BRISTELL B23-915

AIRCRAFT FLIGHT MANUAL

The technical content of this document is approved under the authority of the DOA ref. EASA. 21J.411

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Model: **BRISTELL B23-915**

Serial No: **…….**

Registration:

Document No.: **ADXC-73-003-AFM**

Date of Issue: **09.12.2021**

For approval reference of pages identified as "Approved page" refer to Section 0.1 record of revisions

This aircraft must be operated in compliance with information and limitations contained herein.

This document must be available on-board of the aircraft permanently in a form acceptable for the NAA.

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SECTION 0

0 TECHNICAL INFORMATION

0.1 Record of revisions

Any revision of the present manual, except actual weighing data, must be recorded in the following table and in case of approved Sections endorsed by the Agency.

The new or amended text in the revised pages will be indicated by a black vertical line in the left hand margin, and the Revision No. and the date will be shown on the bottom left hand side of the page.

Issue	Affected Pages	Date	Change/Reason	Approval Reference
A	all	09.12.2021	First issue of	EASA.A.652 Issue 02

0.2 List of Effective Pages

Section	Page	Appr.	Rev.	Date	Section	Page	Appr.	Rev.	Date
	I		A	09.12.2021		2-4	X	A	09.12.2021
	II		A	09.12.2021		2-5	X	A	09.12.2021
	i		A	09.12.2021		2-6	X	A	09.12.2021
	ii		A	09.12.2021		2-7	X	A	09.12.2021
						2-8	X	A	09.12.2021
0	0-0		A	09.12.2021		2-9	X	A	09.12.2021
	0-1		A	09.12.2021		2-10	X	A	09.12.2021
	0-2		A	09.12.2021		2-11	X	A	09.12.2021
	0-3		A	09.12.2021		2-12	X	A	09.12.2021
	0-4		A	09.12.2021		2-13	X	A	09.12.2021
	0-5		A	09.12.2021		2-14	X	A	09.12.2021
	0-5		A	09.12.2021		2-15	X	A	09.12.2021
	0-6		A	09.12.2021		2-16	X	A	09.12.2021
	0-7		A	09.12.2021		2-17	X	A	09.12.2021
	0-8		A	09.12.2021		2-18	X	A	09.12.2021
	0-9		A	09.12.2021		2-19	X	A	09.12.2021
1	1-0		A	09.12.2021	**3**	3-0	X	A	09.12.2021
	1-1		A	09.12.2021		3-1	X	A	09.12.2021
	1-2		A	09.12.2021		3-2	X	A	09.12.2021
	1-3		A	09.12.2021		3-3	X	A	09.12.2021
	1-4		A	09.12.2021		3-4	X	A	09.12.2021
	1-5		A	09.12.2021		3-5	X	A	09.12.2021
	1-6		A	09.12.2021		3-6	X	A	09.12.2021
	1-7		A	09.12.2021		3-7	X	A	09.12.2021
	1-8		A	09.12.2021		3-8	X	A	09.12.2021
	1-9		A	09.12.2021		3-9	X	A	09.12.2021
	1-10		A	09.12.2021		3-10	X	A	09.12.2021
	1-11		A	09.12.2021		3-11	X	A	09.12.2021
	1-12		A	09.12.2021		3-12	X	A	09.12.2021
	1-13		A	09.12.2021		3-13	X	A	09.12.2021
						3-14	X	A	09.12.2021
2	2-0	X	A	09.12.2021		3-15	X	A	09.12.2021
	2-1	X	A	09.12.2021		3-16	X	A	09.12.2021
	2-2	X	A	09.12.2021		3-17	X	A	09.12.2021
	2-3	X	A	09.12.2021		3-18	X	A	09.12.2021

	3-19	X	A	09.12.2021

4	4-0		A	09.12.2021	**6**	6-0		A	09.12.2021
	4-1		A	09.12.2021		6-1		A	09.12.2021
	4-2		A	09.12.2021		6-2		A	09.12.2021
	4-3		A	09.12.2021		6-3		A	09.12.2021
	4-4		A	09.12.2021		6-4		A	09.12.2021
	4-5		A	09.12.2021		6-5		A	09.12.2021
	4-6		A	09.12.2021		6-6		A	09.12.2021
	4-7		A	09.12.2021		6-7		A	09.12.2021
	4-8		A	09.12.2021					
	4-9		A	09.12.2021	**7**	7-0		A	09.12.2021
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	4-11		A	09.12.2021		7-2		A	09.12.2021
	4-12		A	09.12.2021		7-3		A	09.12.2021
	4-13		A	09.12.2021		7-4		A	09.12.2021
	4-14		A	09.12.2021		7-5		A	09.12.2021
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	4-18		A	09.12.2021		7-9		A	09.12.2021
	4-19		A	09.12.2021		7-10		A	09.12.2021
						7-11		A	09.12.2021
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	5-1		A	09.12.2021		7-13		A	09.12.2021
	5-2		A	09.12.2021		7-14		A	09.12.2021
	5-3		A	09.12.2021		7-15		A	09.12.2021
	5-4	X	A	09.12.2021		7-16		A	09.12.2021
	5-5	X	A	09.12.2021		7-17		A	09.12.2021
	5-6	X	A	09.12.2021		7-18		A	09.12.2021
	5-7	X	A	09.12.2021		7-19		A	09.12.2021
	5-8	X	A	09.12.2021		7-20		A	09.12.2021
	5-9	X	A	09.12.2021		7-21		A	09.12.2021
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	5-16		A	09.12.2021		7-28		A	09.12.2021
	5-17		A	09.12.2021		7-29		A	09.12.2021
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						7-32		A	09.12.2021

	7-33		A	09.12.2021					
	7-34		A	09.12.2021					
	7-35		A	09.12.2021					
	7-36		A	09.12.2021					
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	7-39		A	09.12.2021					
	7-40		A	09.12.2021					
	7-41		A	09.12.2021					
	7-42		A	09.12.2021					
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	8-3		A	09.12.2021					
	8-4		A	09.12.2021					
	8-5		A	09.12.2021					
9	9-1		A	09.12.2021					
	9-2		A	09.12.2021					

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0.3 Table of Contents

Sections:

0.4 Symbols, Abbreviations, Terminology

AEPS	Aircraft emergency parachute system
AGL	Above ground level
C.G.	Centre of gravity
CLNT	Coolant temperature
CWS	Control Wheel Steering button which disconnects the AP
EASA	European Union Aviation Safety Agency
ECU	Engine control unit
EGT	Exhaust gas temperature
EIS	Engine indication system (used to describe the physical unit collecting engine sensor data)
ELT	Emergency location transmitter
EMS	Engine managment system
ISA	International standard Atmosphere
LHS	Left hand side
MAC	Mean aerodynamic chord
MAC_{LE}	Distance of MAC to Datum
MCP	Maximum continuous power
MFD	Multifunction display
MLG	Main landing gear
MTOP	Maximum take-off power
MTOW	Maximum take-off weight
NAV/COM	Combined VOR navigation and communication radio unit
NLG	Nose landing gear
OAT	Outside air temperature
PED	Personal electronic device
PFD	Primary flight display
RHS	Right hand side
ROC	Rate of climb
RPM	Revolutions per minute (used synonym with engine speed, not synonym with propeller speed)
SL	Sea level
VOR	Very high frequency (VHF) omnidirectional radio range
VOLT M	Voltage on Batt/ALT C Bus (Main)
VOLT B	Voltage on LANE B
WOT	Wide open Throttle

XPDR	Transponder

Speeds:

CAS	Calibrated airspeed
EAS	Equivalent airspeed
IAS	Indicated airspeed
TAS	True airspeed
V_A	Design manoeuvring speed
V_{FE}	Maximum speed with flaps extended
V_H	Maximum level flight speed
V_{NE}	Never exceed speed
V_{NO}	Maximum structural cruising speed
V_S	Stall speed
V_{S0}	Stell speed in landing configuration
V_X	Speed for best angle of climb
V_Y	Speed for best rate of climb

NOTE

For all practical purposes for this airplane EAS=CAS.

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SECTION 1

1 GENERAL

1.1 Introduction

The aeroplane Flight Manual has been prepared to provide pilots and operators with information for the safe and efficient operation of this very light aeroplane.

This manual includes the information required to be supplied to the pilot according to the certification basis

It also contains supplemental data supplied by the aeroplane manufacturer.

1.2 Certification basis

This type of aircraft has been approved by the European Union Aviation Safety Agency in accordance with

- **CS-23 Amdt. 5**
- **CS-ACNS, issue 2**
- **SC-OVLA-div-02 (glider towing)**

and the

Type Certificate No. :	EASA.A.642 Issue 02
has been issued on (date):	10.01.2021
Category of Airworthiness:	Normal
Noise Certification Basis:	ICAO Annex 16, Volume I, Chapter 10 (10.4b)
Type Certificate No. :	TCDSN EASA.A.642 Issue 3

The determined noise emission value according ICAO Annex 16 Chapter 10 Vol. 1. is **64.9dB(A).**

1.3 Warnings, cautions and notes

1.3.1 AFM warnings, cautions and notes

The following definitions apply to warnings, cautions and notes used in the flight manual.

WARNING

Means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.

CAUTION

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

NOTE

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

1.3.2 Pilot warnings, cautions and advisory lights

The colour coding for pilot indications follows the aviation standard:

- RED: immediate danger, immediate pilot action
- AMBER: condition acceptable only for limited time
- GREEN: normal operation
- Any other: Information

1.3.2.1 LANE A and LANE B indications

The LANE A and B LED indicators provide basic information on the engine ECU state.

LANE A and LANE B lamp OFF is the nominal condition.

NOTE

For ability of failure detection the lane lights when OFF are still powered with a very small current by the ECU. In low light conditions this is visible.

LANE A lamp	LANE B lamp.	Effect on engine	Proposed action on ground	Proposed action in flight
ON	ON	Loss of engine Power possible (LOPC up to IFSD), system relies on default values and tries to maintain operation	Maintenance action required Flight not permissible	Flight possible to your destination at your own discretion. **Land as soon as practical is advised**

LANE A lamp	LANE B lamp.	Effect on engine	Proposed action on ground	Proposed action in flight
flashing	flashing	No effect on Engine power, rely on alternate system	Maintenance required	Flight possible. to destination at your own discretion. **GEN A/B is not delivering to the airframe. observe Batt/ALT C bus voltage (VOLTS M). Consider load shedding and use of backup power.**
OFF	flashing	No effect on engine power, 2 systems available	Maintenance required	Flight possible to your destination at your own discretion
OFF	ON	No effect on Engine power, rely on alternate system	Maintenance required	Flight possible to your destination at your own discretion
ON	OFF	No effect on Engine power, rely on alternate system	Maintenance required	Flight possible to your destination at your own discretion
ON	flashing	No effect on Engine power, rely on alternate system (flashing system operational)	Maintenance required	Flight possible to your destination at your own discretion
flashing	OFF	No effect on engine power, 2 systems available	Maintenance required	Flight possible to your destination at your own discretion

LANE A lamp	LANE B lamp.	Effect on engine	Proposed action on ground	Proposed action in flight
flashing	ON	No effect on Engine power, rely on alternate system	Maintenance required	Flight possible to your destination at your own discretion

- ***NOTE***

- If a warning indicator flashes, it indicates an error with lower severity (fault) that has been detected by the internal testing procedures of the ECU. In this case the ECU 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 ECU will continue to operate in an alternative control mode, which will transfer the control of ignition and injection to the error- free lane.
- Regular operation as well as alternative control modes of the ECU are able to represent the full engine power. Differences arise only in the efficiency of the engine.

1.3.2.2 EFIS PFD and MFD indications

The following table gives an overview of implication and required procedures to react and interpret the indications.

Light	Display	Condition	Implication/ Procedure
RED, EMS master warning	CLNT	Coolant Temp.: max. limit exceeded	Chapter 4.4.12 Climb: Reduce climb angle / increase airspeed
	EGT	Exhaust Gas Temp.: max. limit exceeded	Chapter 4.4.14 Descent: Reduce RPM
	OIL	Oil Temperature: max. limit exceeded	Chapter 4.4.12 Climb Reduce climb angle / increase airspeed
	OIL PRESS	Oil Pressure: min. limit exceeded	Chapter 3.8.6 Loss of oil pressure 1. Reduce engine power setting to the minimum necessary 2. Check oil temperature; if high: - reduce oil temp if temperature decrease does not result in improvement: - land as soon as practical

Light	Display	Condition	Implication/ Procedure
cont... RED, EMS master warning	OIL PRESS	Oil Pressure: max. limit exceeded	Chapter: 3.8.7 High oil pressure: 1. Reduce engine power setting to the minimum necessary 2. engine RPM (propeller) - reduce <5000 3. Speed - 67 KIAS 4. Land as soon as practical Note: warning at p > 5bar Oil pressure with a cold engine could be high. A maximum of 7bar is acceptable Chapter 4.4.3 Engine starting
	MAN PRESS	Manifold Pressure: max. limit exceeded	Reduce power / Throttle *Note: exceedance can be caused by a faulty wastegate.*
	FUEL PRESS	Fuel Pressure: min. limit exceeded	Transient fuel pressure below 2.9bar acceptable for maximum 2sec AUX fuel pump ON
	FUEL PRESS	Fuel Pressure: max. limit exceeded	Transient fuel pressure above 3.2bar acceptable for maximum 2sec AUX fuel pump OFF (if ON) AUX fuel pump ON (if OFF) AND Main Pump OFF (only after AUX pump is ON) Raising fuel pressure is an indication for fuel fine filter loading. Land as soon as practical.

Light	Display	Condition	Implication/ Procedure
	RPM	Engine Speed (RPM): max. limit exceeded	Reduce RPM (propeller) Reduce Throttle (power)
	FUEL L FUEL R	Fuel Quantity: Less than 0liter usable in respective tank	Switch fuel tank Land as soon as practical Prepare for precautionary landing Chapter 3.6.2
cont... RED, EMS master warning	VOLTS	Electric system voltage below 8 Volt	GEN A/B ON ALT C ON Check AMP positive (charging the system) USB power - remove load switch OFF all non-essential electrical equipment - Chapter 3.9.3 Bus system failure - Chapter 3.8.2 Internal generator failure Backup battery ON Backup power ON
	VOLTS	Electric system voltage above 15 Volt	Chapter 3.9.4 Overvoltage Reduce engine RPM (propeller and power) Gen A/B OFF (if not sufficient) Alt C OFF
	AMPS	Battery current below -25A (discharge)	If positive charge (Amps) cannot be maintained: Consider use of backup battery see Chapter 3.8.2 - Land as soon as practical
	AMPS	Battery current above +25A (charge)	MASTER OFF Permanent very high current to the battery is a sign of internal shorting of the battery. To reduce risk of fire the Battery CB PULL

Light	Display	Condition	Implication/ Procedure
	OIL TEMP	Oil Temperature: min. caution limit exceeded	Engine starting: Engine speed <2500 RPM Cruise Increase power / reduce RPM
	FUEL L FUEL R	Fuel Quantity: Less than 10liter usable in respective tank	Switch tank (L/R) Check flight planning
cont... AMB. EMS master caution	VOLTS	Electric system voltage below 11 Volt	GEN A/B ON ALT C ON Check AMP positive (charging the system) USB power - remove load switch OFF all non-essential electrical equipment
	AMPS	Battery current below -10 Amp (discharge)	Observe; if continuous: GEN A/B ON ALT C ON Check AMP positive (charging the system) USB power - remove load switch OFF all non-essential electrical equipment
	AMPS	Battery current above +10Amp (charge)	Observe; if continuous: MASTER Switch OFF
	GEN A/B	GEN A/B does not deliver	GEN A/B ON GEN A/B CB CHECK If the caution indication persists: GEN A/B OFF
	ALT C	Alternator C does not deliver	ALT C ON ALT C CB CHECK ALT C CTRL CB CHECK If the caution indication persists: ALT C OFF

Light	Display	Condition	Implication/ Procedure
	BACKUP BATT	Back Up Batt supply insufficient (below 11 Volt)	Check system voltage, if low consider Chapter 3.8.2 Alternator failure / use of back-up battery
AMB. LOW FUEL Left	N/A	Usable fuel remaining less than 5 liter in left tank	This system is electrically independent of the fuel QTY indication. In case of conflicting information landing is advised as soon as practical
AMB. LOW FUEL Right	N/A	Usable fuel remaining less than 5 liter in right tank	This system is electrically independent of the fuel QTY indication. In case of conflicting information landing is advised as soon as practical
GRE., Fuel pump ON	N/A	AUX. Fuel pump is switched ON	is triggered by the power supply to the electric pump – actual pump function of pressure built up must be checked using the fuel pressure indication
GRE., Land. light ON	N/A	Landing light or WIG/WAG is switched ON	is triggered by the landing light power supply in both, WIG/WAG and ON mode
GRE. Pitot Heat ON	N/A	Pitot Heat is switched ON	is triggered by the power supply to the heating element – it does not sense actual current or temperature built up. This must be checked in pre-flight inspection.
BLUE Ext. Power ON	N/A	External Power supply connected	is triggered by the connected external power Park break SET Never taxi with the External power light illuminated

1.4 Descriptive data

- CS-23 Level 1 aircraft (formally CS-VLA)
- Day and Night VFR operation
- Maximum Take Off Weight 750kg
- Side-by-side seating
- Low wing monoplane
- Conventional cruciform design
- All aluminium airframe, composite canopy frames
- Power plant
  - Engine Rotax 915iSc3 A
    - BRM modified exhaust pipe
    - BRM modified water expansion bottle
    - BRM modified intercooler
    - ROTAX oil cooler and tank – oil system without thermostat
    - ROTAX coolant radiator and additional radiator – coolant system without thermostat
  - Propeller MTV-34-1-A/175-200
    - Hydraulic governor P-110-051/A
- Fuel system
  - Fuel tanks in wing leading edge with strainer pick up
  - Left/Right/OFF fuel selector switching both fuel feed an fuel return
  - Dual electric fuel pumps (main/aux.) with check valve bypass
  - Drain in fuel tanks
- Landing gear
  - Fixed tricycle
  - MLG composite spring type with differential hydraulic braking
  - NLG welded steel design steered (two push/pull cable on excentre) and combined hydraulic/spring damper
- Control system
  - Elevator and Aileron pushrod system
  - Rudder cable / pulley system
  - Electric actuated trim for pitch and roll
  - Anti-Servo tab on pitch control
- Luggage
  - Luggage compartments in cabin (15kg)
  - Luggage compartments in wings (2 x 20kg each)

- AEPS (if installed – optional equipment)
  - BRS-6-1350 (ASTM compliant) on forward RHS fuselage
- Electric system
  - Gen A/B (Engine internal)
  - Alt C (Engine external)
  - Lead MG Starter Battery
  - Li-Ion avionics backup battery

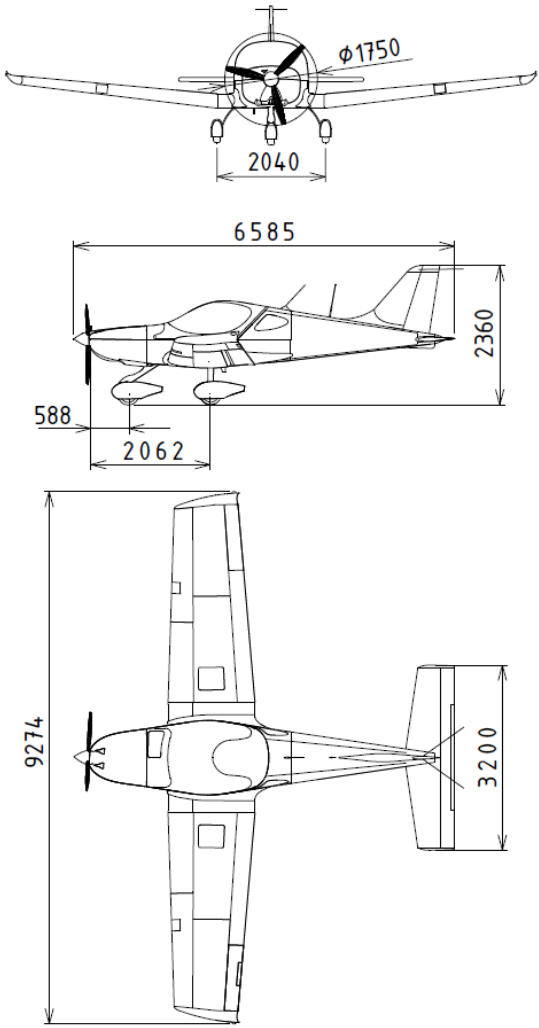
1.4.1 Dimensions External

Total Length:	6.58	m
Maximum Height	2.36	m
Maximum Fuselage Width:	1.3	m
Wing span (incl. wing tip lights):	9.27	m
Wheel base	1.47	m
Wheel track	2.04	m
Maximum propeller diameter	1.75	m
Wing area (projected):	11.75	m^2
Wing mean aerodynamic chord (MAC)	1.343	m
Distance of MAC leading edge to Datum (MAC_{LE}):	1.377	m

1.4.2 Dimensions Internal

Cabin height (floor to top canopy):	0.904	m
Cabin length (firewall to aft luggage compart.):	1.397	m
Cabin width (inside spacing canopy frame):	1.225	m
Luggage volume dimension wing locker (each side)		
36cm*41cm*21cm	31	litres
Luggage volume dimension fuselage		
52cm*17cm*96cm	85	litres

1.5 Three-view drawing



NOTE

Measures valid for static loaded condition, wing span incl. wing tip lights.

