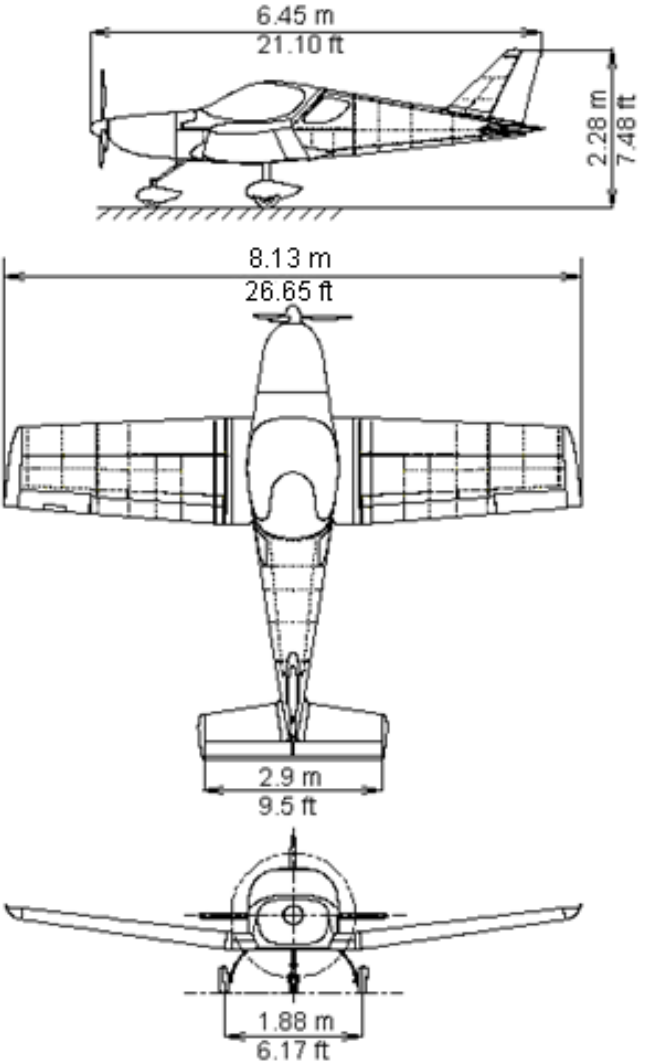
1.3.3 Aircraft dimensions

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	11.68	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
EFIS	Electronic Flight Instrument System
ELT	Emergency Locator Transmitter
EMS	Engine Monitoring System
ft	foot / feet
ft/min	feet per minute
GPS	Global Positioning System
hp	power unit
IAS	Indicated Airspeed
IC	Intercom
IFR	Instrument Flight Rules
in	inch
ISA	International Standard Atmosphere
knot	NM per hour
lb	pound
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		Metric units	US units
Gross weight (Maximum take-off weight)		600 kg	1320 lb
Top speed at sea level	MCP: 5550 rpm	209 km/h CAS	113 KCAS
Cruise speed at sea level	75%: 5000 rpm	188 km/h CAS	102 KCAS
Cruise speed at sea level	65%: 4800 rpm	180 km/h CAS	97 KCAS
Full fuel range at 4000 ft pressure altitude, at 75 % MCP (5000 rpm), No fuel reserve		1050 km	570 NM
Rate of climb at sea level..... **Vx**		840 fpm at 111 km/h IAS	840 fpm at 65 KIAS
Rate of climb at sea level..... **Vy**		920 fpm at 133 km/h IAS	920 fpm at 72 KIAS
Stall speed V_{S1} (flaps retracted)		83 km/h CAS	45 KCAS
Stall speed V_{S0} (flaps fully extended)		71 km/h CAS	38 KCAS
Total fuel capacity		120 liters	31.7 US gal
Total usable fuel		119 liters	31.4 US gal
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	
Engine Maximum takeoff power		73.5 kW (100 HP) at 5800 rpm	
Engine Maximum continuous power		69 kW (90 HP) at 5500 rpm	
Engine Cruising power 75 % of MCP		51 kW (68 HP) at 5000 rpm	
Engine Cruising power 65 % of MCP		44.6 kW (60 HP) at 4800 rpm	
Engine Cruising power 55 % of MCP		38 kW (50 HP) at 4300 rpm	

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
	km/h	*Knots*	
White arc	***71-139***	***38-75***	Flap Operating Range.
Green arc	***83-240***	***45-129***	Normal Operating Range.
Yellow arc	***240-290***	***129-157***	Maneuvers must be conducted with caution and only in smooth air.
Red line	***290***	***157***	Maximum speed for all operations.

2.4 Power plant

2.4.1 Engine operating speeds and limits

Engine Model:		**ROTAX 912 ULS 2**
Engine Manufacturer:		**Bombardier-Rotax GMBH**
Power	***Max Take-off:***	**100 hp at 5800 rpm, max.5 min.**
	Max. Continuous:	**92.5 hp at 5500 rpm**
	Cruising:	**68.4 hp at 5000 rpm**
Engine RPM	***Max. Take-off:***	**5800 rpm, max. 5 min.**
	Max. Continuous:	**5500 rpm**
	Cruising:	**5000 rpm**
	Idling:	**~1400 rpm**
Cylinder head temperature (CHT) Older engines S/N without Suffix -01	***Minimum:***	**50 °C (122 °F)**
	Maximum:	**135 °C (275 °F)** **conventional coolant** - permanent monitoring of coolant temperature and CHT is necessary **Waterless coolant** - permanent monitoring of CHT is necessary
	Optimum:	**80 – 110 °C (176-230 °F)**
Coolant temperature (CT) New engines S/N with Suffix -01	***Minimum:***	**50 °C (122 °F)**
	Maximum:	**120 °C (248 °F)** only conventional coolant allowed
	Optimum:	**80 – 110 °C (176-230 °F)**
Oil temperature	***Minimum:***	**50 °C (122 °F)**
	Maximum:	**130 °C (266 °F)**
	Optimum:	**90 – 110 °C (190-230 °F)**
Oil pressure:	***Minimum:***	**0.8 bar (12 psi) - *below 3500 rpm***
	Maximum:	**7 bar (102 psi) - cold engine start**
	Optimum:	**2 - 5 bar (29 – 73 psi) - *above 3500 rpm***
Exhaust gases temp.	***Maximum:***	***880 ° C* (1616 °F)**

2.4.2 Fuel

General note

NOTICE Obey the local codes and the latest edition of Service Instruction SI-912-016 for the selection of the correct fuel.

NOTICE Use only fuel suitable for the respective climatic zone.

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

Knock resistance

The fuels with following specifications can be used:

Fuel specifikationen		
	Usage/Description	
Knock resistance	**912 A/F/UL**	**912 S/ULS**
	Min. RON 90 (min. AKI* 87)	Min. RON 95 (min. AKI* 91)

* Anti Knock Index (RON+MON)/2

MOGAS

	Usage/Description	
Mogas	**912 A/F/UL**	**912 S/ULS**
European standard	EN 228 Normal	
	EN 228 Super	EN 228 Super
	EN 228 Super plus	EN 228 Super plus

AVGAS

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

	Usage/Description	
AVGAS	**912 A/F/UL**	**912 S/ULS**
Aviation Standard	AVGAS 100 LL (ASTM D910)	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

General note	**NOTICE** 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-912-016, latest edition.
Oil type	For the selection of suitable lubricants refer to the Service Information SI-912-016, latest edition.
Oil consumption	Max. 0.06 l/h (0.13 liq pt/h).
Oil specification	- Use only oil with API classification **"SG"** or higher! - Due to the high stresses in the reduction gears, oils with gear additives such as high performance motor cycle oils are required. - Because of the incorporated overload clutch, oils with friction modifier additives are unsuitable as this could result in a slipping clutch 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 primarity 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

General note

NOTICE Obey the latest edition of Service Instruction SI-912-016 for the selection of the correct coolant.

Conventional coolant

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

Application

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

Use the coolant specified in the manufacturers documentation.

Mixture

NOTICE Obey the manufacturers instructions about the coolant.

Applicable for engine S/N without Suffix -01.

	mixture ratio %	
designation	**concentrate**	**water**
conventional e.g. BASF Glysantine anticorrosion	50*	50
waterless e.g. Aero Cool 180°	100	0

* coolant component can be increased up to max. 65%.

Applicable for engine S/N with Suffix -01.

	mixture ratio %	
designation	**concentrate**	**water**
conventional e.g. BASF Glysantine anticorrosion	50*	50

* coolant component can be increased up to max. 65%.

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 ULS *98.6 hp*	Minimum Limit (red line)	Normal Operating Range (green arc)	Caution Range (yellow arc)	Maximum Range (red line)
Engine speed RPM]	1400	1400-5500	5500-5800	5800
Oil Temperature	*50 °C (122 °F)*	*50-110 °C (122-230 °F)*	*110-130 °C (230-266 °F)*	*130 °C (266 °F)*
Exhaust Gases Temp. (EGT)	-	*800-850 °C (1472-1562 °F)*	*850-880 °C (1562-1616 °F)*	*880°C (1616 °F)*
Coolant Temperature (CT) Only conventional coolant allowed	50°C *(122°F)*	50-110°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*

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. take-off weight	600	kg	1320 lb
Max landing weight	600	kg	1320 lb
Weight of fuel (120 l, 16 US gal)	87	kg	209 lb

Maximum 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	1367	mm	53.819	in

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

2.9 Approved maneuvers

Airplane Category: ELSA

The BRISTELL ELSA 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

2.11 Crew

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

WARNING

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

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 (is 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!

SECTION 3

3 EMERGENCY PROCEDURES

3.8.7 Overvoltage
3.8.8 Inadvertent icing encounter
3.8.9 Loss of primary instruments
3.8.10 Loss of flight controls

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 - switch off
3. Apply brakes

3.2.2 Engine failure during take-off

1. Speed - gliding at 120 km/h (65 KIAS)
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 - 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 120 km/h (65 KIAS)
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 - switch off
9. Safety harness - tighten
10. Master switch - switch off before landing
11. Land

3.3 In-flight Engine Starting

1. Electric pump - ON
2. Fuel Selector - switch to second fuel tank
3. Starter - switch on

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 - 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.

3.4.2 Fire on ground with engine running

1. Heating - close
2. Fuel selector - close
3. Throttle - full power
4. Ignition - 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.

3.4.3 Fire during take-off

1. Speed - 120 km/h (65 KIAS)
2. Heating - close
3. Fuel Selector - close
4. Throttle - full power
5. Ignition - 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.

3.4.4 Fire in flight

1. Heating - close
2. Fuel Selector - close
3. Throttle - full power
4. Master switch - switch off
5. Ignition - switch off after the fuel in carburetors is consumed and engine shut down
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.

NOTE

Estimated time to pump fuel out of carburetors is 30 seconds.

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)

3.5 Glide

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

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

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 carefull 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 120 km/h (65 KIAS)
2. Trim - adjust
3. Safety harness - tighten
4. Flaps - extend as needed
5. COMM - if installed then report your location if possible
6. Fuel Selector - close
7. Ignition - 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 circuit 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.
Unintentional spin recovery technique:

1. Throttle - idle
2. Lateral control - ailerons neutralized
3. Rudder pedals - full opposite rudder
4. Rudder pedals - neutralize rudder immediately when rotation stops
5. Longitudinal control - neutralize or push forward and recover 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

3.8.2 Carburetor icing

The carburetor icing shows itself through a decrease in engine power and an increase of engine temperatures.

To recover the engine power, the following procedure is recommended:

1. Speed - 140 km/h (75 KIAS)
2. Throttle - set to 1/3 of power
3. If possible, leave icing area
4. Increase the engine power gradually up to cruise conditions after 1-2 minutes

If you fail to recover the engine power, land on the nearest airfield (if possible) or depending on the circumstances, perform a precautionary landing according to 3.6.

NOTE

If your engine is equipped with carburetor heating, use it for extended period of descent and also in area of possible carburetor icing.
Remember: Aircraft is approved *to operate in VMC condition only!*

3.8.3 Autopilot malfunction

In the case, that autopilot (if installed) 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.

3.8.4 Loss of oil pressure

1. Reduce engine power setting to the minimum necessary
2. Carry out Precautionary landing 3.6.2.
3. Check oil system
   Possible causes are:

Not enough oil in oil tank - Refill oil
Too hot oil - Cool down oil.

4. Carry out an unscheduled maintenance check according to Rotax 912 Maintenance Manual Line Chapt. 05-50-00

3.8.5 High oil pressure

3.8.5.1 Oil pressure above permitted range at low ambient temperatures

1. Reduce engine power setting to the minimum necessary
2. Carry out precautionary landing 3.6.2.

3.8.5.2 High oil pressure

1. Reduce engine speed and check the oil pressure again once it has reached a higher oil temperature.
2. A maintenance inspection should be carried out.

3.8.6 Alternator failure

The Rotax 912 ULS engine has an integrated AC generator. Voltage drop below 11 volts is indicated by “Low Volt” warning lamp on the instrument panel or on EFIS display. If the alternator fails, then the instruments are supplied by onboard battery for a limited period of time (around 30 minutes). Some instruments, like Garmin G3X, may have installed an internal backup battery which will power them for given time (refer to the device manual).
In any case switch off all electrical equipmetn which is not essential for your current flight conditions and land as soon as practicable. Then, before next flight, investigate cause of alternator failure and remedy it.

3.8.7 Overvoltage

Overvoltage more than 15 Volts

1. Reduce engine speed
2. Check voltage meter for change

If voltage still out of limits:

3. Select AVIONICS OFF
4. MASTER SWITCH OFF

CAUTION

Turning OFF the AVIONICS/MASTER switch will eliminate the possibility of communications or use of GPS/AHRS, flaps, etc.

5. Carry out Precautionary landing 3.6.2.

3.8.8 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. Carb heat - pull knob to ON
4. Cockpit heating - pull knob to ON
5. Up/Down knob - pushed forward (UP) to defrost windshield

3.8.9 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.

3.8.10 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. Effectivness 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 jamm 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 **Chyba! Nenalezen zdroj odkazů.**.