SECTION 2

2 LIMITATIONS

2.1 Introduction

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

The limitations included in this section and in Section 9 have been approved by European Union Aviation Safety Agency.

2.2 Airspeed

Speed		*KEAS*	KIAS	KTAS	Remarks
V_{NE}	Never exceed speed	***156****	***159****	***193****	Do not exceed this speed in any operation. Depending on actual OAT the KTAS Limit does not exceed the KIAS limit at altitudes up to approximately **11.000ft.**
V_{NO}	Max. structural cruising speed	***135***	***138***	-	Do not exceed this speed except in smooth air, and then only with caution.
V_A	Maneuvering speed	***98***	***101***	-	Do not make full or abrupt control movement above this speed, because under certain conditions the aircraft may be overstressed by full control movement.
V_{FE}	Maximum flap extended speed	***81***	***84***	-	Do not exceed this speed with flaps extended.

* In altitudes from SL to FL110 the V_{NE} indicated airspeed limit will always apply. Depending on OAT the true airspeed limit will become the lesser of limits above FL110 and must be respected.

2.3 Airspeed indicator markings

Standby EFIS:

The airspeed markings/colour coding on the standby EFIS are only considering KIAS. No true airspeed limit (KTAS) is programmable. Check airspeed limitation placard and monitor true airspeed indication above FL110.

PFD/MFD

Airspeed limitation colour coding is programmed in the MFD/PFD displays as shown in the table below.

The redline (V_{NE}) is additionally programmed to consider the true airspeed (altitude and OAT effect).

Marking	IAS value or range *knots*	Significance
White	***47-84***	**Flap Operating Range.** (Lower limit is maximum weight 1.1 VS0 in landing configuration. Upper limit is maximum speed permissible with flaps extended positive.)
Green	***55-138***	**Normal Operating Range.** (Lower limit is maximum weight 1·1 VS1 at most forward c.g. with flaps retracted. Upper limit is maximum structural cruising speed.)
Yellow	***138-159***	Manoeuvres must be conducted with caution and only in smooth air.
Red line	***159*** ***(ALT/OAT dependent)***	Maximum speed for all operations. Note: Depending on OAT the true airspeed limit will become the lesser of limits above FL110 (193 KTAS)

2.4 Powerplant

Engine Manufacturer:		Bombardier-Rotax GMBH
Engine Model:		**ROTAX 915iSc3 A**
Power	Max Take-off:	104 kW / 140 HP at 5800 RPM, max.5 min.
	Max. Continuous:	99 kW / 133 HP at 5500 RPM
Engine RPM	Max. Take-off:	5800 RPM, max. 5 min.
	Max. Continuous:	5500 RPM
	Idling:	Min. 1800 RPM
Manifold Air Pressure (MAP)	Minimum	60hPa (1.77 in. HG)
	Maximum	1730hPa (51in. HG)
Coolant temperature (CT)	Minimum:	-20 °C (4 °F)
	Maximum:	120 °C (248 °F)Obey the latest edition of Service instruction SI-915 i-001, for the selection of the correct operating media.
	Optimum:	80 – 110 °C (176-230 °F)
Oil temperature	Minimum:	50 °C (12 °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:	7.0 bar (101.5 psi) - cold engine start
	Optimum:	2.0 – 5.0 bar (29 – 72.5 psi) - above 3500 RPM
Fuel pressure	Minimum:	2.9 bar (42 psi), (max 3 sec: 2.5 bar)
	Maximum:	3.2 bar (45 psi), (max 3 sec: 3.5 bar)
Exhaust gases temp.	Maximum:	950 ° C (1742 °F)
Engine start, operating temperature	Maximum:	50 °C (120 °F) (ambient temperature)
	Minimum:	-40 °C (-40 °F) (Oil temperature)

Propeller Manufacturer:		MT-Propeller Entwicklung GmbH
Propeller Model:		**MTV-34-1-A/175-200**
Diameter	Maximum:	175 cm
	Minimum:	-
Blade Angle (at 75% station)	Low:	+3 °
	High:	+55 °
Rotational speed restrictions	Max. Take Off Speed (propeller RPM)	2560 (equals 6220 engine RPM, engine is limiting)

2.5 Powerplant instrument markings

Powerplant limitation color coding is programmed in the MFD/PFD displays

Rotax 915iSc3A	Minimum Limit (red line)	Caution Range (yellow)	Normal Operating Range (green)	Caution Range (yellow)	Maximum Limit (red line)
Engine speed (RPM)		**< 1800** *6 **RPM**	**1400-5500 RPM**	**5500-5800** *3 **RPM**	**5800** *1 **RPM**
Oil Temp. (OT)	-	**<50 °C** *2 122 °F	**50-110 °C** 122-230 °F	**110-130 °C** *4 230-266 °F	**130 °C** *1 266 °F
Exhaust Gas Temp. (EGT)	-	-	**<950 °C** <1742°F	-	**950°C** *1 1742 °F
Coolant Temp (CLNT)	**-20°C** -4°F	-	**<120°C** <230°F	-	**120 °C** *1 248 °F
Oil Pressure (OP)	**0.8 bar** *1 12 psi	**0.8-2 bar** *4 12-29 psi	**2-5 bar** 29-73 psi	**5-7 bar** *4 73-102 psi	**7 bar** *1 102 psi cold engine starting
Fuel Pressure (FP)	**2.5 bar**[*1] 36 psi	**2.5-2.9bar** *5 42 psi	**2.9-3.2bar** 42 – 45psi	**3.2-3.5 bar** *5 45 psi	**3.5 bar**[*1] 51 psi
Manifold Pressure (MP)	**2inHg** 60hPa	**-**	**2-45inHg** 60-1520hPa	**45-51inHg** 1520-1730hPa	**51inHg**[*1] 1730hPa
Manifold Temperature (MT)	**indication range -20°C to +80°C**				**+80°C**

*1 this event triggers the red “master warning” light and appears on PDF/MFD text message.

*2 this event triggers the yellow “master caution” light and appears on PDF/MFD text message.

*3 operation above maximum continuous power for maximum 5min, see chapter 7.9.1 for details of recommended RPM/manifold pressure combinations.

*4 this range in “non-optimum” and does not trigger an amber “master caution”.

*5 transient fuel pressure below 2.9bar or above 3.2bar acceptable for maximum 5sec.

*6 engine ground idle lower speed limit.

2.6 Miscellaneous instrument markings

MFD/PFD displays are programmed with limitation color coding for:

	Minimum Limit (red line)	Caution Range (yellow)	Normal Operating Range (green)	Caution Range (yellow)	Maximum Limit (red line)
Electric system voltage	**8 to 11 *1 Volt**	**11 to 12 *2 Volt**	**12 to 15 Volt**	**-**	**15 to 16 *1 Volt**
Battery current	**-25 *1 Ampere**	**-25 to -10 *2 Ampere**	**-10 to +10 Ampere**	**+10 to +25 *2 Ampere**	**+25 *1 Ampere**
Fuel quantity*3	**4liter *1 (unusable fuel mark)**	**4 to 14 *2 Litres** 0 to 10liter usable	**14 to 45 *4 litres**		
Fuel flow			**0 to 47 litres/hour**	**>47 litres/hour**	

*1 this event triggers the red “master warning” light and appears on PDF/MFD text message.

*2 this event triggers the amber “master caution” light and appears on PDF/MFD text message.

*3 a separate and independent amber “low fuel caution light” is triggered with the remaining usable fuel quantity being 5liter on the respective tank.

*4 fuel qty between 45liter and 60liter (56usable) is indicated as “45liter”

2.7 Weight

Max. Take-off weight..... 750 kg
Max. Landing weight..... 750 kg
Max. Zero Wing load weight[1]..... 660 kg
Weight of fuel (120 l)..... 87 kg
Max. baggage behind seats
lower area..... …15 kg

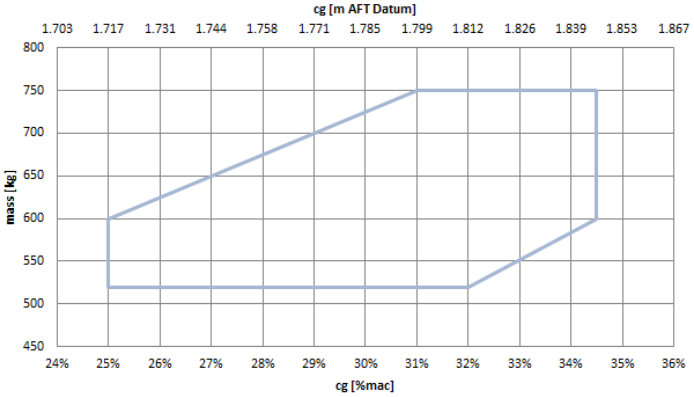
[1] Maximum mass when wing tanks and wing lockers are empty

upper area ..... 1 kg
Max. Wing locker loading (per side)..... 20 kg
Maximum lateral asymmetry (fuel+wing locker baggage) .. 15 kg
Minimum crew weight ..... 55 kg
Maximum crew weight ..... see 6.4
Wing locker luggage ..... None

NOTE
Actual empty weight is shown in SECTION 6.

2.8 Centre of gravity

Operating C.G. range.....25% to 34.5% of MAC
Maximum weight at 25%..... 600 kg
Most forward C.G. at MTOW 750kg.....31% of MAC
Maximum weight at aft C.G. 34.5%..... 750 kg
Maximum aft C.G. at minimum take-off weight 519kg.....32% of MAC
MAC..... 1.343 m
MAC Leading edge ..... 1.377 m
Datum: Propeller flange on the engine.



2.9 Approved manoeuvres

EASA category: CS23 Amdt 5 Level 1 (AMC3 CS-VLA),

1. All standard manoeuvres during normal flight
2. Stalls (except whip stalls)
3. Non-aerobatic manoeuvres:
4. Lazy eight
5. Chandelle
6. Steep turn in which the angle of bank is not more than 60°

WARNING
Aerobatics and intentional spins are prohibited

2.10 Manoeuvring load factors

Maximum positive limit load factor

Flaps UP .....+4 g

Flaps - any other position.....+ 2 g

Maximum negative limit load factor

Flaps UP .....-2 g

Flaps - any other position.....0 g

2.11 Flight crew

Number of seats..... 2

Minimum crew..... 1 pilot on the left seat

2.12 Kinds of operation

Day-VFR

Night-VFR

WARNING
Flight into expected or actual icing conditions is prohibited.

Minimum required equipment for either operating mode is defined in Chapter 6.6.

2.13 Fuel

Tank capacity..... 60 l in each fuel tank

Total fuel .....2 x 60 l = 120 l

Usable fuel..... 2 x 56 = 112 l

Unusable fuel.....2 x 4l = 8 l

Approved fuel grades:

- EN 228 Super and Super Plus (RON 95)
- AVGAS 100LL (ASTM D910)[2]

  (see Service Information SI-915 i-001, latest edition)

2.14 Maximum passenger seating

Maximum passenger seating 1

2.15 Other limitations

Maximum certified altitude .....18.000 ft

Note reduced VNE at altitudes above 14.000ft

Outside air temperature OAT (range)[3] ISA +/-20 K resulting in

Max OAT at SL ..... 15 ºC+23 K = 38 ºC

Min OAT at 18.000ft .....-20ºC-20 K = -40 ºC

Autopilot engagement during take-off, initial climb, final approach and landing is PROHIBITED.

Any autopilot modes related to take off, approach, landing and performance-based NAV modes are not certified in this aircraft.

Smoking prohibited.

AEPS activation speed maximum (if installed) .....157 KIAS

[2] Not recommended for prolonged usage by the engine manufacturer.

[3] Compliance with engine cooling provisions are demonstrated.

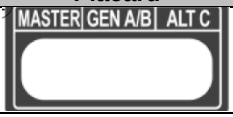
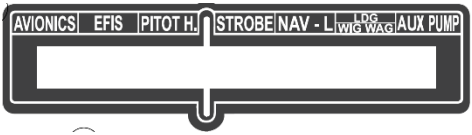
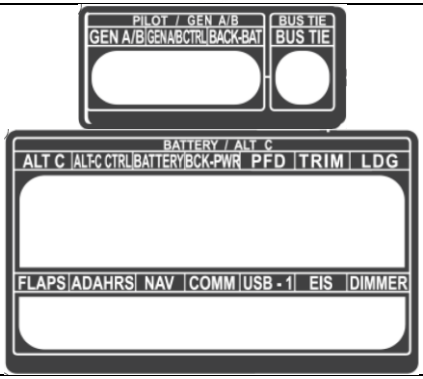
2.16 Placards

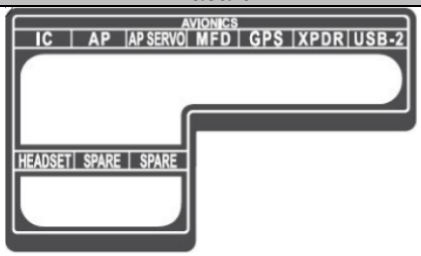
Limitation Placard:

Placard	Meaning and location
This aeroplane is classified as a very light aeroplane approved for Day- and Night-VFR operation, in non-icing conditions. All aerobatic manoeuvres including intentional spinning are prohibited. See Flight Manual for other limitations.	On the instrument panel left-hand side above MFD
AIRSPEED LIMITATIONS: $V_{NE_{<FL110}}$ 159 KIAS $V_{NE_{TRUE>FL110}}$ 193 KTAS V_A 101 KIAS V_{FE} 84 KIAS V_{S0} 44 KIAS	On the instrument panel right-hand side above MFD. Note: all indicated airspeeds are given for Power on correction

Other Placards:

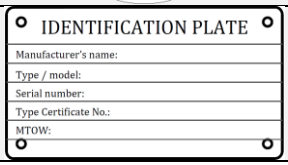
Placard	Meaning and location
Instrument panel left to right:	
BCK-BAT	On avionic backup battery switch cap
BACK PWR	On engine backup power switch cap
START PWR	Start power OFF-(ON) switch

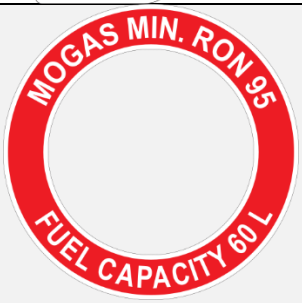
Placard	Meaning and location
	Master switch arrangement lower left panel
	Pilot side electric controls lower left panel
	Alternate air control knob lower left panel
	Call sign label (example) above PFD screen
	Above dimmer and indication lights centre panel
	On centre panel next to trim indication
	Heat direction control knob lower right panel
	Park brake knob lower right panel
	Right side circuit breaker area

Placard	Meaning and location	
		
Calibrated with radio ON, Engine running For N 30 60 E 120 150 Steer For S 210 240 W 300 330 Steer DATE:	Compass deviation placard on front of magnetic compass	if installed (mag comp. optional)
Cabin and Center console front to aft:		
PEDAL SETTING	Left fuselage side panel, below canopy frame	
PEDAL SETTING	Right fuselage side panel, below canopy frame	
	At internal canopy locking handle	
Pull handle to activate parachute. Max. speed 157 KIAS	Above AEPS Handle	if installed (AEPS optional)
⚠WARNING AIRCRAFT ENGINE MUST BE SHUT OFF PRIOR TO DEPLOYING PARACHUTE. FAILURE TO DO SO MAY RESULT IN DEATH OR SERIOUS INJURY.	On AEPS Handle	
	Below AEPS handle	

Placard	Meaning and location
	AEPS locking pin
PROPELLER	On right side of Throttle quadrant
THROTTLE	On left side of Throttle quadrant
USABLE FUEL QUANTITY 2 x 56 L FULLEST FOR TAKE-OFF	Next to fuel selector
	On left and right side of centre console
COPILOT HEADSET PILOT HEADSET	Headset / Headset power
USB 1 USB 2	USB outlets between seats
	On the wall of the lower fuselage luggage compartment

Placard	Meaning and location	
	Between pilot seat to indicate the ELT location which is on a bracket inside the fuselage below the luggage compartment.	
Fuselage exteriour		
	Nose gear wheel cover	
	Left and right main gear wheel cover	
	On oil hatch outside and on oil tank	
	On lower left side of lower cowling	
	On coolant reservoir	
	On firewall, right top engine side above brake fluid reservoir	
	On AEPS Egress panel on right side of fuselage in front canopy. It indicates the location of the rocket.	if installed (AEPS optional)
	On both sides of the aircraft behind the canopy and in front of the rear windows	if installed (AEPS optional)

Placard	Meaning and location
 	At canopy lock outside right
 	At canopy lock outside left
	Left and right static port on fuselage side wall
	Aircraft identification plate mounted on the rear left fuselage, beneath the horizontal stabiliser
CALL SIGN of aircraft (steel plate)	Registration (close to vertical tail)

Placard	Meaning and location
Wings and stabilizers	
	Wing locker placard (for lock)
	Around fuel tank filler caps on both wings.
	On the trailing edge of flaps, ailerons, trim tab and rudder to avoid excessive pressure on them.
	Wing flap root areas
Marking at elevator trim indicator	
	Marking for the optimal elevator trim tab position for take-off positioned next to the fifth LED from the top

2.17 Minimum Equipment

The following equipment must be in operating conditions for the respective operation modes

A.)

Item/Equipment	VFR-Day	VFR-Night
Emergency exit hammer	X	X
Landing light		X
Anti-Collision light	X	X
Position light	during twilight	X
Standby EFIS (altitude / airspeed / attitude) with Magnetometer[4]	X	X
Pitot heat		X
Transponder	[5]	X
COM-Radio	[6]	X
NAV-VOR	[6]	X
Day/Night switch, Dimming functions, glareshield light		X
Generator / Alternator	GEN A/B	GEN A/B & ALT C
Backup Battery		X
PFD/MFD with Engine Monitoring & ADHARS	Min 1	Min 1

B.) Acceptable inoperative equipment is

- AEPS (if installed → must be marked “Inoperative”)
- Cabin heat in fully CLOSED position
- Autopilot
- Intercom
- USB-power outlets[6]
- External power

C.) Optional Equipment is

- Magnetic compass

[4] An inoperative magnetometer can be mitigated by a functioning magnetic compass (optional, if installed)

[5] As required by ATC

[6] The USB power outlets are intended for PED’s. The pilot is responsible for the compatibility of the PED with the aircraft on-board systems.

- Autopilot
- AEPS

All other functions and equipment not listed above in A.), B.) or C.) must be operational at all times.

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SECTION 3

3 EMERGENCY PROCEDURES

3.1 Introduction

Section 3 provides checklists and detail procedures for coping with various emergencies that may occur.

In case of emergency the process steps described in this section should be followed and applied as necessary to correct the problem.

Most failure conditions are associated with caution and warning lights. In the following table a general overview is given:

3.2 Engine failure

3.2.1 Engine failure during take-off run

1. Throttle - IDLE
2. LANE A and LANE B - OFF
3. Brakes - apply

3.2.2 Engine failure enroute or during take-off

1. Speed - gliding at 67 KIAS
2. Altitude below 150ft AGL - land in take-off direction

   over 150 ft AGL: - choose a landing area with little deviation from current direction

   over 1000ft AGL: - consider procedure turn for landing on runway

   enroute: - consider engine restart attempt see section 3.3

WARNING

Returning to the runway with less than 1000ft AGL statistically is the main reason for stall/spin entries and considered the “impossible turn”

3. Wind - find direction and velocity
4. Landing area - CLEAR
5. Flaps - as needed
6. Main & AUX Fuel Pump - OFF
7. Fuel Selector - OFF
8. LANE A and LANE B - OFF
9. Safety harness - tighten
10. Master switch - OFF for VFR DAY
    ON for VFR NIGHT

WARNING

After switching Master switch OFF, control of the flaps is no longer possible

11. Landing Lights - ON for VFR NIGHT
12. Land

3.3 *In-flight engine restart*

1. AUX pump - ON
2. Fuel Selector - fullest fuel tank
3. Throttle lever - Middle
4. LANE A switch - ON
5. LANE B switch - ON
6. Backup Power - ON
7. Backup Battery - ON
8. Starter button - press (if needed)

NOTE

With LANES (ignition) off the propeller does not stop rotation in the air even at speeds close to stall. A stopped propeller is a clear sign of a damaged engine

3.4 Smoke and fire

3.4.1 Engine fire on ground at engine starting

1. Brakes - apply
2. Fuel Selector - CLOSE
3. Heating - CLOSE
4. LANE A and LANE B - OFF
5. Master - OFF
6. Leave the airplane
7. Fire extinguisher (if installed) - use as appropriate
8. Call for a fire-brigade if you cannot extinguish the fire.

3.4.2 Fire on ground with engine running

1. Heating - CLOSE
2. Brakes - apply
3. Fuel selector - CLOSE
4. Throttle - full power
5. LANE A and LANE B - OFF
6. Master - OFF
7. Leave the airplane
8. Fire extinguisher (if installed) - use as appropriate

> ***NOTE***
> The designated place for fire extinguisher installation is located in front of the main spar at the front end of the pilot seat in easy reach of the pilot

9. Call for a fire-brigade if you cannot extinguish the fire.

3.4.3 Engine fire during take-off

1. Speed - 67 KIAS
2. Heating - CLOSE

If landing is ensured OR fire gets critical:

3. Fuel Selector - CLOSE
4. LANE A and LANE B - OFF
5. Main and Aux fuel pump - OFF
6. Master - OFF

7. Land and stop the airplane
8. Leave the airplane
9. Fire extinguisher (if installed) - use as appropriate
10. Call for a fire-brigade if you cannot extinguish the fire.

3.4.4 Engine fire in flight

1. Heating - CLOSE
2. Fuel Selector - CLOSE
3. LANE A and LANE B - OFF
4. Main and Aux fuel pump - OFF
5. Emergency landing - perform according to 3.6.1
6. Leave the airplane
7. Fire extinguisher (if installed) - use as appropriate
8. Call for a fire-brigade.

WARNING

Do not attempt to re-start the engine!

3.4.5 Fire in the cockpit

1.	MASTER	-	OFF
2.	GEN A/B	-	OFF
3.	ALT C	-	OFF
4.	Heating	-	CLOSE
5.	Fire extinguisher (if installed)	-	use as appropriate
6.	Backup Power	-	ON
7.	Backup Battery	-	ON
8.	If fire can be stopped:	-	Land as soon as practical
	If not:	-	Land as soon as possible

NOTE

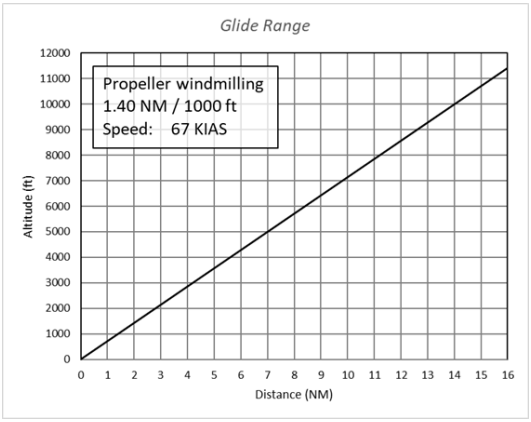
MASTER, GEN A/B and ALT C cut the supply of electrical power to the airframe. The engine remains to be supplied with electric power.

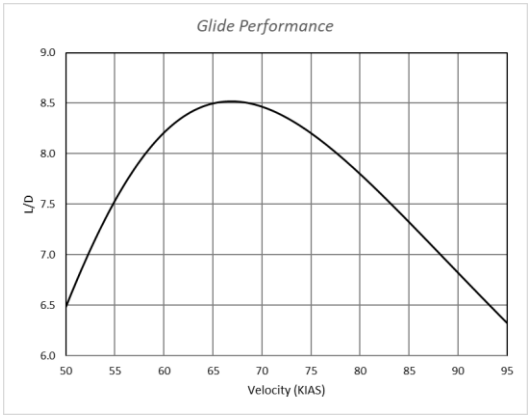
NOTE:

In case of extreme smoke and inability to evacuate by fresh air vents an in-flight un-locking of the canopy can be considered. Un-locking at speeds below V_F without side-slip is demonstrated to lift the canopy rear frame by a few centimetres enabling continued safe flight and landing. This is not flight tested for the full airplane envelope.

3.5 Glide

1. Speed - 67 KIAS
2. Flaps - retracted





CAUTION

Engine rotation with LANES (ignition) off does not stop with airspeed even at stall. However an inflight engine failure or propeller control failure could lead to such condition which is not tested. A further degradation of glide performance in such condition should be anticipated

3.6 Emergency landing

3.6.1 Landing without engine power

Emergency landings might be required in the case of engine failure and the engine cannot be re-started.

1. Speed - 67 KIAS (best glide speed)
2. Propeller - Take-off position
3. Trim - adjust
4. Safety harness - tighten
5. Flaps - extend as needed

Depending on expected landing quality:

6. COM - Make distress call (MAYDAY)
7. XPDR - 7700
8. Fuel Selector - CLOSE
9. LANE A and Lance B - OFF
10. Shallow turns only

Before touch down

11. Master switch - OFF for VFR DAY
    - ON for VFR NIGHT

WARNING

After switching Master switch OFF, control of the flaps is no longer possible

12. Landing Lights - ON for VFR NIGHT

3.6.2 Precautionary landing / land as soon as possible

A precautionary landing might be required in the cases where the pilot may be disorientated, the aircraft has no fuel reserve or possibly in bad weather conditions.

1. Speed - 67 KIAS (best glide speed)
2. Propeller - Take-off position
3. Trim - adjust
4. Landing area - choose (consider wind direction)
5. COM - Report landing location

6. Perform low-altitude passage into wind over the right-hand side of the chosen area with flaps extended 10° and thoroughly inspect the landing area for obstacles.
7. Perform circuit pattern
8. Perform approach
9. Flaps - extend as needed
10. Power - idle (for touch-down)
11. After stopping the airplane switch off all switches, shut off the fuel selector, lock the airplane and seek 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 aileron or elevator control, as applicable
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.

3.6.5 Aircraft turn-over

In inverted situation, following a crash or soft ground loop, it is essential to leave the airplane as soon as possible to mitigate the risk of fuel leak post-crash fire.

In most cases of turn-over the transparency shatters. If this is not the case an emergency hammer is provided which is stored inside of the glovebox between the occupant seats. Appreciable force is required to provide sufficient opening for egress.

Depending on the situation the pilot should consider keeping the seat belt closed until actual egress is performed to remain suspended for the required work.

3.7 Recovery from unusual attitudes

3.7.1 Loss of spatial orientation

Use autopilot „LVL“ button – if installed: If spatial orientation is lost or manual control of the airplane is no longer possible: Press „LVL“ button on the autopilot. The autopilot will take over control and put the airplane in a level attitude.

If control is not regained consider activation of the AEPS system (if installed).

3.7.2 Recovery from unintentional spin

WARNING

Intentional spins are prohibited!

There is no uncontrollable tendency of the airplane to enter into a spin provided the normal piloting techniques are used.

Caution

The airplane is demonstrated to feature acceptable and benign departure characteristics. The following spin recovery technique has not been flight tested but is defined based on best available engineering judgement

If an unintentional spin is encountered, then using the standard “PARE” recovery technique is advised:

1. **P**ower	-	idle
2. **A**ileron control	-	ailerons neutralized
3. **R**udder pedals	-	full opposite rudder (to the mechanical stop)
4. **E**levator control	-	push forward until rotation stops
5. Flaps	-	retract

When rotation stops:

6. Rudder pedals	-	neutralize rudder immediately
7. Recover	-	gently pull out from the dive

3.8 Rotax 915iSc emergencies

3.8.1 Failures indicated by the EMS

The LANE A and B LED indicators provide basic information on the engine ECU state.

LANE A and LANE B lamp OFF is the nominal condition. If limitations were exceeded, individual warning lamps may be reset by restart or individual lane check (see **Chyba! Nenalezen zdroj odkazů.** LANE CHECK).

Simultaneous state		Effect on engine	Proposed action on ground	Proposed action in flight
LANE A lamp	LANE B lamp.			
ON	ON	Loss of engine Power possible (LOPC up to IFSD), system relies on default values and tries to maintain operation	Maintenance action required Flight not permissible	Flight possible to your destination at your own discretion. **Land as soon as practical is advised**
flashing	flashing	No effect on Engine power, rely on alternate system	Maintenance required	Flight possible. to destination at your own discretion. **GEN A/B is not delivering to the airframe. observe Batt/ALT C bus voltage (VOLTS M). Consider load shedding and use of backup power.**

For any other LANE indications refer to Chapter 1.3.2.1

NOTE

If a warning indicator flashes, it indicates an error with lower severity (fault) that has been detected by the internal testing procedures of the ECU. In this case the ECU 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 ECU will continue to operate in an alternative control mode, which will transfer the control of ignition and injection to the error- free lane.

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

3.8.2 Internal generator failure

Failure of Generator A

If during normal operation (Generator A is supplying the EMS) Generator A fails, the ECU automatically switches over to supply the EMS by using Generator B.

If the engine is supplied by Generator B the engine is able to deliver full performance. No performance drop can be recognized while the engine switches the supply from Generator A to Generator B.

CAUTION

If generator B 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 and indicated by the LANE A/B LED lights (flashing simultaneusly) – see Chapter 1.3.2.1

Failure of Generator B

If during normal operation (GEN A supplying the engine and GEN B is supplying the airframe) Generator B fails, the engine ECU is not able to detect this condition (i.e. the LANE A/B LED will not be flashing). Therefore, a the VOLTS M indication needs to be monitored on the EFIS. On the EFIS a GEN A/B caution indicates that the supply is not switched on, either by relay failure or pilot error.
Still ALT C and Battery supply the airframe and the flight.

CAUTION

If Generator B fails the airframe will not be supplied with electrical power by an internal generator. ALT C must be switched ON. Monitor the bus voltage.

Failure of both internal Generators

A failure of both Generators (Generator A/Generator B) will result in engine stoppage unless the EMS is powered by an external power source (backup power by ALT C and Battery).

1. Backup power - ON
2. Backup battery - ON
3. Inflight engine start - Perform according 3.3.
4. Land - as soon as practicable.

3.8.3 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

Except for in-flight emergency, never attempt starting the engine with a disconnected, broken or blocked throttle valve actuation. This may lead to excessive engine speeds.

Power control is still possible with the propeller control. Pull back the propeller control for reduction of power.

For shutting off the engine proceed to Emergency Engine shut- OFF procedure. As part of an abnormal operation, it might be required to shut down the engine at higher engine speeds. Inflight restarting by just resetting the LANEs is possible.

3.8.4 Emergency Engine shut-off

1. LANE A - OFF
2. LANE B - OFF

NOTE

The ECU needs to be deactivated before the fuel pumps. Shutting off the engine by deactivating the fuel supply may result in fault and failure entries in the ECU. Shutting down the engine by shutting off the fuel pumps is only allowed in emergency situations.

3.8.5 The sprag clutch fails to decouple from the starter

This condition is audible to the trained ear by a creeping, abnormal sound of the engine.

CAUTION

Shut down engine!

Risk of fire and danger of the electric starter overheating

Follow engine shut OFF procedure according to 3.8.4.

3.8.5.1 Fuel pressure outside range

CAUTION

Reduce engine power setting to the minimum necessary and prepare for engine in-flight shutdown and precautionary landing according to 3.6.2.

High fuel pressure

If AUX pump ON AUX pump OFF

Only if no effect

AUX pump ON MAIN pump OFF

If this has no effect, then limited flight operation with reduced power is possible. The by-pass check valve of the fuel fine filter (engine compartment) might be activated due to clogged fine filter which warrants maintenance action.

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.

3.8.6 Loss of oil pressure

1. Reduce engine power setting to the minimum necessary
2. Check oil temperature
   if high: - continue flight on low power setting and potential descent for improved cooling
   if temperature is normal or
   if temperature decrease does not result in improvement:
   - land as soon as practical

3.8.7 High oil pressure

1. Reduce engine power setting to the minimum necessary
2. engine RPM (propeller) - reduce <5000
3. Speed - 67 KIAS
4. Prepare for land as soon as possible 3.6.2.

3.9 Other emergencies

3.9.1 Vibration

If any forced aircraft vibrations appear, it is necessary:

1. To set engine speed to such power rating where the vibrations are lowest. In case of severe vibrations, with identified origin being the powerplant and endangering structural integrity the engine should be shut down.
2. To land as or to perform an emergency landing according to 3.6

3.9.2 Autopilot malfunction

In the case of an autopilot malfunction,

1. AP OFF button (stick) - press
2. Autopilot CB - PULL

WARNING

Take-off, initial climb, final approach and landing with AP engaged and any operation with malfunctioning AP are PROHIBITED.

NOTE

AP should be powered at all times during flight to support the envelope protection and LVL recovery function

NOTE

In case of trim system failure (loss of power to trim system) the AP disconnect by trim button is also inoperative

3.9.3 Bus system failure

The B23 electric bus system features two main sections Pilot/GEN A/B (with the Avionic Sub-Bus) and Batt/ALT C. They are connected via the BUS-TIE circuit-breaker.

Both sides of the system provide a set of functions enabling safe flight and landing. See table in Section 7.11 Electrical system.

Upon complete loss of electric power

1. Backup power - ON

2. Backup battery - ON
3. Master switch - OFF
4. GEN A/B switch - OFF
5. ALT C switch - OFF
6. BUS TIE CB - PULL
7. BATT CB - PULL
8. GEN A/B CB - PULL
9. ALT C CB - PULL

Individually check BATT(Master)/ GEN A/B /ALT C by setting the respective CB and associated control in operational mode to locate the malfunction.

Land as soon as practical.

3.9.4 Overvoltage

Overvoltage more than 15 Volts

1. Reduce engine RPM (propeller and power)
2. Alternators - Check GEN A/B and ALT C to identify which alternator causes the problem. Keep that one OFF for the reminder of the flight
3. If positive charge (Amps) cannot be maintained on single alternator: Consider use of back-up battery, see 7.11.2.

Land as soon as practical.

3.9.5 Inadvertent icing encounter

WARNING

Operation under known icing conditions is PROHIBITED!

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

3.9.6 Loss of primary instruments

Although the Garmin displays might be used as main electronic flight instrument, the independent standby EFIS is the primary flight display. In case the Garmin displays have a malfunction (or loss of function) or in case of discrepancy refer standby EFIS.

The Garmin autopilot is independent of the Garmin display, however in case of loss of Garmin display function use the autopilot with caution and monitor your flight path carefully!

Loss of ONE GDU460: continuation of flight;

Loss of BOTH GDU460: Land as soon as practical;

Loss of standby EFIS: Land as soon as practical

3.9.7 RPM overspeed/underspeed/fluctuations; Propeller vibration

The propeller control by the hydraulic governor is dependent on the oil-circuit as well as a chain of mechanical connections.

In any case of erroneous behaviour:

1. Throttle and RPM control: - adjust for smooth running
2. If engine operates within limit: - land as soon as practical

   If not: - land as soon as possible

3.10 AEPS activation (if installed – optional equipment)

The airplane is equipped with an optional airplane emergency parachute system (AEPS) .

If installed, its use should be considered as last resort for situations of

- loss of control,
- loss of structural integrity or
- loss of spatial orientation as well as
- inability to land safely.

The use of the rescue system will likely result in heavy damage to the aircraft and injuries to the aircraft occupants.

WARNING

The rescue system must be unlocked during flight to allow immediate use in emergency!

WARNING

Avoid activation in strong updrafts. In these situations, it is best to first get away from the updraft, and then to activate the rescue system.

WARNING

Minimum effective altitude for the use of AEPS is 1000ft (300 m) above ground. By activating at height under 1000 ft the swinging oscillation of the aircraft may not stabilize and the crew may be injured by impact with terrain. Additionally, the parachute canopy may not be fully loaded so as to properly reduce the speed of fall.

If time is not critical:

1. Report your emergency and intention to use the AEPS.
2. Advise your passenger to follow your orders and actions.
3. Tighten seat belts.
4. Activate ELT
5. Check area beneath to avoid power lines and similar risks.
6. Switch off fuel supply
7. Cut power, reduce speed as much as possible.
8. Switch off main switch
9. Pull the activation handle strongly.
10. Protect your face with your hands, put your hands and feet together (i.e. „roll into a ball“, firm up your whole body!
11. Firm up your body before landing and impact!
12. After landing promptly leave the aircraft, if possible, in opposite direction of the wind.

In a time critical situation:

- activate the AEPS immediately, regardless of the flight altitude, attitude and terrain over which you are
- Follow all other steps of procedure above.

SECTION 4

4 NORMAL PROCEDURES

4.1 Introduction

Section 4 provides checklist and amplified procedures for the conduct of normal operation. Normal procedures associated with optional systems can be found in Section 9.

4.2 Daily inspection

Daily inspection is to be performed prior to the first flight of the day.
It consists of actions identifying any issues that may have accumulated during the time the airplane has been parked, actions to remove any storage/mooring equipment, as well as actions requiring removal of the cowling.