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SECTION 4

4 NORMAL PROCEDURES

4.2 Assembly and Disassembly

4.3 Pre-flight Inspection

4.4 Normal procedures

4.4.1 Before engine starting
4.4.2 Engine starting
4.4.3 Engine warm up, Engine check
4.4.4 Taxiing
4.4.5 Before take-off
4.4.6 Take-off
4.4.7 Short field take-off
4.4.8 Soft field take-off
4.4.9 Climb
4.4.10 Cruise
4.4.11 Descent
4.4.12 Before landing
4.4.13 Balked Landing (Go around)
4.4.14 Landing
4.4.15 Short field landing
4.4.16 Soft field landing
4.4.17 After landing
4.4.18 Engine shutdown
4.4.19 Aircraft parking and tie-down
4.4.20 Flight in rain

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 ELSA Maintenance and inspection procedures manual.

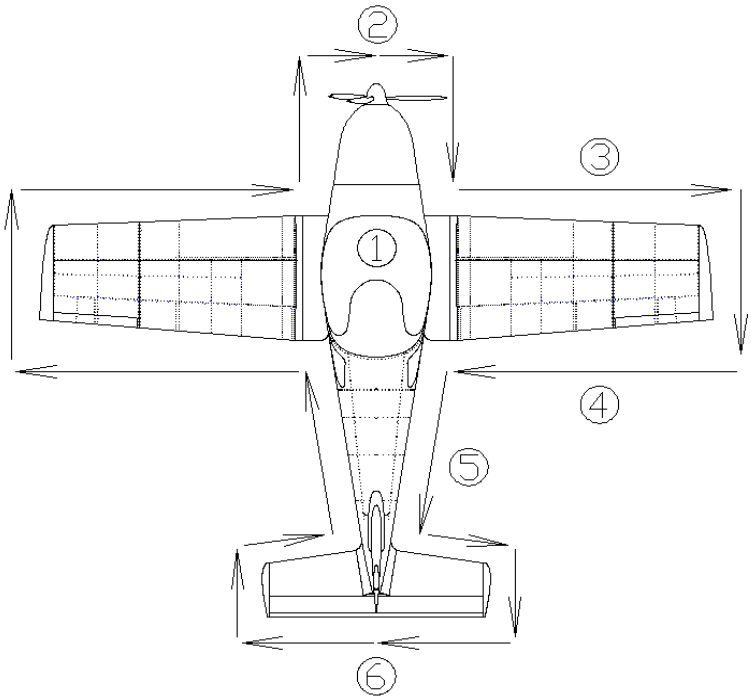
4.3 Pre-flight Inspection

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:



Aircraft Operating Instructions

Inspection Check List

①	– Ignition	- 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	– Engine cowling condition – Propeller and spinner condition. No damages, cracks, unstuck parts. – Check correct fixation of the blades in the propeller hub. – Check cleanliness of all blades and overall condition of surface. – 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	

WARNING

Physically check the fuel level before each take-off to make sure you have sufficient fuel for the planned flight.

CAUTION

In case of long-term parking it is recommended to turn the engine several times (Ignition LANE A, B OFF!) by turning the propeller. Always handle the blade area by the palm i.e. do not grasp only the blade edge. It will facilitate engine starting.

4.4 Normal procedures

4.4.1 Before engine starting

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

WARNING

Adjusting of rudder pedals position during flight is PROHIBITED.

4.4.2 Engine starting

1. Start the engine according to its manual procedure
2. Master switch - ON
3. Fuel Selector - set to LEFT fuel tank

NOTE

Aircraft fitted with Rotax 912 ULS engine is equipped with the fuel return line going only into the left tank. Do not start or take-off with the fuel selector set to the right tank if the left one is full, because returning fuel will overpressure left tank and fuel will leak from fuel tank air vent tube at the wing tip.

4. Electric fuel pump - ON – only for cold engine
5. Choke (cold engine) - pull to open and gradually release after engine start
6. Starter - hold activated to start the engine.

CAUTION

The starter should be activated for a maximum of 10 sec., followed by 2 min. pause for engine cooling.

As soon as engine runs, adjust throttle to achieve smooth running at approx. 2000 rpm. Check the oil pressure, which should increase within 10 sec. Increase the engine speed after the oil pressure has reached 29 psi and is steady.

To avoid shock loading, start the engine with the throttle lever set for idling or 10% open at maximum, then wait 3 sec to reach constant engine speed before new acceleration.

Only one ignition should be switched on (off) during ignition circuit check.

4.4.3 Engine warm up, Engine check

4.4.3.1 Engine warm up

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).

Prior to engine check block the main wheels using chocks. Initially warm up the engine to 2000 rpm for approx. 2 minutes, then continue to 2500 rpm till oil temperature reaches 50° (122°F). The warm up period depends on ambient air temperature.

Check both ignition circuits at 4000 rpm for Rotax 912 ULS. The engine speed drop during the time either magneto switched off should not over 300 rpm. The Max. engine speed drop difference between circuits A and B should be 115 rpm.

NOTE

Only one ignition should be switched on (off) during ignition circuit check.

Set max. power for verification of max. speed with given propeller and engine parameters (temperatures and pressures).

Check acceleration from idling to max. power. If necessary, cool the engine at 3000 rpm before shutdown.

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).

4.4.4 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

4.4.5 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 - set to LEFT fuel tank

NOTE

Aircraft fitted with Rotax 912 ULS engine is equipped with the fuel return line going only into the left tank. Do not start or take-off with the fuel selector set to the right tank if the left one is full, because returning fuel will overpressure left tank and fuel will leak from fuel tank air vent tube at the wing tip.

7. Ignition A,B - ON
8. Electric fuel pump - ON
9. Wing flaps - extend as needed
10. Autopilot (if installed) - OFF

4.4.6 Take-off

1. Brakes - apply to stop wheel rotation
2. Take-off power - Move throttle lever slowly fully forward to avoid overspeed
3. Engine speed - check rpm
4. Instruments - check within limits
5. Nose wheel unstick - 55 km/h (30 KIAS)
6. Airplane lift-off - 75 km/h (40 KIAS)
7. Wing flaps - retract when speed of 120 km/h (65 KIAS) is reached, at altitude of 150 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 (if installed)is “ON”

4.4.7 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)	72 KIAS (133 km/h)
Obstacle:	Vx (best angle of climb)	60 KIAS (111 km/h)

11. Flaps - set to 10°
12. Climb at:

No obstacle:	Vy (best rate of climb)	72 KIAS (133 km/h)
Obstacle:	Vx (best angle of climb)	60 KIAS (111 km/h)

13. Trim - adjust
14. Flaps - retract at Vy 67 KIAS (125 km/h) or at 150 ft

4.4.8 Soft field take-off

1. Inspect field condition checking for grass height, bumps, holes, debris, wetness.
2. Taxiing - control stick fully aft
3. Heading - set
4. Flaps - 30°
5. Trim - as required
6. Throttle - fully forward (5800 rpm, max. 5min.)