①	General inspection outside – Inspect general condition of aircraft – Inspect for any birds or insects nesting in any of the cowling openings or other areas – Inspect for leaks – Inspect for water entering where it should not – Check tire pressure (2.1bar main gear, 1.8bar nose gear) – Remove any pitot/static port protections – Remove any mooring / tie down ropes – Remove wheel chocks, check freedom of wheel rotation with park brake is OFF – Check MASTER, BACKUP-POWER and LANES are OFF, 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	Remove UPPER cowling – Inspect condition of fuel hoses – Inspect condition of oil/water cooler and connecting hoses – Inspect condition of intercooler and connecting hoses ***NOTE*** Intercooler cooling air is guided by a form fit duct on top of the intercooler. This should be lifted up to identify any foreign objects or bird nesting. – Inspect attachment of spark plug connectors – Inspect tightness of exhaust mounting – Inspect exhaust mounting springs

	– Inspect air hose routing, tightness of connection – Inspect air hoses for chafing at oil cooler – Check operation of alternate air (Bowden cable/valve) – Inspect exhaust and exhaust heat shroud condition – Fuel system draining, wings – Check oil level ○ Replenish as required ***NOTE*** Oil level check requires to open the oil access hatch and remove the oil filler cap. Then the engine is manually rotated slowly in the normal direction of rotation until a gurgling sound is heard. Only then the dip stick correctly indicates the amount of oil. – Check coolant level in expansion tank ○ Replenish as required up to top – Check coolant level in overflow bottle ○ Replenish as required – Check brake fluid level – Check battery pole condition – Check Bowden cables condition and attachment – Inspect inside of cowling for signs of exhaust gas impingement, excessive heat, chaffing – Inspect cowling attachments Re-install cowling – Check form fit and position of intercooler inlet box – Inspect all cowling fasteners being tight
③	Cockpit checks – Inspect general condition – Remove control locks, if applicable – Inspect area below and aft of seats for foreign objects

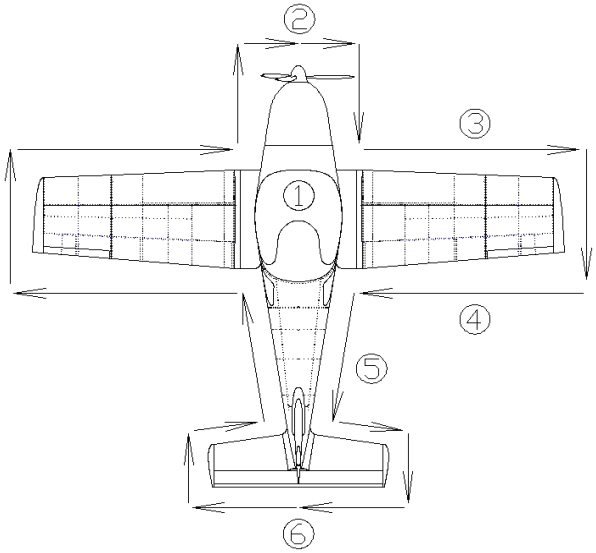
4.3 Pre-flight inspection

Carefully carry out the pre-flight inspection following the instructions in the inspection list below. Incomplete or careless inspection can cause an accident.

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:



①	– LANE A and LANE B	- OFF
	– Avionics/Instruments	- Check condition
	– Cockpit	- Check for loose objects and condition
	– Loading	- Check for weight and balance, securing
	– Master switch	- ON
	– Avionics switch	- ON
	– Fuel quantity indication	- Check
	– Flap	- Check operation - Select down (for inspection)
	– Lights	- check as needed for the flight - for day-operation set DIMMERs to left
	– Pitot tube heating	- check function (visible by current consumption and notable by warm up. Caution: HOT surface)
	– Avionics switch	- OFF
	– Master switch	- OFF
	– Control system	- visual inspection, function, clearance, free movement up to stops

	– Rudder pedals - set for flight condition according pilot size – Canopy - condition of attachment, cleanness
②	– Engine cowling condition – Propeller, blades and spinner condition (no blade cracks, no leading edge protection damages) – Engine mount and exhaust manifold condition – Oil quantity check /access hatch LH) ***NOTE*** Oil level check requires to open the oil access hatch and remove the oil filler cap. Then the engine is manually rotated slowly in the normal direction of rotation until a gurgling sound is heard. Only then the dip stick correctly indicates the amount of oil. – Visual coolant quantity check (access hatch RH) – Inlets free of obstructions – Nose gear condition
③	– Wing surface condition – Leading edge condition – Stall strips condition – Check actual fuel quantity to correspond to indication (open filler cap) – Check filler cap closing – Check fuel vent openings
④	– Wing tip - surface condition, attachment, light attachment – Aileron - surface condition, attachment, clearance, free movement trim tab condition – Flap - surface condition, attachment, clearance, hinge bolts secure ***NOTE*** The left flap has a one degree offset versus the right flap. The left flap when retracted is about 7mm below the stub wing contour. The right flap is streamlined. – Wing locker - check loading, - inspect drain hole - lock
⑤	– Landing gear - Check for condition damage - wheel attachment, brakes, condition and pressure of tires – Wing lower surface and fuselage bottom surface condition

	– Static port	- no obstructions
⑥	– Vertical tail unit	- condition of surface, attachment, free rudder movement (press tail down to have nose gear free), rudder stops, antenna - check rudder trim tab
	– Horizontal tail unit	- condition of surface, attachment, free elevator movement, elevator stops - check attachment of elevator tips (mass balance) - Check trim/anti-servo tab - Check free movement of tab for full elevator movement
	The check on left side of the fuselage and wing is the same as on right side except on left wing: – Check pitot tube condition	

4.4 Normal procedures and check list

NOTE

As a general rule, the operation of the Rotax 915iSc3 A requires the pilot to allow the engine time to adjust to any new situation imposed on it. Many of the check-list actions are followed by a “check warning light” action which may take a few seconds.

4.4.1 Before engine starting

1. Luggage secured / no loose objects in cabin
2. Rudder pedal position - SET

WARNING

Adjusting of rudder pedals position during flight is PROHIBITED. Make sure the pedals are set symmetrically

3. Safety harness - tighten
4. Control system - free & correct movement
5. Canopy - LOCKED
6. Park brake - SET

4.4.2 Use of external power

NOTE

The external power does not charge the battery. Engine start with a completely depleted battery and no engine indication is not advised.

WARNING

The external power connection and disconnection is only possible with the outside person temporarily out of sight from pilot station. If an outside person is used a clear coordination before the operation between the pilot and the outside help is mandatory. The outside person is advised to always keep one hand on the left wing leading edge as visible sign to the pilot of a save position. Under no circumstances the outside person shall move other than along the leading edge when engine is running. Removal of the external power connection with engine running is not advised.

4.4.3 Engine starting

NOTE

The engine manufacturer limits engine starting to an ambient temperature below 50°C and oil temperature above -20°C. Note that the engine ambient (inside cowling) is not identical to outside air.

NOTE

Engine cranking power surge, especially in cold and low battery state conditions causes supply voltage drop to the indication. To prevent loss of indication during start the back-up battery can be used.

1. Circuit breakers - CHECK
2. Master switch - ON
3. GEN A/B - ON
4. PFD - Wait for boot sequence and confirm fuel QTY matches with pre-flight visual check

NOTE

Fuel qty above 45liter (per tank) is indicated as “45liter”.

CAUTION

The Garmin function of fuel remaining is no trustworthy source of information

5. Voltage M (Batt/ALT C Bus) - Check minimum 12.0V
6. PFD/Baro - Set
7. DIMMER - Adjust

NOTE

The dimming slope of the LED indication lights is set to a lesser effect for master caution and warning which can cause that the other lights which are not illuminated during start-up are set too low.

8. Fuel Selector - set to more empty fuel tank
9. Propeller control - fine pitch (fully forward)
10. Throttle - Closed
11. Strobe light - ON

NOTE

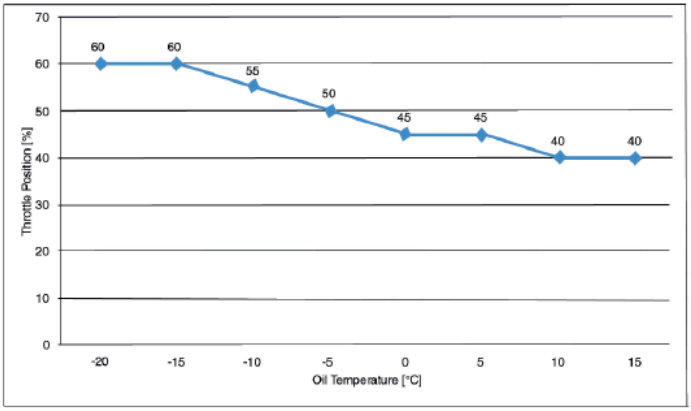
The following Lane switching and fuel pump ON is preparation only. The Lanes and the fuel pump are supplied with electricity only after Start power is selected

12. LANE A - ON
13. LANE B - ON
14. Main fuel pump - ON
15. Start power - ON (HOLD)
16. LANE lamp A and B - wait till OFF
17. Engine indication - check active and correct
18. Fuel pressure - check in limit

NOTE

The power consumption of the strobe lights case a fluctuating sound of the fuel pump

19. Throttle - Set according to figure below



NOTE

Throttle setting is displayed on the engine page of PFD/MFD between manifold pressure and engine speed indication as “T” followed by the value. This indication, after engine start shows engine power in percent.

20. Starter - press activated to start the engine until engine fires
21. Start power - release (OFF)
22. Oil pressure - Check rise within 10sec

23. Throttle - reduce to IDLE
    a. LANE A Lamp - Check (OFF)
    b. LANE B Lamp - Check (OFF)
    c. Pilot Display - Check

NOTE

For ability of failure detection the lane lights when OFF are still powered with a very small current by the ECU. In low light conditions this is visible.

CAUTION

The starter should be activated for a maximum of 10 sec., followed by 2 min. pause for starter and starter circuit cooling.
Start the engine with the throttle in the predefined position. As soon as engine runs, adjust throttle to IDLE. Check the oil pressure, which should increase within 10 sec. Increasing engine speed is only permitted at steady oil pressure readings above 3 bar.

24. Throttle - set 2500 RPM (hold min.10 sec)
25. Voltage M (Batt/ALT C Bus) - Check nominal 13.4V
26. Voltage B (LANE B) - Check nominal 14.0V

4.4.4 After engine start

1. Avionics - ON
2. MFD - Select engine screen
3. ALT C - ON
4. Voltage M - Check increase, nom. 13.8V
5. EFIS (standby) - ON
   Set baro
6. Cockpit lights - as required (Dimmers, Day/night switch)
7. Intercom - Adjust

4.4.5 Engine warmup

8. Throttle - maintain 2500 RPM until oil temp reached 50°C
   - Set IDLE

NOTE

Best cooling in ground condition is not at idle, but at 2500…3000 RPM.

4.4.6 Before Taxiing

9. Nav Light (at night) - as required
10. Landing/Taxi Light - as required

4.4.7 Taxiing

Apply power and brakes as needed. Keep engine speed <2500 RPM until oil temperature reaches 50°C. 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.

Checks during Taxi:

1. Ground control - check nose gear steering
2. Brakes - check function
3. Indication - check attitude and direction indication on PFD/MFD and on standby EFIS

4.4.8 Engine run up

CAUTION

The engine run up 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).

1. Park brake - SET
2. Oil Temperature - minimum 50°
3. Propeller control - set fine pitch (full forward)

4.4.8.1 PUMP AND FUEL SUPPLY CHECK

NOTE

The engine relies on electric fuel pump running. Erroneous switching to a condition with no pump active will lead to practically immediate engine stop.

1. Throttle - Set 3000RPM
2. AUX pump - ON, Check pressure within limits
3. AUX pump light - Check ON

NOTE

The AUX pump indication does show indicate only the electric power to the pump, it does not check actual function. A change in sound can be noticed.

4. Main fuel pump - OFF, Check pressure within limits
5. Main fuel pump - ON

NOTE

The AUX pump stays ON as preparation for take-off.

CAUTION

If the fuel pressure is not within the limits, the cause must be determined. Maintenance action might be required – do not take-off until the problem is rectified.

6. Fuel tank - switch side
7. Fuel pressure - check in limits
8. Fuel tank - select fullest fuel tank

4.4.8.2 Wastegate/PVC/Lane and Prop Check

1. Throttle - Full throttle
   - Check min 5700; max 5800 RPM
2. Manifold pressure - Check within operational limits

NOTE

The development of maximum manifold pressure takes a few seconds.

3. Manifold temperature - Check below 65°C
4. Throttle - Set 4700 RPM
5. LANE A - OFF
   Wait >15 seconds
   Check max. RPM drop 250 RPM
   Check engine parameter in limits

NOTE

When Lane A is OFF (lamp ON) - Loss of data for coolant temperature | Exhaust gas temperatures from cyl. 1-4 | Ambient temp | Throttle lever position

After LANE A is switched on again confirm regain of all indications and LANE A light OFF and wait minimum 3 seconds before continuing with the next step.

6. LANE A - ON (wait min. 3 sec.)
7. LANE B - OFF

Wait >15 seconds
Check max. RPM drop 250 RPM
Check engine parameter in limits

NOTE

When Lane B is OFF (lamp ON) - Loss of data for oil temperature | oil pressure | "B" voltage | fuel flow
After LANE B is switched on again confirm regain of all indications and LANE B light OFF and wait minimum 3 seconds before continuing with the next step.

8. LANE B - ON (wait min. 3 sec.)
9. Propeller control - Cycle 3 times
10. Throttle - IDLE check
11. Throttle - Set 3000 RPM

CAUTION

Engine speed should 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.

NOTE

Best cooling in ground condition is not at idle, but at 2500…3000 RPM.

4.4.9 Before take-off

1. Altimeter/Baro - set
2. Instruments - CHECK
3. Trim - set pitch trim to take-off position
   set roll trim to neutral
4. Control system - check free movement
5. Cockpit canopy - closed & locked
6. Safety harness - tighten
7. Rescue system (if installed) - remove and store safety pin
8. Passenger briefing - explain rescue system (if installed)
9. Engine instruments - CHECK within limits
10. Flaps - Set 10°
11. Autopilot (if installed) - Engage, for each test

○	Flight controls	-	CHECK (verify autopilot can be overpowered in both pitch and roll)
○	AP Disconnect (any trim)	-	PRESS (verify autopilot disengages and audio alert is heard)
○	CWS button	-	PRESS LONG (verify autopilot disengages temporarily)
○	CWS button	-	PRESS SHORT (verify autopilot disengages)

NOTE

Take-off or Landing with Autopilot active is not permitted

4.4.10 Take-off

1.	Brakes	-	release
2.	Propeller control	-	full forward
3.	Throttle	-	full power
4.	Airspeed indication	-	check airspeed “alive”
5.	Nose wheel unstick	-	50 KIAS
6.	Airplane lift-off	-	60 KIAS
7.	Initial Climb	-	70 KIAS
8.	Flaps	-	retract at 75KIAS and no less 150 ft AGL
9.	Climb	-	Vy 82 KIAS

4.4.11 Short and Soft field take-off:

1.	Use all available runway		
2.	Flaps	-	10°
3.	Trim	-	as required
4.	Hold brakes		
5.	Propeller control	-	full forward
6.	Throttle	-	fully forward
7.	Release brakes after full MP and RPM increase		

CAUTION

Beware of engine torque effect

8. Accelerate and pull control stick aft to lift off the nose wheel as soon as possible.
9. As aircraft becomes airborne, level off in ground effect to accelerate to:

   No obstacle: best rate of climb (Flap 10°) 84 KIAS
   Obstacle: best angle of climb (Flap 10°) 68 KIAS
10. Trim - adjust
11. Flaps - retract at no less 150 ft AGL
12. Climb - Vy 82 KIAS

4.4.12 Climb

1. Climbing speed - Vy best ROC speed 82 KIAS
   Vx best angle of climb 66 KIAS
2. Throttle - full forward
3. Prop control - set engine speed
   - max. 5800 RPM for 5 minutes
   - max. continuous 5500 RPM

NOTE

Early reduction of throttle/RPM to reduce noise and engine stress should be considered depending on condition.

4. Trim - trim the airplane
5. Instruments - oil temperature and pressure, coolant temperature within limits
6. AUX Pump - OFF
7. Fuel pressure - Check in limits

4.4.13 Cruise

1. Fuel selector - LEFT or RIGHT.

NOTE

It is recommended to switch between tanks in regular intervals of about 25min during flight to consume fuel equally from both tanks.
An illumination of the low fuel caution light indicates that approx. 5 liters usable fuel are left in the respective tank giving a 12min remaining flight time on the respective tank at moderate power settings.

2. Throttle - Set as desired
3. Prop control - Set engine speed maximum 5500 RPM

4. Fuel flow - Check

NOTE

Throttle and propeller control position is held by a friction system. Failure of the friction system or creeping control setting warrants according maintenance action.

Refer to Chapter 5.3.2, for recommended cruising power settings.

4.4.14 Descent

1. Throttle - Reduce (15...17”Hg)
2. Prop control - Set engine speed maximum 5000 RPM
3. Airspeed - Set (90..100KIAS)

CAUTION

It is not advisable to reduce the engine throttle control lever to minimum when descending from very high altitude. In such cases the engine temperatures get too low and a loss of power may occur. Descent at 15..to 17inHg manifold pressure and airspeed of 90KIAS to 100KIAS results in approximately 500ft/min descent

CAUTION

Descending for extended periods of time at higher RPM can lead to exceeding EGT maximum limit. Reduce RPM accordingly.

4.4.15 Before landing

1. Seat belt - Tighten
2. Cockpit - Prepare
3. Autopilot - Disengage
4. Throttle - as required
5. Speed - 83 KIAS
6. Flaps - Set 10°
7. Trim - as needed
8. Landing light - ON
9. AUX pump - ON

In final approach:

10. Flaps - Set 25°
11. Speed - 60 KIAS
12. Trim - as needed
13. Prop Control - Set MAX (forward)
14. Throttle - Set approx. 7inHG, Maintain RPM>2600

4.4.16 Balked landing (Go around)

1. Throttle - full forward
2. Speed - accelerate to 70KIAS
3. Flaps - Set 10°
4. Trim - adjust as needed
5. Flaps - retract at 75KIAS and no less than 150ft AGL
6. Climb - Vy 82 KIAS
7. Continue with normal take off and climb procedures

4.4.17 Landing

1. Throttle - close
2. Touch-down - on main wheels
3. Brakes - Apply as needed
4. Flaps - Retract

4.4.17.1 Short field landing:

1. Throttle - fully close before flare
2. Touch down - on main wheels
3. Flare - minimum float
4. After touchdown - stick release
5. Brake - max brake
6. Flaps - Retract

4.4.17.2 Soft field landing:

1. Touch down - on main wheels
2. Flare - expect excessive ground friction.
   To avoid violent nose gear drop add power before touchdown to keep elevator effective to help keep weight off nose wheel,

3. After touchdown - throttle to idle
   gradually increase back elevator to keep weight off nosewheel
   Avoid braking during roll out
4. Retract flaps

4.4.18 After landing

1. Engine speed - SET as required for taxiing
2. Landing light - as required for taxi

4.4.19 Shutdown

1. Propeller control - FINE PITCH (fully forward)
2. Engine speed - IDLE
3. Instruments - engine instruments within limits
4. ALT C - OFF
   check Volt M no less than 13.4V

NOTE

If voltage drop is excessive it indicates a GEN B failure which as such is not detected by the ECU.

5. Cooling down - minimum 2 minutes
6. LANE A - OFF
7. Wait 3sec - Lane A lamp ON
8. LANE B - OFF
9. Aux fuel pump - OFF
10. Main fuel pump - OFF
11. Avionics - OFF
12. EFIS - OFF
13. Lights - OFF
14. GEN A/B - OFF
15. Master - OFF
16. Park brake - SET

4.4.20 Aircraft parking and tie-down

1. LANE switches check - OFF
2. Master switch check - OFF
3. Parking brake - SET

4. Canopy - CLOSE and LOCK
5. 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. Make sure that the cockpit canopy is properly closed and locked.

4.4.21 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

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

The data in the charts has been computed from actual flight tests with the aeroplane and engine in good condition and using average piloting techniques.

In this section the term

- maximum continuous power MCP is synonym with wide open throttle (WOT) at engine speed of 5500 RPM
- maximum take-off power MTOP is synonym with wide open throttle (WOT) at engine speed of 5800 RPM

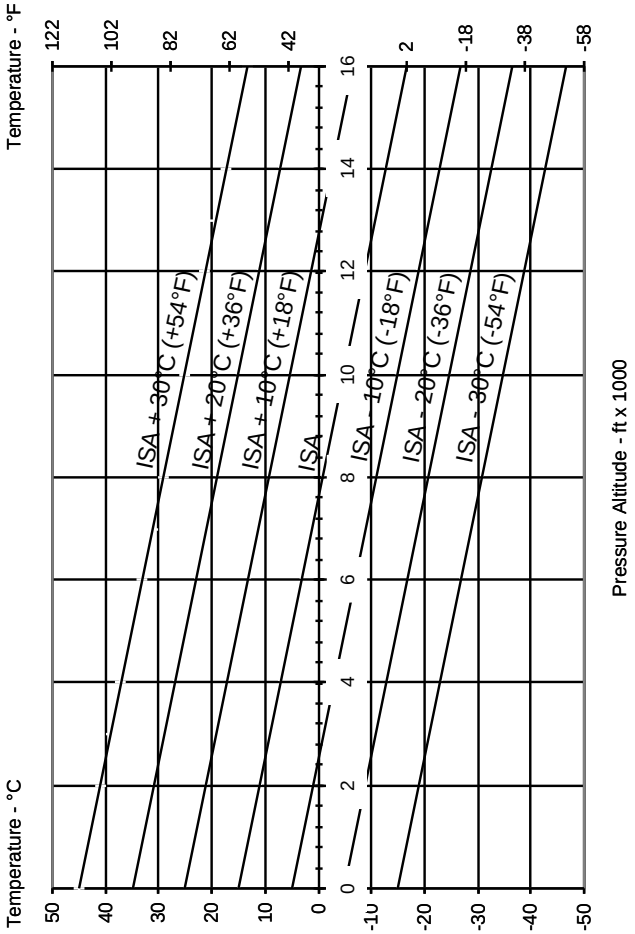
Unless otherwise specified all data given refers to standard day condition (ISA) at zero wind speed.

Unless otherwise specified altitude depending data is given over density altitude which is a function of pressure altitude and outside air temperature.

The B23-915 offers performance enabling regular and efficient use of higher flight altitude. The required provision of oxygen is pilots responsibility, for provisions refer to section Oxygen. Usage of an SPo2 sensing device is recommended.

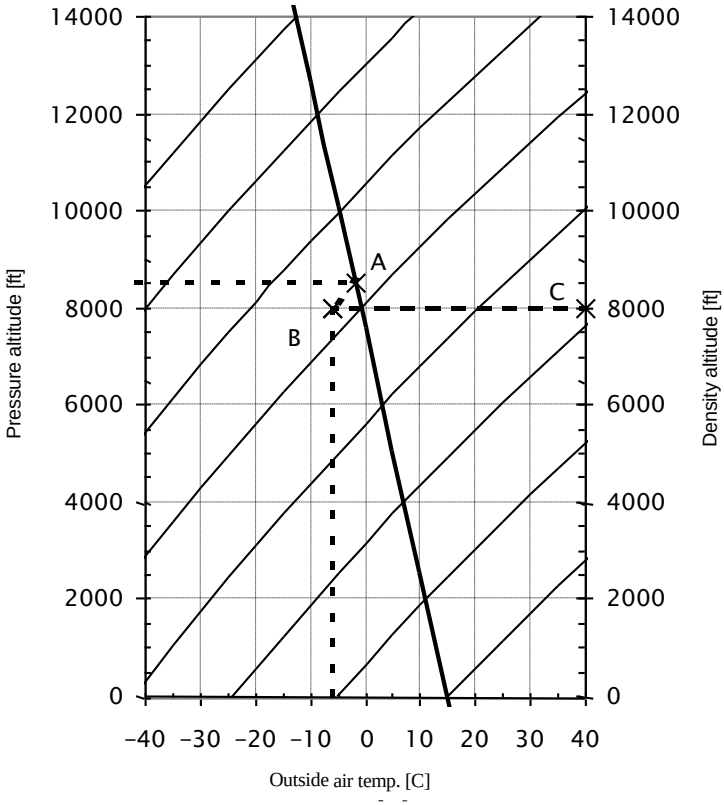
5.1.1 ISA Conversion

The offset from ISA condition can be determined with actual outside temperature and pressure altitude using the following diagram.



5.1.2 Pressure to density altitude conversion

Procedure:
A.) determine pressure altitude by ISA-conversion
B.) determine intersection of outside air temperature with isobar line
C.) read density altitude on right side of diagram
Example: pressure altitude = 8500ft, outside air temp. =-6C; result: density altitude = 8000ft



5.2 Approved data

5.2.1 Airspeed indication system calibration

The airspeed indication system error is depending on power setting but not noteworthy influence by the wing flap setting.

General the indicated airspeeds are higher than the calibrated airspeed. For low airspeed with engine idle the error is less than 1 knot, but for high power settings the error is significant at low speeds. At high speed the power influence diminishes. Both power ON and OFF error are 2-3KTS.

	KIAS Power OFF	KIAS Power ON	KCAS
VS0	43	52	43
	47	55	47
VS1 (Flap 0)	50	57	50
	55	61	55
	60	65	60
	70	74	70
VFE	82	84	81
	91	93	90
VA	99	101	98
	111	113	110
	121	123	120
	132	133	130
VN0	137	138	135
	142	143	140
	146	147	144
	152	153	150
VNE	158	159	156
	Max 193 KTAS		

NOTE

Data presented assumes the error of the indicator itself being zero

5.2.2 Stall speeds

Wing level stall speeds are based on flight testing.

Turning flight stall speeds are computed from wing level stall speeds and load factor developed at turn.

CONDITIONS: MTOW 750 kg Engine at idle	Wing flaps position	Stall speed		Altitude loss at recovery
	[°]	KIAS	KEAS	[ft]
WING LEVEL STALL	0	50	50	260
	10	46	46	280
	25	43	43	280
CO-ORDINATED TURN, 30° BANK	0	54	54	220
	10	49	49	220
	25	46	46	220

5.2.3 Performance reference values

Flaps 0°

(Sea level, ISA conditions, 750kg, MCP 5500 RPM)

V_Y	82	kIAS
Best ROC (sea level)	1211	ft/min
V_X	66	kIAS
Best angle of climb (sea level)	17.3%, 9.8°	
V_H (sea level)	134	kIAS
Best glide speed	65	kIAS

(Sea level, ISA conditions, 750 kg, MTOP 5800rpm)

CAUTION
MTOP (5800 RPM) may be used for max 5min!

Best ROC speed	83	kIAS
Best ROC (sea level)	1259	ft/min
Best angle of climb speed	66	kIAS
Best angle of climb (sea level)	17.8%, 10.0°	

Flaps 10°

(Sea level, ISA conditions, 750kg, MCP)

Best ROC speed	83	kIAS
Best ROC (sea level)	1146	ft/min
Best angle of climb speed	67	kIAS
Best angle of climb (sea level)	16.0%, 9.1°	

(Sea level, ISA conditions, 750 kg, MTOP 5800 RPM, balked landing performance)

Best ROC speed	84	kIAS
Best ROC (sea level)	1195	ft/min
Best angle of climb speed	68	kIAS
Best angle of climb (sea level)	16.4%, 9.3°	

5.2.4 Take-off performance

Take-off distances are based on flight test at MTOW corrected for ISA/SL conditions.

Conditions:

Wind..... NIL
Runway.....dry and level
Flaps..... Take-off 10°
Brakes.....held while applying the power
Throttle..... full
Speed at 50ft height.....70 KIAS

Take-off run distance		Take-off distance over 50 ft (15 m) obstacle	
m	ft	m	ft
176sure	577	331	1086

Correction factors for varying conditions

Factors to be applied to take off distance over 50ft
Grass Runway 1.14
Uphill slope (per each 1 % of slope) 1.05
Downhill slope (per each 1% of slope) 0.95
Decrease distance per 5KTS headwind.....15%
Increase distance per 5KTS tailwind.....20%

Take off performance dependent on altitude and temperature

TOW = 750 kg	Field Altitude [ft]	Outside air temperature [° C]				
		ISA – 20	ISA – 10	ISA	ISA +10	ISA + 20
Ground Roll [m]	0	149	162	176	191	208
	2000	174	191	208	229	252
	4000	208	230	254	282	314
	6000	253	283	319	360	411
Distance to clear a 15-m obstacle [m]	0	272	301	331	363	397
	2000	321	352	385	421	460
	4000	376	411	450	493	540
	6000	441	484	532	588	653

5.2.5 Landing distances

Landing distances are based on flight test at MTOW corrected for ISA/SL conditions.

Conditions:

Wind..... NIL

Runway.....dry and level

Flaps.....Landing 25°

Final approach speed .....58 KIAS

Landing distance from over 50 ft (15 m) obstacle		Landing distance Ground roll	
m	ft	m	ft
391	1283	146	479

Correction factors for varying conditions

Factors to be applied landing distance over 50ft

Grass runway.....1.18

Uphill slope (per each 1 % of slope) 0.95

Downhill slope (per each 1 % of slope) 1.05

Wet runway.....1.15

Decrease distance per 5KTS headwind.....5%

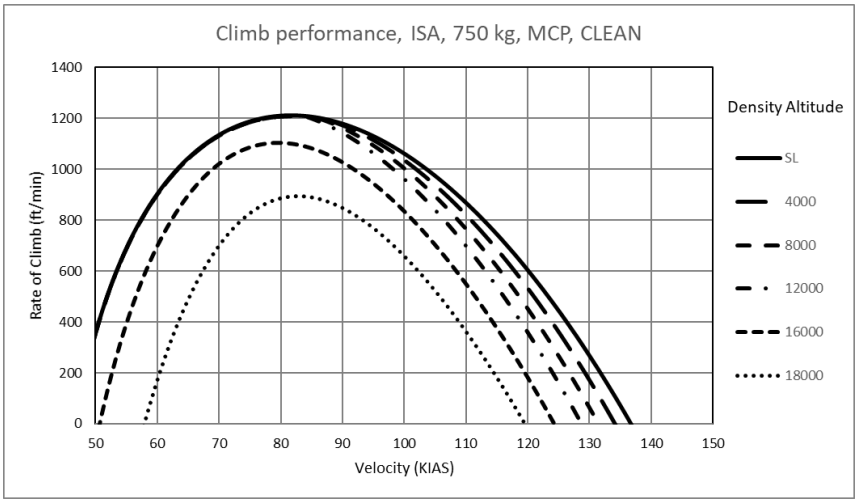
Increase distance per 5KTS tailwind.....10%

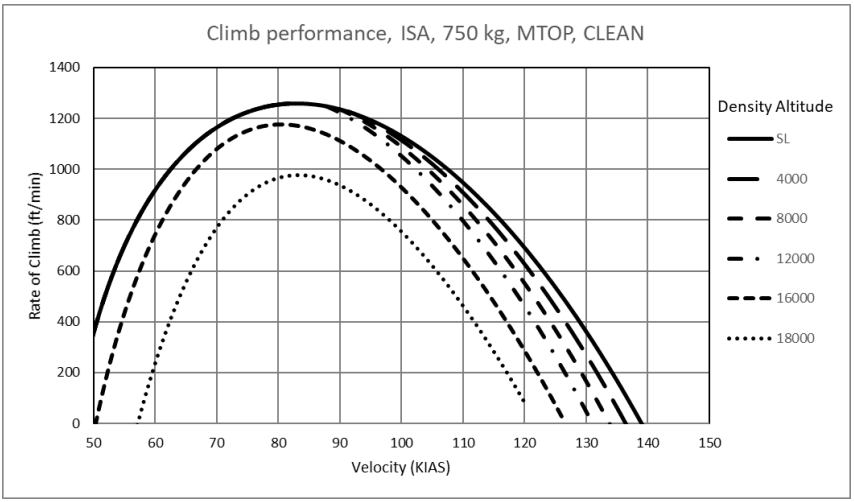
Landing distances depended on altitude and temperature

Landing weight = 750 kg	Field Altitude [ft]	Outside air temperature [° C]				
		ISA – 20	ISA – 10	ISA	ISA +10	ISA + 20
Ground Roll [m]	0	136	141	146	151	157
	2000	146	151	157	163	169
	4000	157	163	169	175	182
	6000	169	175	182	189	196
Distance to clear a 15-m obstacle [m]	0	362	376	391	405	419
	2000	389	405	420	436	451
	4000	419	436	453	469	485
	6000	452	470	488	505	523

5.2.6 Climb performance

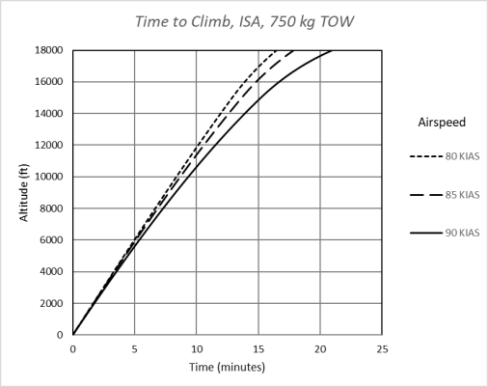
Climb performance, Flaps 0°





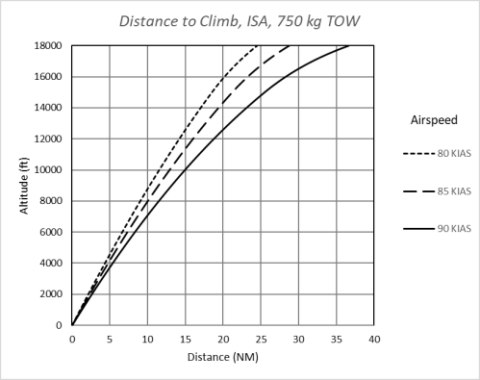
CAUTION

MTOP (5800 RPM) may be used for max 5min!



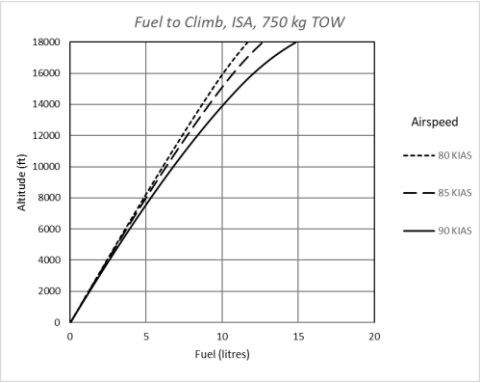
Condition MCP

Note: the shortest possible time to a given altitude requires permanent adjustment of airspeed along line of best rate of climb, see climb performance graph



Condition MCP

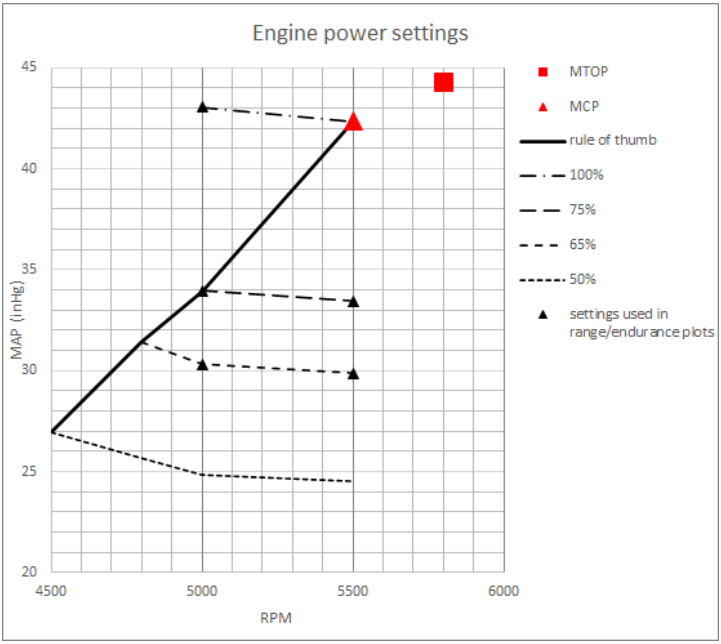
Note: the shortest possible distance to a given altitude requires permanent adjustment of airspeed along line of best angel of climb, see climb performance graph



Condition MCP

5.3 Additional information

5.3.1 Engine power settings



Engine power is displayed in percent [%] on the engine page of the PFD/MFD between manifold pressure and engine speed indication

NOTE

Useful rule of thumb for power setting:

$MAP_{(recommended)}$ = RPM/100*1.5-42

100% MCP @ 5500RPM (MAP = 40.5in)

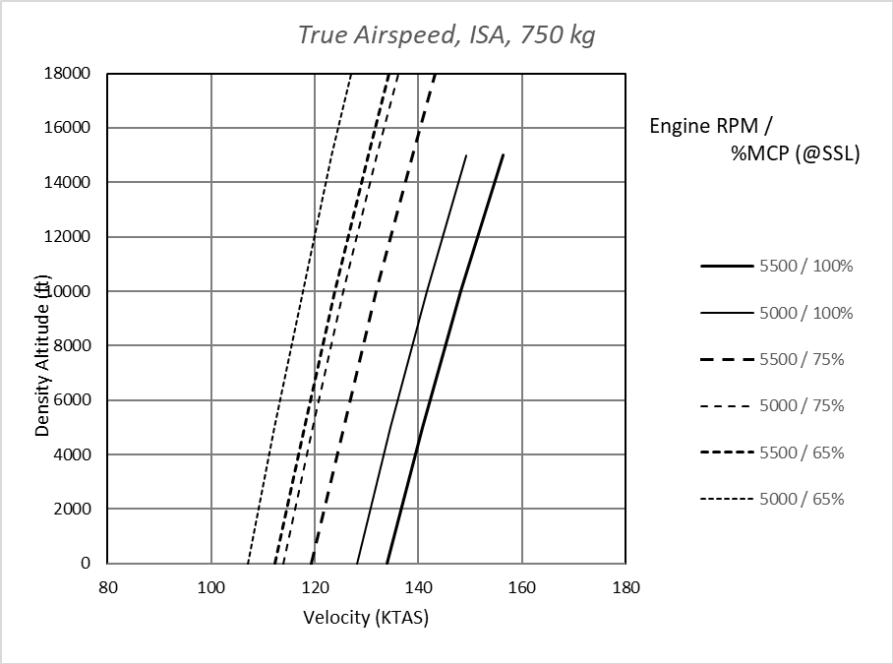
75% MCP @ 5000RPM (MAP = 33.0in)

50% MCP @ 4500RPM (MAP = 25.5in)

NOTE

Engine power is not equal to available thrust power due to the propeller efficiency varying with engine and airplane speed.