7. Control stick	- full aft pressure during T/O run to lift off nose wheel as soon as possible.	
8. As aircraft becomes airborne, level off in ground effect to accelerate to:		
No obstacle:	Vy (best rate of climb)	72 KIAS (133 km/h)
Obstacle:	Vx (best angle of climb)	60 KIAS (111 km/h)
9. Flaps	- set to 10°	
10. Climb		
No obstacle:	Vy (best rate of climb)	72 KIAS (133 km/h)
Obstacle:	Vx (best angle of climb)	60 KIAS (111 km/h)
11. Trim	- adjust	
12. Flaps	- retract at Vy 72 KIAS (133 km/h) or at 150 ft	

4.4.9 Climb

1. Speed	- Best rate of climb speed (Vy): 72 KIAS (133 km/h) - Best angle of climb speed (Vx): 60 KIAS (111 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, cylinder head/coolant temperature within limits

CAUTION

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

4.4.10 Cruise

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

Refer to Section 5, for recommended cruising regimes.

NOTE

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

4.4.11 Descent

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

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 120-130 km/h IAS (65-70 KIAS) and check that the engine instruments indicate values within permitted limits.

4.4.12 Before landing

1. Approach speed - 120 km/h (65 KIAS)
2. Throttle - as needed
3. Electric fuel pump(s) - ON
4. Wing flaps - extend as needed
5. Trim - as needed
6. Autopilot (if installed) - OFF

4.4.13 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 120 km/h (65 KIAS)
5. Trim - adjust
6. Repeat circuit pattern and landing

4.4.14 Landing

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

4.4.15 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. Electric fuel pump - ON
7. Flaps - 30°
8. Trim - as required
9. Landing light(s) - ON
10. Flare - minimum float
11. After touchdown - stick forward
    - Retract flaps
    - Maximum braking

4.4.16 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. Electric fuel pump - ON
6. Flaps - 20 °
7. Trim - as required
8. Landing light(s) - on
9. Flare - add power before touchdown to keep elevator effective to help keep weight off nose wheel
10. After touchdown - throttle to idle
    gradually increase back elevator to keep weight of nosewheel
    No braking during roll out

4.4.17 After landing

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

4.4.18 Engine shutdown

1. Engine speed - idle
2. Instruments - engine instruments within limits
3. Avionics - switch off
4. Ignition - switch off
5. Circuit breakers - switch off
6. Master switch - switch off
7. Switch box - turn key to switch off
8. El. pump - off
9. Fuel Selector - off

CAUTION

Rapid engine cooling should be avoided during operation. This happens above all during aircraft descent, taxiing, low engine rpm or at engine shutdown immediately after landing.

Under normal conditions the engine temperatures stabilize during descent, taxiing and at values suitable to stop engine by switching the ignition off. If necessary, cool the engine at 2500 - 2750 rpm to stabilize the temperatures prior to engine shut down.

4.4.19 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.

4.4.20 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.

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 engine and propeller.

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 600 kg Engine idle run	Wing flaps pos.	IAS [km/h]	CAS [km/h]	*KIAS*	*KCAS*	Altitude loss at recovery [ft]
Wing level stall	0°	82	83	44	45	100
	20°	78	79	42	43	120
	30°	70	71	37	38	160
Co-ordinated turn 30° bank	0°	88	89	47	48	120
	20°	84	85	45	46	160
	30°	75	76	40	41	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: ***Maximum takeoff power MTOW 600 kg***	**Climbing speed Vy for best rate of climb**		**Rate of climb**	**Climbing speed Vx for best angle of climb**		**Rate of climb**
	IAS [km/h]	***KIAS***	***[fpm]***	***IAS [km/h]***	***KIAS***	***[fpm]***
0 ft ISA	*133*	*72*	*920*	*111*	*60*	*840*
2000 ft ISA	*130*	*70*	*810*	*109*	*59*	*730*
4000 ft ISA	*128*	*69*	*700*	*107*	*58*	*630*
6000 ft ISA	*125*	*68*	*590*	*105*	*57*	*530*
8000 ft ISA	*123*	*66*	*480*	*103*	*56*	*430*
10000 ft ISA	*120*	*65*	*370*	*101*	*55*	*340*

5.2.6 Cruise

		50%	65%	75%	MCP
		4300 rpm	4800 rpm	5000 rpm	5500 rpm
0 ft	KIAS	84 knots	96 knots	101 knots	112 knots
	KCAS	86 knots	97 knots	102 knots	113 knots
	KTAS	86 knots	97 knots	102 knots	113 knots
2000 ft	KIAS	79 knots	91 knots	96 knots	107 knots
	KCAS	81 knots	92 knots	97 knots	108 knots
	KTAS	83 knots	95 knots	100 knots	112 knots
4000 ft	KIAS	74 knots	86 knots	91 knots	103 knots
	KCAS	76 knots	88 knots	92 knots	104 knots
	KTAS	81 knots	93 knots	98 knots	110 knots
6000 ft	KIAS	69 knots	81 knots	86 knots	98 knots
	KCAS	71 knots	83 knots	87 knots	99 knots
	KTAS	78 knots	91 knots	96 knots	108 knots
8000 ft	KIAS	65 knots	76 knots	81 knots	93 knots
	KCAS	66 knots	78 knots	83 knots	94 knots
	KTAS	75 knots	88 knots	93 knots	106 knots
10000 ft	KIAS	60 knots	72 knots	76 knots	88 knots
	KCAS	62 knots	73 knots	78 knots	90 knots
	KTAS	72 knots	85 knots	91 knots	104 knots

5.2.7 Endurance and Range

The table below shows fuel consumption, endurance and range.

Fuel qty. = **31,7 US gal**
Unusable fuel = **0,3 US gal**

NO FUEL RESERVE CONSIDERED !

		50%	65%	75%	MCP
		4300 rpm	4800 rpm	5000 rpm	5500 rpm
0 ft	KIAS	84 knots	96 knots	101 knots	112 knots
	KCAS	86 knots	97 knots	102 knots	113 knots
	KTAS	86 knots	97 knots	102 knots	113 knots
	Fuel consumption	3,7 USgal/h	4,9 USgal/h	5,4 USgal/h	6,6 USgal/h
	Endurance	8:28	6:23	5:47	4:45
	Range	730 NM	620 NM	590 NM	540 NM
2000 ft	KIAS	79 knots	91 knots	96 knots	107 knots
	KCAS	81 knots	92 knots	97 knots	108 knots
	KTAS	83 knots	95 knots	100 knots	112 knots
	Fuel consumption	3,7 USgal/h	4,9 USgal/h	5,4 USgal/h	6,6 USgal/h
	Endurance	8:28	6:23	5:47	4:45
	Range	710 NM	610 NM	580 NM	530 NM
4000 ft	KIAS	74 knots	86 knots	91 knots	103 knots
	KCAS	76 knots	88 knots	92 knots	104 knots
	KTAS	81 knots	93 knots	98 knots	110 knots
	Fuel consumption	3,7 USgal/h	4,9 USgal/h	5,4 USgal/h	6,6 USgal/h
	Endurance	8:28	6:23	5:47	4:45
	Range	680 NM	590 NM	570 NM	520 NM
6000 ft	KIAS	69 knots	81 knots	86 knots	98 knots
	KCAS	71 knots	83 knots	87 knots	99 knots
	KTAS	78 knots	91 knots	96 knots	108 knots
	Fuel consumption	3,7 USgal/h	4,9 USgal/h	5,4 USgal/h	6,6 USgal/h
	Endurance	8:28	6:23	5:47	4:45
	Range	660 NM	580 NM	550 NM	510 NM
8000 ft	KIAS	65 knots	76 knots	81 knots	93 knots
	KCAS	66 knots	78 knots	83 knots	94 knots
	KTAS	75 knots	88 knots	93 knots	106 knots
	Fuel consumption	3,7 USgal/h	4,9 USgal/h	5,4 USgal/h	6,6 USgal/h
	Endurance	8:28	6:23	5:47	4:45
	Range	630 NM	560 NM	540 NM	510 NM
10000 ft	KIAS	60 knots	72 knots	76 knots	88 knots
	KCAS	62 knots	73 knots	78 knots	90 knots
	KTAS	72 knots	85 knots	91 knots	104 knots
	Fuel consumption	3,7 USgal/h	4,9 USgal/h	5,4 USgal/h	6,6 USgal/h
	Endurance	8:28	6:23	5:47	4:45
	Range	610 NM	540 NM	520 NM	500 NM