5.3.2 Cruise



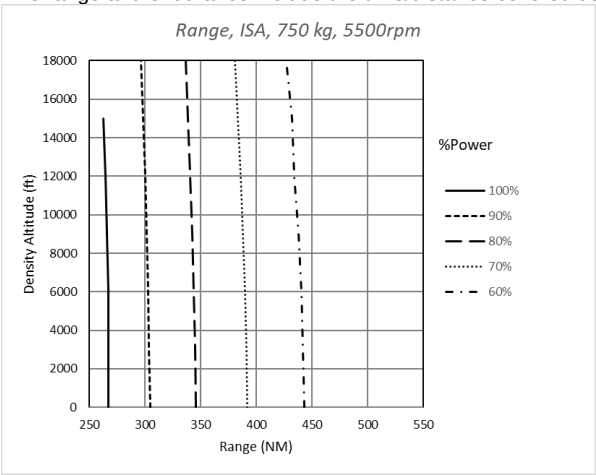
NOTE

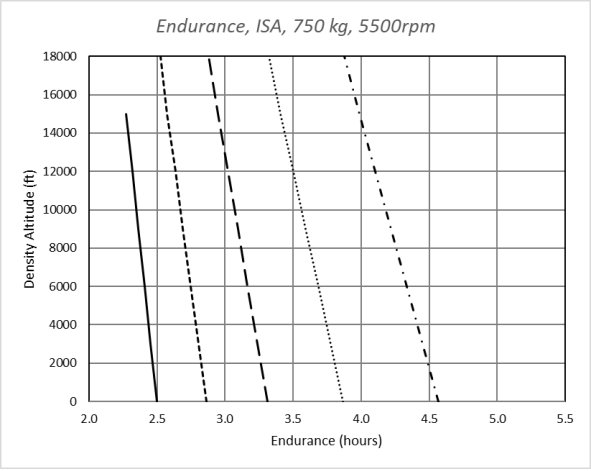
100%pwr is not available at 18.000ft due to the physical limitations of the turbo

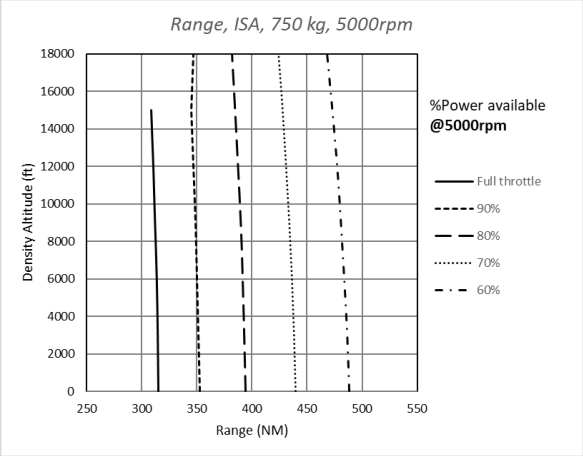
5.3.3 Endurance

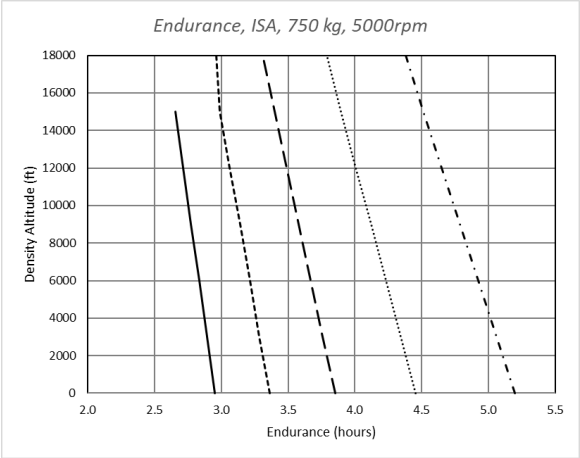
Conditions:

- No specific allowance of fuel burn for start-up and taxi
- Initial climb to altitude @ MCP (full throttle, 5500 RPM)
- Initial climb-out at V_Y
- Descent fuel flow 20l/h
- 30 minutes reserve (fuel flow corresponding to the range/endurance point)
- The range and endurance include the time/distance covered during climb

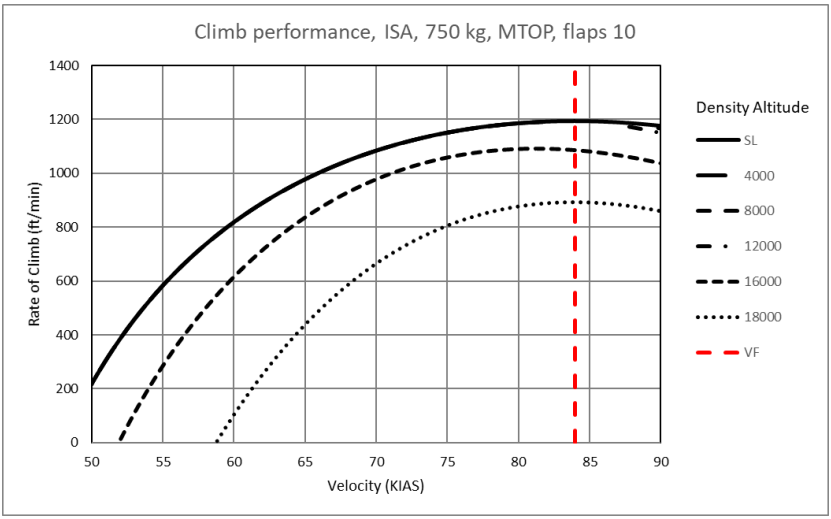





Range, ISA, 750 kg, 5000rpm
Density Altitude (ft)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
250
300
350
400
450
500
550
Range (NM)
%Power available
@5000rpm
Full throttle
90%
80%
70%
60%


Endurance, ISA, 750 kg, 5000rpm
Density Altitude (ft)
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
Endurance (hours)

5.3.4 Balked landing climb



Refer to 5.2.3 for reference data

5.3.5 Effect on flight performances and characteristics caused by rain or accumulation of insects.

Performance data in this flight manual has been determined with an airplane in good condition but without surface painting. During flight test no noteworthy degradation due to wet or dirty aircraft has been noted neither in performance nor in flight characteristics.

The lifting surface cross sections employed on the B23 are not known to be specifically susceptible to such degradation.

5.3.6 Demonstrated crosswind performance

Maximum demonstrated crosswind speed: **15kts**

NOTE

The stated cross wind component may or may not be limiting. Actual use of the airplane in high crosswind condition is subject to pilot skill.

5.3.7 Noise data

The noise level of the B23-915, according to ICAO Annex 16, Chapter X, amounts to 64.9dB(A).

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SECTION 6

6 WEIGHT AND BALANCE

6.1 Introduction

This section contains information about the aircraft empty weight and centre of gravity as well as the procedure for its determination.

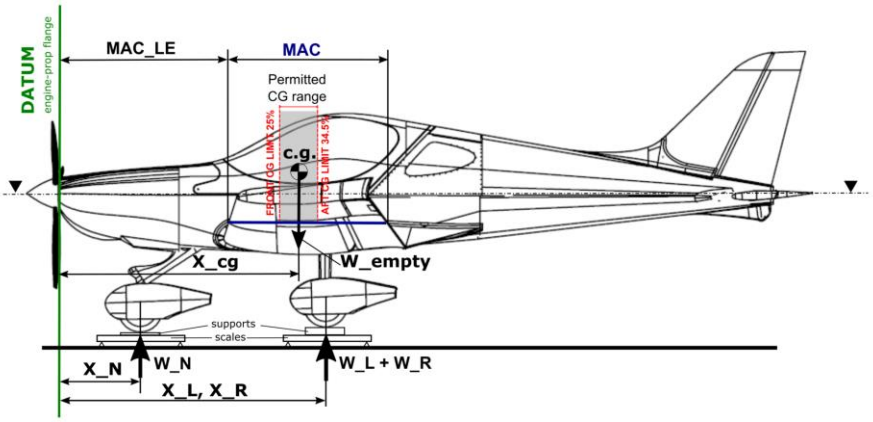
In addition, the method for determination of airplane operational weight and balance is given.

The range within the airplane may be safely operated is defined in section 2 „Limitations“

6.2 Definitions

The basic airplane empty weight is defined as the empty aircraft with full engine operational required fluids (oil and coolant) as well as with the amount of unusable fuel in the fuel tanks (2*4liter).

The centre of gravity lever arms relate to the airplane datum located at the propeller plane. Airplane level attitude is defined as the fuselage top rivet row just below the canopy frame.



Nominal geometric lever arms and lengths are:

Nose gear ground contact X_N	0.588	m
Main gear ground contact X_L, X_R	2.062	m
MAC	1.343	m
MAC Leading edge (MAC_{LE})	1.377	m

CG-locations:

Fuel	1.600	m
Luggage in wing locker	2.025	m
Occupant	2.085	m
Luggage in lower aft area	2.520	m
Luggage in upper aft area	2.800	m

6.3 Airplane weighing procedure

Procedure:

1.) Prepare aircraft by off-loading any luggage and loose items which are not part of the standard equipment
2.) Check coolant and oil filled, replenish if needed
3.) Drain fuel
4.) Level airplane on scales (reference upper rivet row below canopy frame)
5.) Determine individual weight on all three gears (W_N, W_L, W_R)
6.) Check gear lever arms (X_N, X_L, X_R; reference propeller flange X=0.0m, or firewall X=0.960m).
7.) Calculate Empty Weight:

$$W_{empty} = W_N + W_L + W_R$$

8.) Calculate Empty airplane moment:

$$M_{empty} = WN*X_N + W_L*X_L + W_R*X_R$$

9.) Calculate Empty Airplane CG:

$$CG_{empty} = M_{empty}/W_{empty}$$

10.) Record date, empty weight, moment and CG in the weight and balance record sheet (next page).

6.4 Empty aircraft weight and balance record

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

Type	BRISTELL B23	Serial. No.:																		
Date	Item No.	Description of part or modification	Weight change								Basic weight of empty airplane									
			Added (+)			Removed (-)														
			Weight (kg)	Arm (m)	Moment (kg.im	Weight (kg)	Arm (m)	Moment (kg.m)			Weight (kg)	Moment (kg.m)								
	+	Manufactured airplane																		
	-																			

6.5 Loaded Aircraft Weight and CG

Loaded aircraft weight and balance is determined by summing individual masses and moments and calculating according flight condition for actual fuel and zero fuel. Results shall be entered in the graph of permissible range.

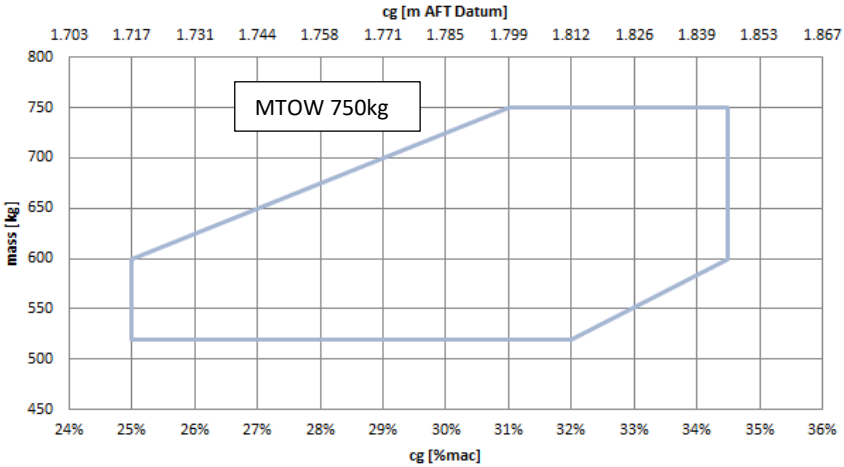
To do so the following blank form and graph should be used:

1	ITEM	WEIGHT (kg)	ARM (m)	MOMENT= WEIGHT x ARM (kg.m)
EMPTY AIRCRAFT (weighing result)	RIGHT MAIN WHEEL		2.062	
	LEFT MAIN WHEEL		2.062	
	NOSE WHEEL		0.588	
	EMPTY AIRCRAFT	**SUM =**	**X_{CG} = SUM M / SUM W**	**SUM =**

2	ITEM	WEIGHT (kg)	ARM (m)	MOMENT= WEIGHT x ARM (kg.m)
AIRCRAFT WITHOUT WING LOAD	EMPTY AIRCRAFT			
	PILOT & PASSENGER		2.085	
	BAGGAGE – BEHIND SEATS		2.520	
	ZERO WING LOAD AIRCRAFT	**SUM =**	**X_{CG} = SUM M / SUM W**	**SUM =**

3	ITEM	WEIGHT (kg)	ARM (m)	MOMENT= WEIGHT x ARM (kg.m)
LOADED AIRCRAFT	ZERO WING LOAD AIRCRAFT			
	BAGGAGE – WING LOCKERS		2.025	
	FUEL weight = qty*0.72kg/liter		1.600	
	LOADED AIRCRAFT	**SUM =**	**X_{CG} = SUM M / SUM W**	**SUM =**

The result of step 2 and 3 must be checked versus the limitations (check graph on next page).



$CG_{(\%MAC)} = \frac{X_{CG} - MAC_{LE}}{MAC} * 100$; with MAC = 1.343m and MAC_{LE} = 1.377m

6.6 Equipment list

List of equipment installed in BRISTELL B23-915

Equipment	Req, Opt	Installed = X, Instal. date	Mass [kg]	Location X [m]
Engine section				
Engine Rotax 915iSc3 A (dry weight)	1 Req.	X	101	0.36
Propeller	1 Req.	X	10.00	-0.117
Governor Jihostroj P-110-051/A	1 Req.	X	1.000	0.246
Fuel pump assy. ROTAX 889698 without pump housing/cover	1 Req.	X	1.070	1.550
Fuel check valve	1 Req.	X	0.040	0.915
External Alternator	1 Req.	X	3.000	0.091
Cabin				
Seat belt harness	2 Req.	X	2* 0.81	2.308
Emergency exit hammer	1 Req.	X	0.150	2.107
Instrument panel				
Garmin PFD GDU460	1 Req.	X	2.090	1.548
Garmin MFD GDU460	1 Req.	X	2.090	1.548
L3 ESI-500	1 Req.	X	0.925	1.521
Garmin Autopilot control GMC307	1 Opt.		0.227	1.553
Garmin GNC 255 NAV/COM	1 Req.	X	1.370	1.411
Garmin GTX 345 XPDR	1 Req.	X	1.245	1.457
Compass Airpath C2400	1 Opt.		0.290	1.559
Glareshield lights with Dimmer	1 Req.	X	0.055	1.67
Elevator Trim indication	1 Req.	X	0.035	1.552
Aileron Trim Indication	1 Req.	X	0.035	1.552
Intercom PM3000	1 Req.	X	0.259	1.518
In front of instrument panel				
AEPS System (complete; if installed)	1 Opt.	X	14.380 12.00	1.080 1.015
Garmin engine indication GEA24	1 Req.	X	0.318	1.371
Garmin ADHARS GSU25C	1 Req.	X	0.235	1.504

Equipment	Req, Opt	Installed = X, Instal. date	Mass [kg]	Location X [m]
Overvoltage voltage protection	2 Req.	X	0.145 0.145	1.31 1.38
Encoding altimeter	1 Req.	X	0.180	1.331
Backup Battery IBBS 6AH	1 Req.	X	0.967	1.125
Floor area				
AP Servo Garmin GSA28	2 Opt.	X X	0.614 0.614	1.858 1.943
Wing				
Garmin GAP26 pitot tube / AoA	1 Req.	X	0.177	1.78
NAV/Strobe lights	1R req. 1G Req.	X X	0.235 0.235	2.551 2.551
Landing light	2 Req.	X	0.183	1.522
L3 Magnetometer MAG-500	1 Req.	X	0.135	1.677
Garmin Magnetometer GMU22	1 Req.	X	0.227	1.677
Gear/Brakes				
Nose wheel 5.00-5”	1 Req.	X	4.195	0.603
Main Wheel 5.00-5”	2 Req.	X	4.205	2.067
Wheel brakes Berringer	2 Req.	X	0.975	2.106
Nose gear suspension damper	1 Req.	X	0.605	0.925
Brake cylinder	4 Req.	X	0.100	1.089
Brake fluid reservoir	2 Req.	X	0.050	0.916
Retrofits/Additions				

NOTE:

“Optional” refers to the commercial aspects. Equipment required for a specific operation mode is defined in Limitation section 2.17

SECTION 7

7 AEROPLANE AND SYSTEM DESCRIPTION

7.1 Introduction

This section provides description and operation of the aeroplane and its systems. Refer to Section 9, Supplements, for details of optional systems and equipment.

7.2 Airframe

The main airframe of Bristell B 23 aircraft is an aluminium metal riveted structure.

7.2.1 Wing

The wing is an all-metal structure with 2 spars. The centre section of the wing is an integrated part of the fuselage. The outer part of the wing consists of nine ribs and has trapezoid shape. There are 3 main attachments (positioned on the main spar) and one rear attachment (positioned on the rear spar) where outer wing is joined with the centre section.

Fuel tanks are installed in front of the main spar on the inner third of the outer wing.

Winglets are produced from fibreglass and are riveted on the end of the wing skin. Position lights and anti-collision beacons are installed on the winglets.

Both ailerons and flaps are all-aluminium structures. They consist of skin and ribs (and spar-flaps) riveted together. Ailerons are suspended on the rear spar of the wing using piano hinges. Flaps are suspended on the rear spar on three hinges.

The aileron control pushrods are led between the spars. The aileron trim tab is installed on the left aileron. The trim tab actuator is installed inside of left aileron.

There is one common flap control actuator which is installed in the fuselage between the seats and beneath the glove box. It actuates a central torsion tube to transmit the force to the flap actuation lever located at the flap inboard root.

Wings are equipped with wing lockers placed between the second and the third rib aft of the main spar. Capacity of each wing locker is 20 kg. Access doors are suspended on two hinges. They can be locked with a latch.

Wing locker drain holes shall be inspected regularly to avoid unnoticed accumulation of water.

The wing leading edges feature stall strips to provide benign stall characteristics. Stall strips are symmetric in spanwise extension, but not symmetric in placement along the cross section.

7.2.2 Fuselage

The fuselage all-aluminium structure design is formed by bulkheads, stiffeners and surface sheets. The fuselage consists of the front part (between firewall and bulkhead aft of the rear windows) and the rear part (aft of the beforehand mentioned bulkhead).

Cockpit with carbon/aramid composite seats is located in the front part of the fuselage. The luggage compartment (capacity max 15 kg) is located behind the seats.

The centre section of the wing is an integral part of the fuselage and contains the main spar attachments and the rear spar attachments. Main landing gear attachment points are located behind the main spar.

Top engine mount attachment points are located on the cross channel (transversal beam) behind the firewall. Bottom attachment points are located on the cockpit floor and connected with reinforcement channels under the floor.

The cockpit further consists of a composite structure canopy frame with an integrated back-rest for pilot and co-pilot.

The rear part of the fuselage has an elliptic cross section. The fin with rudder attachments and stabilizer attachments is an integral part of the fuselage. The last two bulkheads form the stabilizer attachment points.

A tail skid is located on the bottom aft fuselage. It is made from composite material.

7.2.3 Stabilizers, flaps and movable control surfaces

The horizontal stabilizer is an all-metal structure consisting of two aluminium spars, eight ribs and aluminium skin. It is mounted on the fuselage by means of front and rear attachments. The front attachments consist of two pins - riveted on the second last bulkhead, and bushings - riveted on the front stabilizer spar. The rear attachments consist of four hinges bolted on the top and the bottom part of the last bulkhead, and riveted to rear stabilizer spar.

The elevator is attached to the rear spar of the HST using a piano hinge. The main structure is made of aluminium and consists of ribs and skin riveted together. Control lever is riveted between the middle elevator ribs. Fiberglass elevator tips equipped with mass balance are riveted on the both elevator ends. The elevator is equipped with the trim tab, which is suspended on a piano hinge on the rear spar close to the trailing edge of the elevator. The trim tab is made of aluminium and is actuated by a RayAllen electric drive integrated in the horizontal stabilizer. The trim tab also acts as anti-servo tab, increasing the stick forces with increasing deflection of the elevator. When moving the elevator the trim tab makes an additional deflection into the same direction.

The vertical fin is an aluminium structure and is an integral part of the fuselage. The fin consists of stiffeners, spar, ribs, and aluminium skin. Individual parts are riveted together. Fin tip is made of fibreglass. Two rudder hinges are integrated on the vertical spar.

Rudder is an aluminium structure and consists of spar, ribs and skin riveted together by rivets. Bottom attachment is riveted to the root rudder rib. Top attachment is located on the spar.

The flaps are likewise all aluminium. Rigging of the flaps is correct with the left flap 8±1mm below the corresponding stubwing surface and the right flap in line.

7.3 Flight controls

Control System consists of an aluminium pushrods system (machined bell cranks) with a steel torque tube for aileron and elevator.

Rudder Control System consists of steel cable and pulley system. The rudder control is also used for nose gear steering in a closed loop system.

7.3.1 Aileron control and aileron trim

Ailerons are actuated with two control sticks located between the pilot's and co-pilot's legs. Movement of the control sticks is synchronized via pushrod lead between the inside of the elevator control torque tube. Lateral control stops are located on the torque tube in the cockpit.

The ailerons have differential actuation, to minimize the unwanted secondary yawing caused by aileron deflection.

The aileron trim tab is installed on the left aileron. It is controlled by the actuator located inside of the left aileron. Control switches are integrated into both stick grips.

A LED position indicator is installed on the instrument panel in the pilot's view field (independent from EFIS). The aileron trim position light intensity can be dimmed by a fixed value using the day/night switch.

7.3.2 Elevator control and elevator trim tab control

The elevator is controlled by moving the control sticks forward and aft. A system of transmission levers and pushrods transfers the movement of control sticks to the elevator.

An electric actuator is installed in the horizontal stabilizer. It is used to control the elevator trim tab. Control switches are integrated in both stick grips.

A LED position indicator is installed on the instrument panel in the pilot's view field (independent from EFIS). The elevator trim position light intensity can be dimmed by a fixed value using the day/night switch.

The elevator trim tab serves as anti-servo-tab for the elevator, it co-moved with the elevator to enhance control force.

7.3.3 Rudder control

The rudder is controlled by means of foot control pedals. Pedal deflections are transferred to the rudder by a cable-pulley system.

Foot control pedals can be set individually to two positions (large and small pilot) by means of a lock-pin mechanism on the side wall of

fuselage under the instrument panel. Setting of the rudder pedals in flight is not permissible. Non-symmetric settings (i.e. left pedal back, right pedal front) is mechanically possible but not approved for flying. The pilot upon boarding shall check the correct symmetric pedal setting.

The pedals also control the nose gear steering.

The rudder is equipped with a fixed trim tab.

7.3.4 Wing flap control

Wing flaps are controlled by one central electric actuator connected to the flaps by a lateral torque tube with transfer pushrods on each side of the wing. The flap actuator is located in the centre channel of fuselage between the seats and is controlled by programable control unit with three positions switch (including “up”) located on the centre console. An LCD indicator is integrated to the control unit for confirmation of the positions (and transition - blinking). Wing flaps deflection can be 0°, 10°, and 25°. Additional end switches protect the system. The handle of the flap control is shaped to prevent LED reflections in the canopy. While moving the handle to the next positions reflections might be noticeable at night.

The LED brightness is adjusted by operating the right hand dimmer control.

WARNING

If the flap lever is moved while the master switch is OFF, the flap will not move to the indicated position after switching on the master. Therefore, always perform a flap operation check, as per the standard procedures after switching on the master.

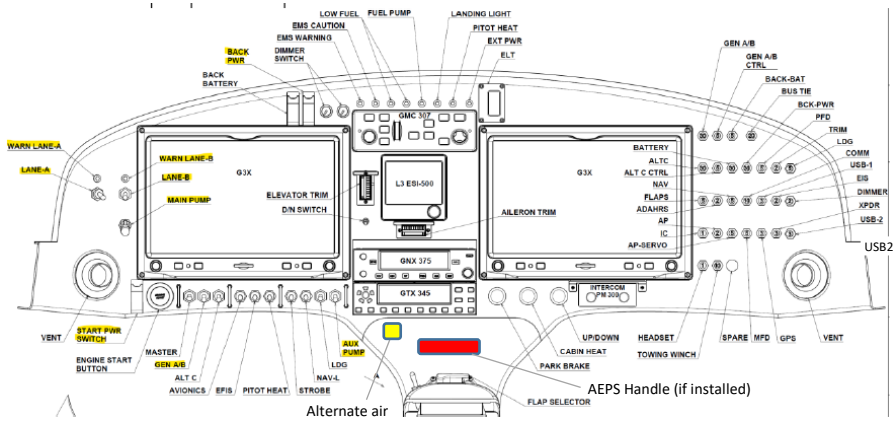
NOTE

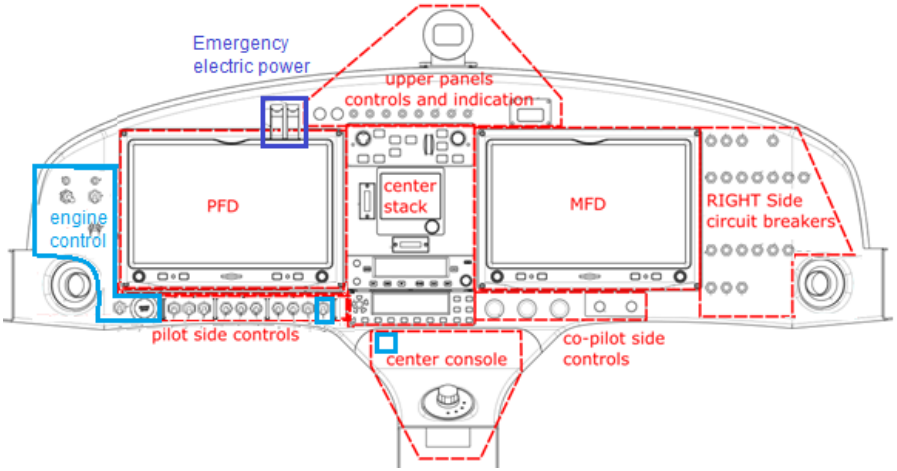
The left flap has a one degree offset versus the right flap. This is visible with retracted flaps. The left flap has a correct position of 8±1mm below the stub wing contour. The right is fully streamlined

7.3.5 Nose wheel control

Turning of the nose wheel fork is controlled through a dual Teleflex rod (push/pull cable) which has its bottom end connected to the top of the nose wheel fork, and its upper end connected to a lever welded to the rudder control system. The nose landing gear / rudder control has a closed loop (with centring springs) system located in the same channel where the nose landing gear mounts.

7.4 Instrument panel and glare shield





7.4.1 Upper panel controls and indication

On the upper centre panel switches and annunciator lights are mounted from left to right:

- Backup battery switch
- Backup power switch (engine)
- Dimmer for glareshield light
- Dimmer for flap system and intercom LED and warning/caution/indication LED (not External power).
- RED, EMS master warning
- AMBER, EMS master caution

  Master warning and caution illuminate with related relevant warning or caution triggered by the Garmin system - for details check Garmin PFD and MFD displays.
- AMBER; LOW FUEL Left
- AMBER; LOW FUEL Right

  The low fuel light is triggered with less than 5liter usable fuel in the respective tank. This system is electrically independent of the fuel QTY indication. In case of conflicting information landing is advised as soon as practical.
- GREEN; AUX pump ON

  The AUX fuel pump ON light is triggered by the power supply to the electric pump – actual pump function of pressure built up must be checked using the fuel pressure indication.
- GREEN; Landing light ON

  The landing light on is triggered by the landing light power supply in both, WIG/WAG and ON mode.
- GREEN; Pitot Heat ON

  The pitot heat ON light is triggered by the power supply to the heating element – it does not sense actual current or temperature built up. This must be checked in pre-flight inspection.
- BLUE; External Power ON

  The external power ON light is triggered by the connected external power. Never taxi with the External power light illuminated.
- ELT; Control unit with Status light

Failure of the dimmer unit or its power supply results in inoperative warning/caution and indication lights. Power supply can be restored with the backup battery.

7.4.2 Left side instrument panel

- Controls
  - LANE A lamp / LANE B lamp
  - LANE A switch / LANE B switch
  - Main pump switch
- Features
  - Vent outlet; rotate to open and close, adjust for comfort

7.4.3 Pilot side controls

- Primary Flight Display (PFD) with touch and control knobs

Left to right:

- start power switch (spring loaded) | starter button
- Three groups of controls are located on the lower left instrument panel.

Master switch arrangement | Avionics | Lights and aux pump

Those controls are switches and combined switch circuit breakers

The landing lights are controlled by a three position switch as follows:

ON (UP)

WIG/WAG (centre) (left and right light illuminate alternating)

OFF (DOWN)

7.4.4 Center stack

- Autopilot control unit (optional), refer to 7.14 Avionics
- EFIS standby instrument, refer to 7.14 Avionics
- Pitch and roll trim indication
- Day-Night switch controlling brightness of trim indication
- NAV/COM

- XPDR
- AEPS activation handle (if installed)
- Flaps control

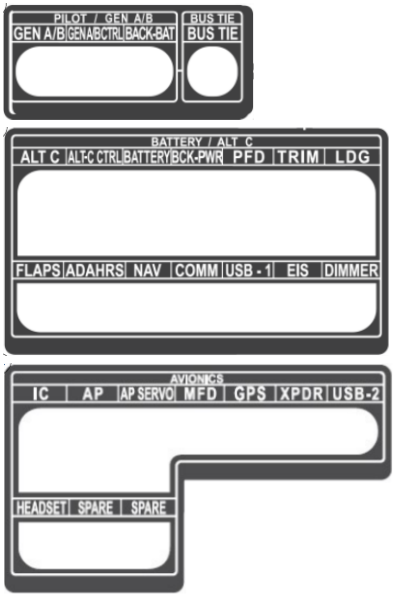
7.4.5 Co-Pilot side controls

- Multifunction Display (MFD) with touch and control knobs
- Park brake: press pedals to brake and pull to lock
- Cabin Heat: pull for heat ON
- Up-Down: heated air distribution: pull for DOWN, push for UP

  the control guides the heated air either to the windshield or to the occupant legs. To defrost the windshield the Cabin heat must be ON and the UP-Down pushed.
- Intercom; refer to 7.14 Avionics

7.4.6 Right side instrument panel

Circuit breakers:



Features:

- Vent outlet; rotate to open and close, adjust for comfort

7.4.7 Control sticks

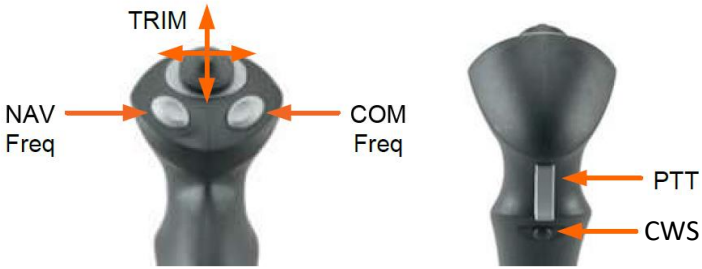
Both control sticks are equipped with buttons for:

- PTT (at front)
- Trim (and AP disconnect – four way button)
- CWS (control wheel steering which disconnects the AP, front side of grip)
- COM frequency toggle (right grey button on top)
- NAV frequency toggle (left grey button on top)

Note

PRESS LONG of COM button changes freq. to emergency freq. **121.500** and locks the freq. To unlock PRESS LONG the COM button again.

Pilot / Co-Pilot Aircraft
Grip Controls



Simultaneous use of trim from both pilot station stops the trim action.

7.4.8 Center console

Below the center panel avionic stack and between the seats a number of controls and features located:

- Alternate Air Control
  With alternate air pulled the engine draws air from within the cowling, bypassing the inlet filter. It shall only be used in case of (suspected) icing or other blockage of the primary air intake. Due to the risk of ingestion of unfiltered air, and the fact that its function cannot be verified by engine parameter indication the alternate air function is not included in the operational pre-flight inspection, but in the daily inspecting (visual check of opening and closing).
- AEPS activation handle (if installed):
  to activate the AEPS the handle must be pulled with a force of at least 18 to 25kg. At all times the airplane is not in use the handle shall be secured by the securing pin carrying a “remove before flight” flag.
- Flap control:
  The electronic flap control unit indicates any “in transition mode” by flashing LED’s, permanent illuminated LED indicate the reached position. Reversal of travel direction, respectively change of flap setting can be done any time also during travel. The Flap system has electronic programmed deflections and deflection limits as well as additional travel limit switches.
- Propeller RPM control:
  The engine power (throttle) and propeller control are mounted on

a common rotation axle. A friction system is installed to prevent uncommand power or propeller setting changes.
Readjustment of the friction setting is a permissible pilot-owner maintenance action requiring removal of the co-pilot seat pan to gain access to an adjustment nut which can be operated manual.

The nut is secured with safety wire which needs to be removed and refurbished.

- Glove box:
  The glove box allows storage contains the emergency exit hammer and can be used to store smaller objects like a torch light for night flying. It can be removed to gain inspection access to some of the main control and flap control system.
- USB power outlets, headset connectors and Bose headset power supply are located aft of the glove box between the seat back rests. It is advised to perform any required plug-in or plug-out before boarding.

7.5 Landing gear system

BRISTELL B 23 airplane landing gear is a three-wheel fixed design, that consists of the main landing gear and the nose landing gear. The nose landing gear is steerable. The main landing gear wheels are equipped with hydraulic disc brakes.

7.5.1 Main landing gear

The main landing gear consists of the composite landing gear legs, wheel axle and wheels equipped with disc brakes. The landing gear legs are inserted in the gear channel under the seats, where they are attached using two bolts and a stirrup. Wheels are equipped with tubeless tires. The nominal tyre pressure of the main gear tires is 2.1bar.

7.5.2 Nose landing gear

The nose landing gear is steerable. It consists of a welded steel leg, a steerable wheel fork, a shock absorber (spring and oil damper) and the nose wheel itself. The landing gear is attached to the brackets installed in the nose gear channel located between engine bulkhead and the main wing spar. The wheel is equipped with tubeless tires. The nominal tyre pressure of the nose gear tire is 1.8bar.

7.5.3 Wheel brakes

The airplane is equipped with individual hydraulic disc brakes system for the main landing gear wheels. Brake system consists of the brake pedals (foot tip part of rudder control pedals), brake pumps, hoses for brake fluid supply, brake callipers and brake pads. By pressing pedals, brake pumps are compressed and pressure is generated in the brake circuit and the callipers pushes the brake pads onto the brake discs. Braking pressure can be controlled via brake pedal force.

The airplane is equipped with a hydraulic manually controlled parking brake. It is activated by pressing the brake pedals and pulling the park brake control in the instrument panel.

7.5.4 Wheel fairings

The airplane is equipped with composite wheel fairings that decrease drag and improve aerodynamic properties of the airplane. The wheel fairings are installed onto the brackets by bolts.

NOTE:

Operation without wheel fairings is not approved

7.6 Cockpit lay-out, Seats and safety harness,

Two seats are provided in side by side arrangement. Seats are Kevlar sandwich panels with leather upholstery. The seat pans are held in place by metal clips engaging to the main spar. The seat back rests are held in place by a combination of form fit on the lower end. Seat belts routed through lips at the upper end of the seat back rest. Seats are removable for easier cleaning in the centre fuselage. Side panels are composite sandwich, upholstered in the arm rest area. Map/AFM storage pockets are installed on the side panel.

Seats are equipped with ETSO approved four-point safety harnesses. Safety harnesses consist of two lap straps, two shoulder straps and a safety harness lock. Length of the lap straps and the shoulder straps is adjustable. The shoulder belt are routed through clips on the upper end of the seat back rest.

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.

7.7 Baggage compartment

7.7.1 Fuselage

The rear baggage compartment is located behind the seats. It may accommodate up to 15 kg (33 lb). This space is divided on two sections – baggage compartment A (front, lower) and B ("shelf", aft higher). It is prohibited to place heavy items into Baggage compartment B.

The baggage in the fuselage compartment A is secured by means of a net which is restrained using retainment rings at the four corner points of the luggage compartment

Baggage in fuselage compartment B is limited to soft and very light items which do not present a hazard to the occupants.

CAUTION

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.

7.7.2 Oxygen

The B23-915 does not have installed oxygen as part of type design. However, an oxygen bottle mounting provision is installed aft of the seats, in the front part of the baggage compartment. Securing of a portable oxygen bottle is pilot action by means of straps. Care should be

taken to ensure visibility of pressure and flow indication as well as securing against negative g-loads.

Providing and using oxygen dependent on flight altitude and duration is a pilot responsibility. The use of an SpO_2 sensor is recommended.

7.7.3 Wing luggage

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

Sharp edge luggage in the wing compartments should be covered with some soft material (folded jacket, cushion) to avoid “jumping” in the wing lockers.

7.8 Cabin

Access to the cockpit is from both sides after opening the canopy. The canopy is suspended on two hinges on the front side of the frame. It is opened fore-/upward. The opening movement is supported by gas springs on each side. The gas springs also keep the canopy in opened position.

NOTE

Engine run with canopy open is possible but not advised due to vibrations. Canopy locking with engine running is hampered by aerodynamic suction forces in opening direction.

The canopy lock for outside access to the aircraft is placed on both sides of the fuselage behind the cockpit bulkhead and below the cockpit frame. It consists of a lever that in closed position neatly fits into the outer fuselage contour. To open the canopy the part of the lever next to the canopy frame has to be pushed, deflecting the lever so that it can be hold and turned around 40° upwards to open the canopy lock.

From inside the canopy lock can also be operated from both sides of the cockpit using hand levers mounted on the side walls just above the map pockets. Connecting all four opening and closing levers is a central torque tube. The system has means to lock by overcentering in fully opened and fully closed position, assuring that no accidental opening occurs during flight.

The cabin is provided with fresh air from ducts on the fuselage side and adjustable vent outlets on either side of the instrument panel.

Heated air is provided from a heat exchanger on the exhaust. The heat exchanger is located on the muffler and supplied with air from NACA inlet located on the left side of the lower cowling. Heated air is supplied into the cockpit by an air hose through a control flap located on the firewall. Quantity of hot air is regulated via the CABIN HEAT push/pull control on the left lower instrument panel. On the cabin side of the firewall is a valve which splits hot air flow into the canopy bubble outlet (UP) and into the crew legs outlet (DOWN). The split usage is controlled via the UP/DOWN push pull control next to the cabin heat control.

A glove box is positioned in the middle of the cockpit between the two seats. The composite box can hold only minor mass items

It is closed by a lid. In the inside the emergency exit hammer is stored.

7.9 Powerplant

Standard power unit of BRISTELL B23-915 airplane is the ROTAX 915iSc3 A engine and MTV-34 in flight adjustable 3-blade propeller. Both, engine (EASA-TCDS E.121) and propeller (EASA-TCDS P.049) are type certified.

7.9.1 Engine

ROTAX 915iSc3 A is a 4 stroke, 4 opposed - cylinder engine, with maximal power of 104 kW (140 hp) at 5800 RPM. The engine is liquid cooled and equipped with a turbo charger providing max continues performance up to 15.000ft.

NOTE

Useful rule of thumb for power setting:

$MAP_{(recommended)}$ = RPM/100*1.5-42

100% MCP @ 5500RPM (MAP = 40.5in)

75% MCP @ 5000RPM (MAP = 33.0in)

50% MCP @ 4500RPM (MAP = 25.5in)

NOTE

Engine power is not equal to available thrust power due to the propeller efficiency varying with engine and airplane speed. Overall efficiency (distance or time per fuel burned) likewise varies. For details refer to the respective performance graphs.

The engine (and fuel system) can be operated on automotive fuel EN 228 Super and Super Plus (RON 95), “MOGAS” as well as on AVGAS. Applicable Service Bulletins of ROTAX apply and must be considered for according fuel operation.

Following recommendations are provided for use of automotive fuel and MOGAS:

- Only fuel for the specific climate zone should used
- Special attention should be paid to the current outside air temperature
- Winter blends of MOGAS shall not be used in warmer than normal temperatures
- There is a risk of vapor formation when using winter fuel for summer operation.
- Fuel with more than 5% of ethanol blend should not be used

The propeller is driven through a gearbox which has a gearing ratio of 2.54.

The fuel consumption of the Rotax engine, dependent on throttle setting, RPM and altitude is up to a maximum of 45liter/hour. Indicated momentary fuel flow can differ significantly especially during transient conditions. Measured fuel flow is calculated by subtracting the fuel flow in the return line from the fuel flow to the engine. The accumulated tolerances of the sensing as well as the transient conditions make fuel flow indication no trustworthy source for fuel consumption or flight planning. Likewise the “fuel remaining” function of the Garmin system must be treated with care. In flight test it has been found that that fuel burned is underestimated by up to 5% - this may vary in other installations. The pilot should keep track for his individual airplane.

The engine installation is equipped with an alternate air intake to account for potential blocking of air intake by ingestion. The alternate air is obtained from the engine bay.

Difficulties to start the engine might have the following reasons

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

CAUTION

This condition indicates a problem with the internal generators and warrants maintenance action

Insufficient fuel supply.

- Ensure that Engine is supplied with fuel in appropriate quality

CAUTION

This condition indicates a problem with the fuel system warrants maintenance action

Starting at low oil temperature.

- Use high quality oil without friction modifier.

Starting with wrong throttle setting

- Set throttle according the figure in the start-up procedure 4.4.3

7.9.2 Propeller

The propeller MTV-34 is a three-blade in flight hydraulically adjustable wooden-composite propeller designed for light airplanes with piston engines with power up to 104 kW (140 hp) and max. propeller speed up to 2279 RPM.