5.2.8 Demonstrated crosswind performance

Max. permitted head wind velocity for take-off and landing	20	m/s	40	knots
Max. permitted cross wind velocity for take-off and landing				
Average pilots	8	m/s	15	knots
Skilled pilots	11	m/s	22	knots

5.2.9 Optimum glide speed

Optimum glide speed	120	km/h	65	KIAS

5.2.10 Ceiling

Service ceiling	4300	m	14.000	ft

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 ELSA 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.

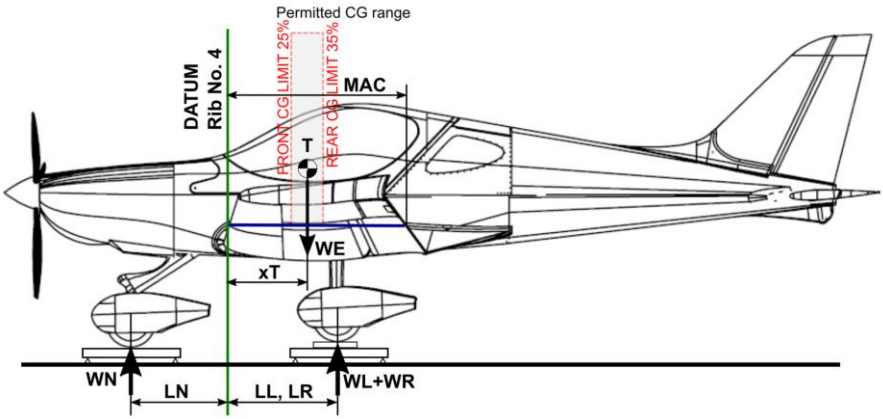
6.2 Weight and Balance Record

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

Type	BRISTELL ELSA			Serial. No.:	312/2018						
Date	Item No.		Description of part or modification	Weight change						Basic weight of empty airplane	
				Added (+)			Removed (-)				
DD.MM. YYYY	+	-		Weight (lb)	Arm (in)	Moment (lb.in)	Weight (lb)	Arm (in)	Moment (lb.in)	Weight (lb)	Moment (lb.in)
			Manufactured airplane								

6.2.1 Weight and Balance Report

6.2.1.1 Empty Aircraft Weight and CG



Actual empty weight and Aircraft 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= 323.7	LR= 27,6	MR= 8934.1
	LEFT MAIN WHEEL	WL= 317.7	LL= 27,6	ML= 8756.5
	NOSE WHEEL	WN= 154.1	LN= -29,7	MN= -4576.8
	EMPTY AIRCRAFT	EMPTY WEIGHT (lbs) WE= 795.5	CG (in) = 16.48 CG (%MAC) = 30.7	EMPTY ACFT TOTAL MOMENT (lbs.in) MT= 13113.8

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

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

Serial No.: 312/2018
Date: 17-July-2018
By: SFUSAS

6.2.1.2 Loaded Aircraft Weight and CG

	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 - FRONT optional)		-9,8	
	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.: 312/2018
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 - FRONT optional)		-9,8	
	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

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

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

Serial No.: 312/2018
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

Actual airplane empty weight and CG!

PERMITTED PAYLOAD RANGE OF BRISTELL (lb)								
S/N:	312/2018				Empty weight (lb):	796	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	NO BAGGAGE	0	**463** *35.0 %MAC*	**464** *34.5 %MAC*	**434** *33.9 %MAC*	**403** *33.2 %MAC*	**373** *32.5 %MAC*	**333** *31.6 %MAC*
	1/2 REAR	17	**337** *35.0 %MAC*	**407** *35.0 %MAC*	**417** *34.6 %MAC*	**387** *33.9 %MAC*	**357** *33.3 %MAC*	**316** *32.4 %MAC*
	MAX REAR	33	**212** *35.0 %MAC*	**281** *35.0 %MAC*	**351** *35.0 %MAC*	**370** *34.7 %MAC*	**340** *34.0 %MAC*	**300** *33.1 %MAC*
	1/2 WING LOCKERS	44	**408** *35.0 %MAC*	**420** *34.6 %MAC*	**390** *33.9 %MAC*	**359** *33.3 %MAC*	**329** *32.6 %MAC*	**289** *31.7 %MAC*
	1/2 REAR + 1/2 WING	61	**282** *35.0 %MAC*	**352** *35.0 %MAC*	**373** *34.7 %MAC*	**343** *34.0 %MAC*	**313** *33.3 %MAC*	**272** *32.4 %MAC*
	MAX REAR + 1/2 WING	77	**157** *35.0 %MAC*	**226** *35.0 %MAC*	**296** *35.0 %MAC*	**326** *34.7 %MAC*	**296** *34.1 %MAC*	**256** *33.2 %MAC*
	MAX WING LOCKERS	88	**353** *35.0 %MAC*	**376** *34.7 %MAC*	**346** *34.0 %MAC*	**315** *33.3 %MAC*	**285** *32.7 %MAC*	**245** *31.8 %MAC*
	1/2 REAR + MAX WING	105	**227** *35.0 %MAC*	**297** *35.0 %MAC*	**329** *34.8 %MAC*	**299** *34.1 %MAC*	**269** *33.4 %MAC*	**228** *32.5 %MAC*
(lb)	MAX REAR + WING	121	**102** *35.0 %MAC*	**171** *35.0 %MAC*	**241** *35.0 %MAC*	**282** *34.8 %MAC*	**252** *34.1 %MAC*	**211** *33.2 %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!

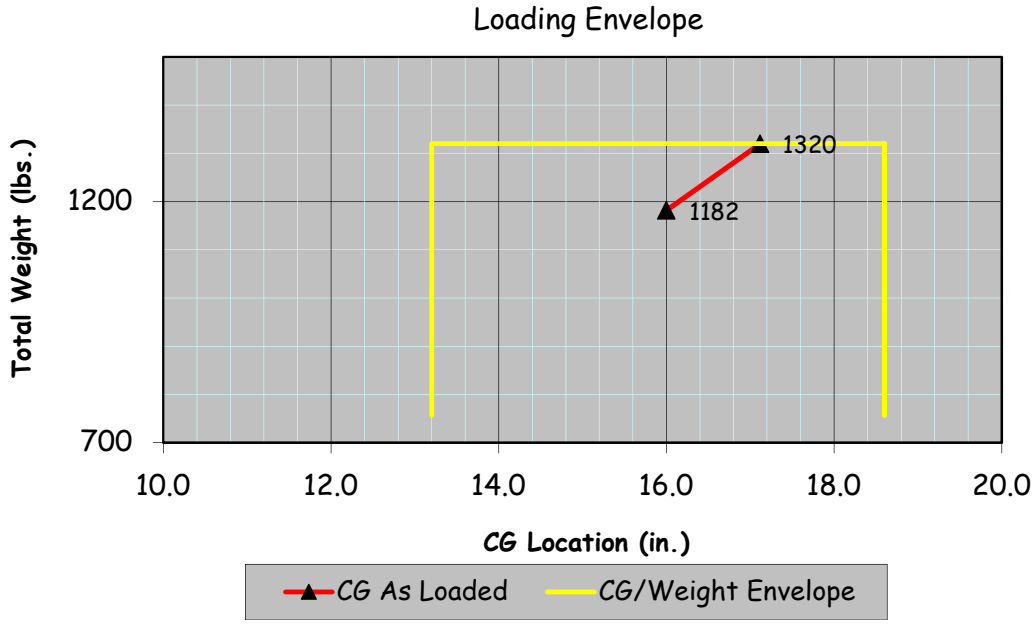
BRM Aero NG5

Weight and Balance Calculator

N312LM

Max Zero Fuel Weight		1320 lbs
Max Gross Weight		1320 lbs
Max Landing Weight		1320 lbs
CG Aft Limit		18.6 inches
CG Forward Limit	1320 lb	13.3 inches
CG Forward Limit	1320 lb	13.3 inches
Baggage Comp. Limit	44 lb	

	Gallons	Weight	x Arm	= Moment
Basic Weight		772	14.90	11496.84
Pilot		210	23.60	4956.00
Front Passenger		180	23.60	4248.00
Wing Baggage		10	24.80	248.00
Aft Baggage		10	55.10	551.00
Zero Fuel Weight		**1182**	16.00	21499.84
Fuel	23	138	7.87	1086.06
TOTAL		**1320**	**17.12**	22586



6.4.1 Airplane Loading Schedule Chart

Aircraft Type/Model:	BRISTELL LSA	Airplane S/N:	312/2018	Registration:	N312LM

LOADING SCHEDULE CHART			SAMPLE AIRCRAFT			YOUR AIRCRAFT		312/2018
#	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			
2.	Crew		198,4	23,6	46,9		23,6	
3.	Fuel	190,5	111,1	7,9	8,7		7,9	
4.	Bagagge 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
AFT CG LIMIT 18,8

CG POSITION [in] = TOTAL MOMENT/100 x 100 / TAKEOFF WEIGHT
= 20982,4 / 1224,4
= **17,136**

CG POSITION [in] = TOTAL MOMENT/100 x 100 / TAKEOFF WEIGHT
=
=

FRONT CG LIMIT 25,0 %MAC
AFT CG LIMIT 35,0 %MAC

CG POSITION [%MAC] = CG POS. [in] x 100 / MAC
= 1713,6 / 53,8
= **31,8**

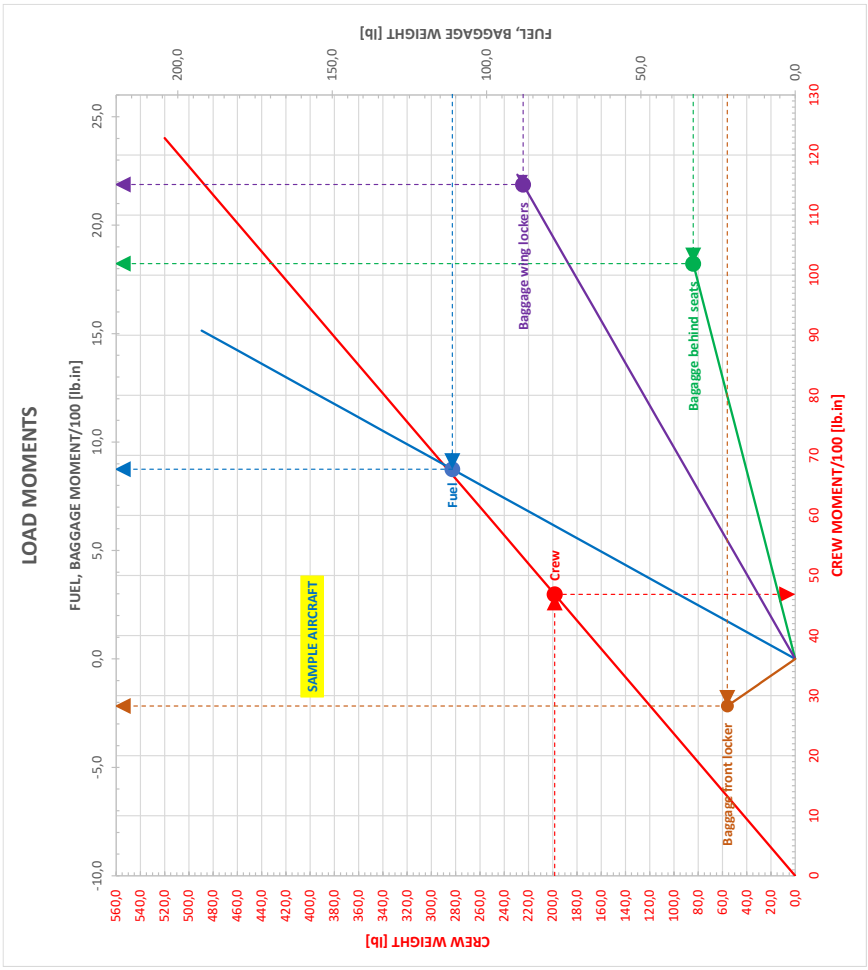
CG POSITION [%MAC] = CG POS. [in] x 100 / MAC
=
=

MAC [in]= 53,8

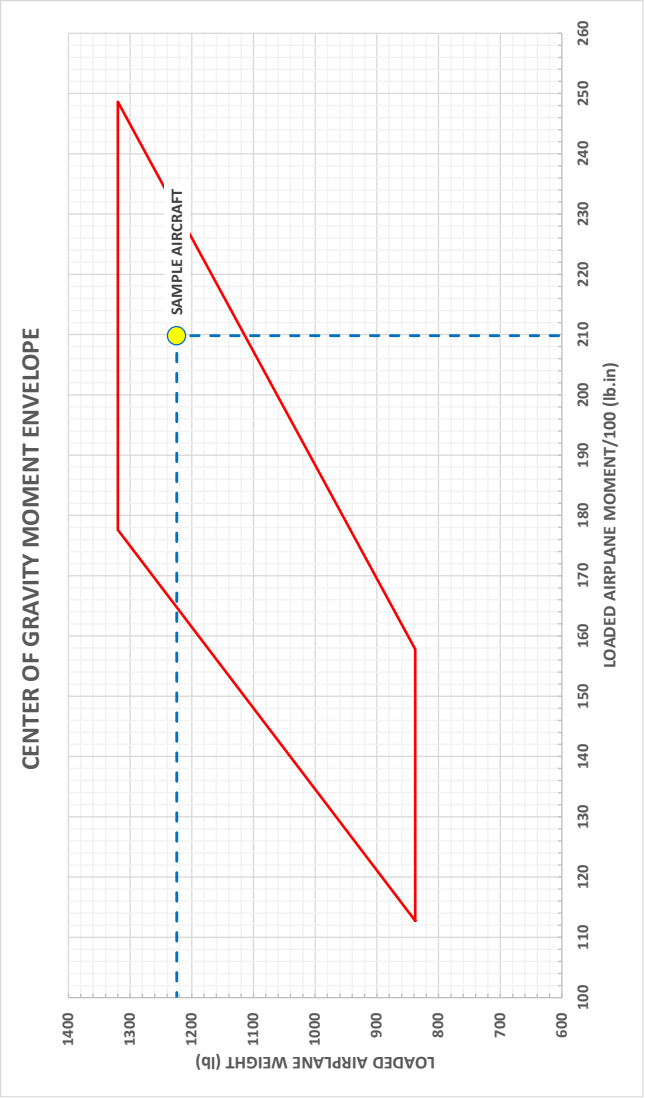
6.4.2 Table of static moments

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	52,0	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

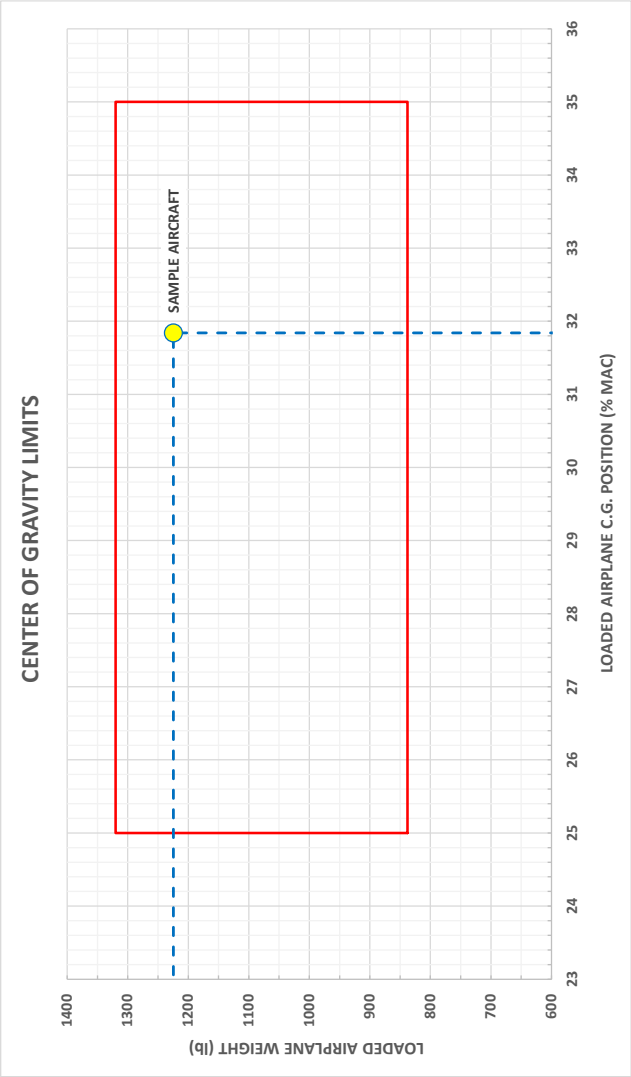
6.4.3 Airplane loading graph



6.4.4 CG Moment envelope



6.4.5 CG limits



6.5 Equipment list

Equipment list of BRISTELL ELSA S/N 312/2018 (At Build):

1. 12V/5V socket behind seats
2. 12V/5V socket on instrument panel
3. 2 map pockets
4. 3-pos.adjustable rudder pedals
5. 4-point safety belts
6. Aileron electric trim
7. Arm rest box
8. Aveo eye ball vents black
9. AVEO wing strobes/nav lights
10. Backup battery for Garmin G5 EFIS
11. Baggage compartment behind seats
12. Beringer 5,00-5 10PLY wheels
13. Beringer brake limiter
14. Beringer dual brakes
15. Cabin heat
16. Carbon instrument panel
17. Dark Grey interior
18. Fiti Eco Comp 3 Blade
19. Elevator electric trim
20. ELT Kannad AF Integra 406 MHz
21. RAMI - AV-525 VOR, LOC & GS „V“ Dipole Antenna
22. Garmin G5 EFIS
23. Garmin GA 26C GPS antenna for G3X
24. Garmin GA 26C GPS antennas (2x) for G3X
25. Garmin GA 35 External active GPS antenna
26. Garmin GA 57X combo GPS / XM antenna for G3X
27. Garmin GDL 51 Sirius/XM Reciever
28. Garmin GAP 26 angle of attack heated probe
29. Garmin GDU 460
30. Garmin GDU 460
31. Garmin GEA 24 Engine Interface Module
32. Garmin GMA 245 digital audio panel
33. Garmin GMC 507 Autopilot Control Module
34. Garmin GMU 22 Magnetometer
35. Garmin GSA 28 autopilot servos installation

36. Garmin GSU 25 ADHRS (2x)
37. Garmin GNC 255 NAV/COMM
38. Garmin GTP 59 Temperature Probe
39. Garmin GTR 20 remote-mount comm radio
40. Garmin GTX 45R mode S transponder with ADS-B out
41. Key switch box
42. Lambert+LINAK electric flaps actuator
43. Landing lights in both wings, WIG-WAG
44. Leather glareshield
45. Leather upholstery
46. LEMO jacks
47. Lockable canopy
48. Lockable fuel tank caps
49. Long HTU (2.9 m) with horn balance
50. Middle size instrument panel for G3X
51. Noise insulation on firewall
52. Nose gear doubled flexible rod (Teleflex)
53. Paint scheme: #14
54. Parking brake
55. Pierburg auxiliary fuel pump
56. RAMI AV-10 comm antenna
57. RAMI AV-200 ELT antenna
58. RAMI AV-74 transponder DME antenna
59. Ray Allen G205 grips
60. Rear console with cut out for fuel selector
61. Rotax 912 ULS engine, clutch, airbox
62. TCW IBBS-12V-3AH backup battery for Garmin G3X
63. Tinted canopy - blue
64. Tow bar
65. USB port(s) on the instrument panel
66. Garmin GPS20A & GA35 Ant
67. Wheel fairings (pants)
68. Whelen MB 1 tail mounted LED strobe
69. Wing lockers

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SECTION 7

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 aluminium sheet metal riveted to aluminium angles with Avex rivets. This high strength aluminium alloy construction provides long life and low maintenance costs thanks to its durability and corrosion resistance characteristics.
The wing has a high lift aerofoil 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 centred on the body.

7.6 Baggage compartment

The rear baggage compartment is located behind the seats. It may accommodate up to 15 kg (33 lb). 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 (optional equipment) up to 20 kg (44 lb), in each wing locker.

Optionally also a front locker in a space between the instrument panel and firewall may be installed. Maximum baggage is 10 kg (22 lb).

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 912 ULS S engine 98.6 hp is installed. Rotax 912 ULS is 4-stroke, 4 cylinder, horizontally opposed, spark ignition engine with one central camshaft-push-rod-OHV. Liquid cooled cylinder heads, ram air cooled cylinders.

Dry sump forced lubrication. Dual contactless capacitor discharge ignition. The engine is fitted with an electric starter, AC generator and mechanical fuel pump. Prop drive via reduction gear with integrated shock absorber.

Propeller:

- FITI ECO COMPETITION 3 LR 158, 3-bladed, on-ground adjustable propeller with composite blades.

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 carburettors. 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: .....2x60 l 2x16 US gallons
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 electric fuel pump is located on firewall.

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 Ignition Switch

Ignition must be on BOTH to operate the engine: For safety, remove key when engine is not running.

NOTE

All switches and or engine controls are "up" or "push forward" for operation, except the choke, cabin heat and carburetor pre-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.

7.11 Pitot and static pressure system

Pitot tube (optionally heated) is located below the left 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 ELSA S/N 312/2018 is fitted with (At Build):

1. 12V/5V socket behind seats, on the instrument panel
2. 2 map pockets
3. 3-pos.adjustable rudder pedals
4. 4-point safety belts
5. Aileron+elevator electric trim
6. Arm rest box
7. Aveo eye ball vents black
8. AVEO wing strobes/nav lights
9. Beringer 5,00-5 10PLY wheels
10. Beringer dual brakes, park brake, brake limiter
11. Cabin heat
12. Carbon instrument panel
13. Key switch box
14. Lambert+LINAK electric flaps actuator
15. Landing lights in both wings, WIG-WAG
16. Leather glareshield, Leather upholstery
17. LEMO jacks
18. Lockable canopy, Lockable fuel tank caps
19. Middle size instrument panel for G3X
20. Noise insulation on firewall
21. Nose gear doubled flexible rod (Teleflex)
22. Pierburg auxiliary fuel pump
23. Ray Allen G205 grips
24. Rear console with cut out for fuel selector
25. Tinted canopy - blue
26. USB port(s) on the instrument panel
27. Wheel fairings (pants)
28. Whelen MB 1 tail mounted LED strobe
29. Wing lockers

7.13 Instruments and Avionics

BRISTELL ELSA S/N 312/2018 is fitted with (At Build):

Flight Instruments:

1. Garmin G5 EFIS + Backup battery
2. Garmin G3X flight display system including:

- Garmin GDU 460 display
- Garmin GDU 460 display
- Garmin GMU 22 Magnetometer
- Garmin GA 26C GPS antennas (2x) for G3X
- Garmin GA 57X combo GPS / XM antenna for G3X,
-- Garmin GPS20A & GA 35 Antenna
- Garmin GAP 26 angle of attack heated probe
- Garmin GMU 507 AP control module + GSA 28 servos
- Garmin GSU 25 ADHRS (2x)
- Garmin GTP 59 Temperature Probe
- TCW IBBS-12V-3AH backup battery for Garmin G3X

Engine instruments:

1. Garmin G3X flight display system including
2. Garmin GEA 24 Engine Interface Module

COM/NAV:

1. GARMIN GNC 255 NAV/COM ,
   Garmin GA 35 External active GPS antenna,
   RAMI - AV-525 VOR, LOC & GS „V“ Dipole Antenna
2. ELT Kannad AF Integra 406 MHz + RC 200 control unit + Rami AV-200 antenna
3. Garmin GDL 51 XM/ADS-B Receiver, Garmin GA 26C GPS antenna for G3X
4. Garmin GTR 20 remote-mount comm radio+ RAMI AV-10 comm antenna
5. Garmin GTX 45R mode S transponder with ADS-B out + RAMI AV-74 transponder DME antenna
6. Garmin GMA 245 digital audio panel

NOTE

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

7.14 Cockpit

7.14.1 Cockpit layout

BRISTELL ELSA, S/N 312/2018 has the following cockpit layout:

7.14.2 Instrument panel

BRISTELL ELSA, S/N 312/2018 has the following instrument panel arrangement:

SECTION 8

8 Airplane handling, servicing and maintenance

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:

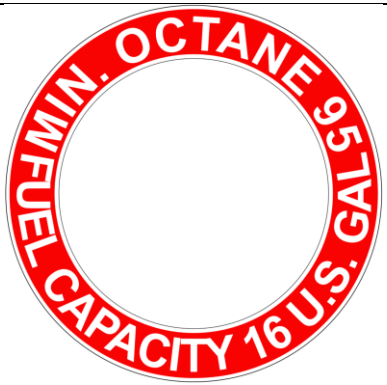
- All fuses
- Ignition switches
- Choke
- Starter
- Trim: Nose heavy, Tail heavy
- Flaps: 0°, 10°, 20°, 30°
- Maximum rear baggage weight 15 kg (33 lb)
- Maximum weight in each wing locker 20 kg (44 lb), if installed
- Maximum weight in front locker 10 kg (22 lb), if installed
- Instruments
- Canopy: Open - Close
- Fuel capacity: 60 l (15.87 U.S. gallons) / min. 95 Octane - at filler neck
- Fireproof Identification plate attached to the fuselage port side, in front of the horizontal tail unit.

Aircraft Operating Instructions

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 F 37.	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. 15 KG	Maximum weight of baggage in the Baggage compartment – A, behind the seats.
MAX. 20 KG	Maximum weight of baggage in each wing locker, if installed.
MAX. 10 KG	Maximum weight of baggage in fuselage front locker, if installed.
UNUSABLE FUEL QUANTITY 0.5 l	
V_{FE} 75 kt V_A 96 kt V_{NE} 157 kt	Airspeed limitations. Located on the instrument panel or fuselage side.
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. 600 kg (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.

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	Located on the top of the canopy inside.
	Located on the lever between seats.
	**If BRS rescue system is installed:** Placard located on the both sides of fuselage between canopy and rear window
	Placard located in place rocket egress
	Located on both sides of the fuselage tail where are located static ports.

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	01/2011	Aircraft Flight Training Supplement
11/2017	02	Description of the aircraft S/N 312/2018

10.3 Inserted Supplements

Aircraft Operating Instructions

SUPPLEMENT No. 01/2011

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***

Aircraft Operating Instructions

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 ELSA

BRM AERO Wings with heart

Aircraft Operating Instructions

SUPPLEMENT No. 02

AIRCRAFT DESCRIPTION

Registration: **N312LM**

Serial number: **312/2018**

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 ELSA of S/N 312/2018.

0.1 Record of revisions

No changes.

1 GENERAL INFORMATION

No changes.

2 OPERATING LIMITATION

2.4.3 Oil

Type of oil: Aeroshell Oil Sport Plus 4
Aircraft Manufacturer uses: Aeroshell OIL SPORT PLUS 4

2.4.4 Coolant

Type of coolant: Dexcool 50/50
Type of coolant used by aircraft manufacturer: 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 changes.