A CrNi-steel leading edge serves as impact protection. In order to increase service life, the propeller surface has a sprayed-on coat made of resistant polyurethane varnish. The composite propeller spinner is a part of the propeller.

A Jihostroj governor (P-110-051/A) is installed.

The propeller is attached to the engine using bolts and securing nuts.

7.10 Fuel system

Fuel is stored in two fuel tanks. The fuel tanks are integrated part of the wing. Their volume is 60 litres each. The tanks are located in the leading edge of the first third of the outer wing span in front of the main spar. The ribs and rear tank wall are structurally independent from the main spar and wing ribs.

Each fuel tank has a filler neck with flush head filler cap, venting tube, fuel strainer, floater type quantity sensor, low fuel sensor and a drain valve. Fuel is filled into each tank through the filler neck, which is located on the top skin. Fuel drain from the tank is through the drain valve located in the rear corner of bottom skin close to the root fuel tank rib.

On the low-pressure side of the fuel pumps the fuel flows from the tank, through fuel strainers to the 4-way selector valve and from there to the fuel pump assy. The electrical fuel pump assy is located on the fuselage lower side aft of the “nose gear channel” and is accessible thru an inspection hatch in the fuselage skin.

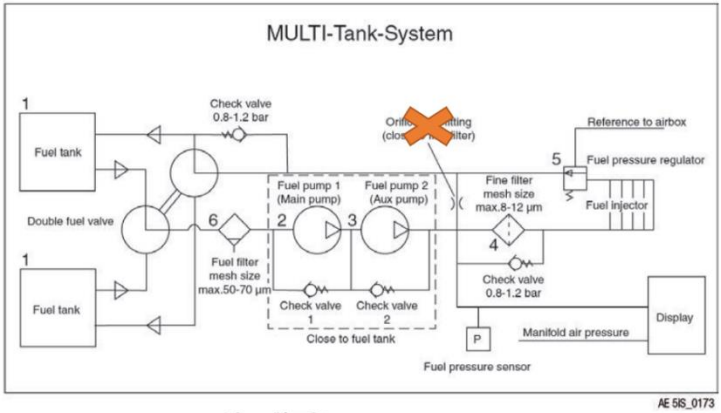
On the fuel high-pressure side the fuel is guided through the “nose gear channel to the engine bay. On the engine compartment side (designated fire zone) it flows to a fine filter and bypass into the fuel rail of the injection engine. At the end of tef fuel rail is the pressure regulator.

The excess fuel flows back thru the return line and the fuel selector into the tank from which the fuel is currently drawn.

The fuel selector valve also serves for interruption of fuel supply in case of engine fire or for airplane long–time parking. The selector handle is located on the middle console between the seats in the cockpit. Handle actin is transmitted by a torque tube to the valve which is mounted on the fuselage belly skin.

NOTE

The high-pressure fuel pumps create a noticeable noise in the cabin when switched ON on ground, which is normal. When strobe lights are switched ON the oscillating power surge can be noticed but has no influence on fuel pressure.



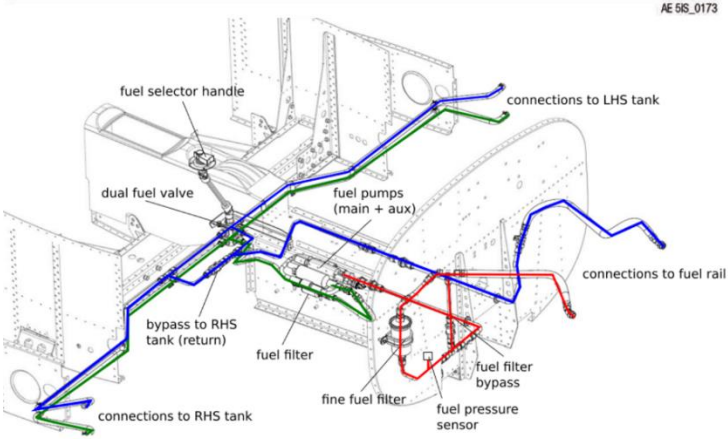
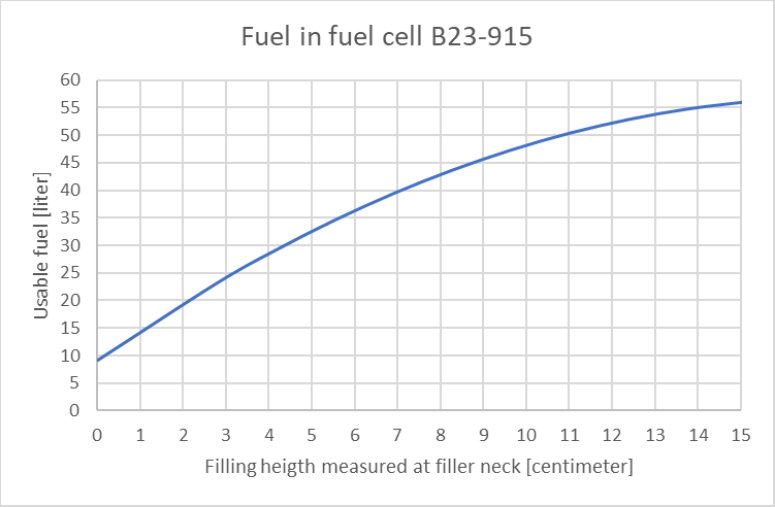


Figure 9: fuel system from fuel tank connection to fuel rail
green->feed lines low pressure; red->feed line high pressure; blue->return lines
Orifice not installed

Fuel quantity is measured by the fuel float gauges. The float position is converted to an electrical signal and fuel quantity in the tank is indicated on the PFD/MFD screens. The fuel system also provides an independent hardwired low-fuel warning light in the instrument panel (LED). The low fuel warning illuminates with about 5 litres usable fuel left in the respective tank. The fuel quantity indication by a floater sensor detects the fuel quantity from zero to 45 litres. From 45 to 60 litres (56 litre usable) no detection is given, amount indicated is „45litres“.

Visual fuel quantity determination in pre-flight inspection is through the filler neck. If the lower wing surface right below the filler neck is wetted with fuel the amount in the tank equals to about 9 litres. Using a ruler or “Fuel Hawk” tube the actual usable quantity above 9 litres can be determined:



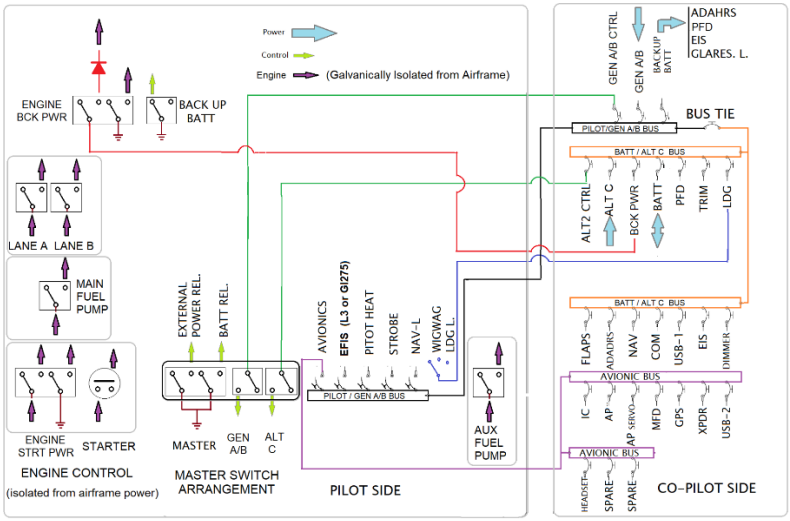
The fuel vents end at the wingtips where a little scoop provides some RAM pressure. A secondary opening aft of the RAM-scoop ensures pressure relief in conditions of an iced up RAM scoop.

The fuel quantity indication is to a minor extent dependent on the aircraft attitude. Readings of quantity are calibrated in normal ground attitude. In nose up attitude (slow speed/climb) the indication is slightly higher in nose down (Flap down/high speed/decent). The total effect is about +/-2 litres over the range of normal in flight attitude.

Designated ground bonding (electric discharge) point during re-fuelling is the exhaust end pipe.

7.11 Electrical system

The Rotax 915iSc3A engine has two integrated AC generators (GEN A/B), a further external alternator is installed (ALT C). Failure to switch on, respectively unintended switching OFF GEN A/B and Alternator failure is indicated on the PFD. Voltage drop below 11 volts is indicated by “Low Volt” warning on EFIS display and EMS caution light on instrument panel.



The airplane is equipped with 14V DC electrical installation with grounded negative pole. In normal operation the injection engine uses electrical power directly from GEN A. Primary source of electrical power for the airframe are GEN B supported by ALT C. In case of GEN A failure the engine is automatically supplied by GEN B which in this case no longer supplies the airframe. This condition is indicated by flashing LANE lights. Failure of GEN B is only indirectly indicated by a slight voltage drop. Therefore it is important to confirm during engine start that the engine power source switches from GEN B to GEN A. This is indicated by a voltage rise on the VOLT M from Battery voltage to GEN B delivery voltage and can be detected clearly only with ALT C OFF. The secondary source of electrical energy is a 12 V battery, located in the engine compatment. It is used for starting the engine, as buffer and as a source of electric energy in the case of generator failure. Further electric power is provided by avionics backup battery to the essential indications of the Garmin system

and the glareshield light. The standby EFIS features its own separate internal backup battery.

Three busses are defined:

1.) Pilot Bus: GEN A/B & Backup Batt which is powered from internal Generator B

2.) Battery Bus: BATT / ALTC which is powered from Alternator C and the Battery

A normally closed bus tie circuit breaker links the two busses

3.) AVIONICS BUS which is powered from the PILOT BUS via the „Avionics switch“

Systems are protected by circuit breakers, which are permanently ON. On the Pilot Bus also combined switches-circuit breakers are used.

After switching the MASTER switch ON, activating the LANE A and LANE B and the MAIN pump and holding the START POWER switch up, the engine starter system is ready. By pressing the engine start button the starter is activated. The starter is supplied from the battery. GEN B is directly supplying the engine thereafter. If a defined engine speed threshold has been reached for a certain time GEN A takes over to supply the engine. After this, GEN B can be used to supply the airframe. In no operation state can GEN A be used to supply the airframe.

Two voltage indications are on the display. VOLT B which is the Voltage at the LANE B and VOLT M which is the voltage at the Batt/ALT C Bus.

Before engine start up both indicate the voltage as received from the aircraft battery. Immediate after start up VOLT B jumps to the Voltage supplied by GEN B, after automatic switch over VOLT B indicates the Lane voltage supplied by GEN A and VOLT M jumps to the Voltage supplied by GEN B. To monitor this, it is important to check before activation of ALT C to confirm both engine internal generators are functional.

The current signal is tapped from the battery feeder line and displays negative values for current flowing from the battery to the bus system. Positive values indicate charging. Zero indication is a fully charge and balanced situation.

ALT C caution is triggered by an actual failure of the alternator but also by failure of the respective alternator control power supply. Therefore, the alternator caution also turns on when the alternator is not switched on. Also GEN B triggers an indication on the EFIS in case of deactivation

of the GEN A/B supply to the airframe. A failure of GEN B as such is not indicated.

Failure of GEN A results in automatic switch to GEN B by the engine ECU. Then GEN B is no longer available to the airframe. This condition is indicate by dual flashing LANE A and LANE B light.

Overvoltage protection units are installed in either ALT C and GEN A/B line.

The supply to the backup battery is monitored by the backup battery itself. It triggers a caution if the supply voltage drops below 11Volt.

The correlation of consumers and supplying part of the bus system allows continued safe flight and landing with a partial bus system failure:

Consumer	Pilot/GENB Bus		Batt/AltC Bus
	Avionic Bus		
EFIS standby instr.		d	
Pitot Heat		s	
Strobe L.		s	
NAV L.		s	
WIGWAG; LDG L.			s
El. Fuel Pump		s	
Backup batt (charge)		*s*	
Starter (Rel.)			s
PFD			d
Trim			s
Flaps			s
ADAHRS		d	
NAV			s
COM			s
USB-1			s
EIS			d

DIMMER			d
Intercom	s		
Autopilot*	s		
Autopilot Servo*	s		
MFD	s		
GPS	s		
XPDR	s		
USB-2	s		
Headset	s		

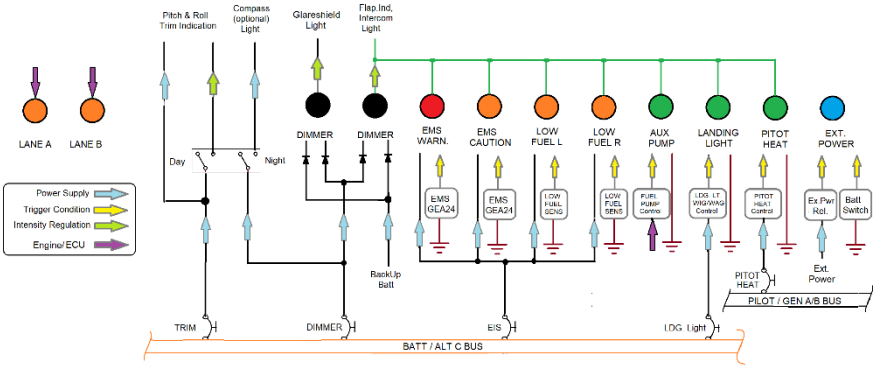
s= single supply d = dual supply (through backup battery) *= option

The installed USB power outlets are intended for personal electronic devices (PED) and can supply 1000mA and 2100mA as indicated on the outlet. The pilot is responsible for the compatibility of the PED with the aircraft on board system. In case of doubt: don't use PED's.

7.11.1 Warning, caution and indication lights, internal lighting

There are three major streams of information to the pilot:

- Lane lights
- Warnings and cautions displayed on the EFIS system
- Hardwired information with LED indicators



The functionality of the indication lights depends on the respective power supply AND the power to the dimming unit.

Cockpit lighting is provided by a dimmable glareshield light. Light intensity of indication lights is regulated independently. The control knob for the glareshield dimmer is on the left end of the dimmer/indication light row. Intensity increased (lighting up in darker situation) when rotated clockwise.

A second dimmer control is next in the row what dims the LED indication lights. Intensity is reduced when rotated clockwise.

NOTE:

"Day" position for both dimmers is fully turned anti-clockwise

Losing power on either bus and/or on the EIS CB leads to partial loss of the information. Restoring power by means of the backup battery does restore the function of the EIS unit, and the power input to the indication light control.

Instrument lighting is mainly provided by the respective screens, refer to the avionic section.

A further feature of the internal light system is the Day/Night switch located in the centre panel. The switch reduces the brightness of the trim indication for night operation to a fixed value and switched ON the compass light (optional, if installed).

NOTE:

For ability of failure detection the lane lights when OFF are still powered with a very small current by the ECU. In low light conditions this is visible.

7.11.2 Use of backup battery

The power input to the consumers which can be fed from the backup battery (ADHARS/PFD/EIS/Glareshield light/Indication light intensity control) is separated from the regular power input by means of diodes. The consumer will utilize the power which provides the higher voltage. So, in order to make sure the backup battery is actually used (and main battery energy is conserved for other functions) the pilot has to

Pull the CB's of:

- ADHARS
- PFD
- EIS
- Dimmer/ glareshield lights

This in turn means the functionality of low fuel warning and the indication light dimming function is not available.

7.11.3 External lighting

External lights are individual selectable

- Wing leading edge mounted landing lights
- Wing tip mounted position lights incorporating also
- Anti-collision lights

All three types of light have their own circuit. In case of severe electric system failures partial external lighting can be restored after pulling the BUS-TIE CB, refer to chapter 7.11.

The landing lights have two operational modes controlled by the 3position switch

- WIG/WAG mode which alternates on/off of the left and right light for better in-flight recognition by other aircraft.
- Landing light mode which switches both lights permanently on for landing and taxi operation.

There is no time/temperature limit on either light.

7.11.4 External Power

The functionality of the external power is limited to supply the engine starter motor and the indication light. The external power cannot be used for re-charging.

The external power plug is located on the lower side of the firewall on the engine side left of the nose landing gear. It is accessible through the large air-dump opening of the lower cowling.

WARNING

The external power connection and disconnection is only possible with the outside person temporarily out of sight from pilot station. If an outside person is used a clear coordination before the operation between the pilot and the outside help is mandatory. The outside person is advised to always keep one hand on the left wing leading edge as visible sign to the pilot of a save position. Under no circumstances the outside person shall move other than along the leading edge when engine is running. Removal of the external power connection with engine running is not advised.

The voltage supplied to the external power must be in the range of 12 to 14Volt for correct operation. Incorrect polarity of the external power supply is protected by a control diode.

The continuous current capacity of the external power plug is 50Amps which is usually exceeded during engine start attempts. Therefore, even with unlimited electric supply the time of start attempts must be limited.

CAUTION

The starter should be activated for a maximum of 10 sec., followed by 2 min. pause for starter, starter circuit and external power connection cooling.

7.12 Pitot and static pressure systems

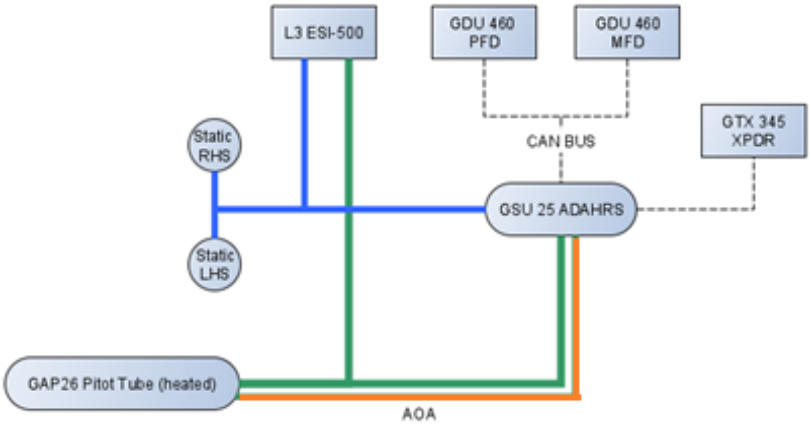
The Garmin GAP-26 Heated Pitot Tube with AOA (angle of attack) is located under the left wing.

The total pressure is sensed through the hole in the pitot–tube face.

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

Pressure distribution to individual instruments is performed by means of flexible plastic hoses.

Static and total pressure is lead to Garmin ADHARS unit and the approved standby EFIS with independent airdata computer.



The static ports are located left and right on the aft part of the fuselage side wall.

NOTE

Pitot/Static and AOA pressure ports an lines are subject to insect nesting and should be covered whenever the airplane is not operated

Drain provisions (maintenance action) are provided by spring loaded valves.

- for the pitot as well as the AOA sensing between the centre wing and left outer wing (removal of wing root cover needed),
- for the static system on the fuselage belly

7.13 Miscellaneous equipment

7.13.1 Stall warning system

The stall warning employed on this airplane is programable in the G3X and uses AOA as well as normal and pitch acceleration (G3X system).

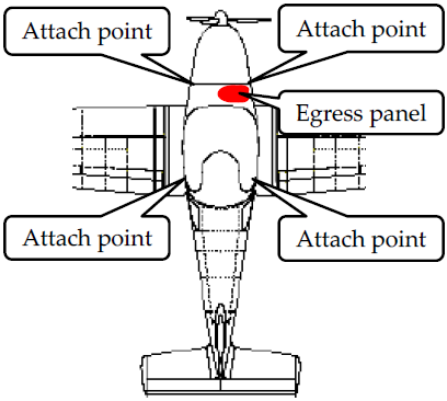
It is set to warn the pilot (constant tone and red chevron) of approaching stall at about 5kts above stall speed.

7.13.2 Airframe emergency parachute system (optional equipment)

The B23 is equipped with an optional BR23-SP05 ballistic system which can be used in situations where continued safe flight is impossible and immediate danger for the occupants is imminent. The recovery system deployment sets the aircraft into an almost horizontal condition with slight nose down attitude. The system is mechanically activated by the pilot or from the occupant seat.

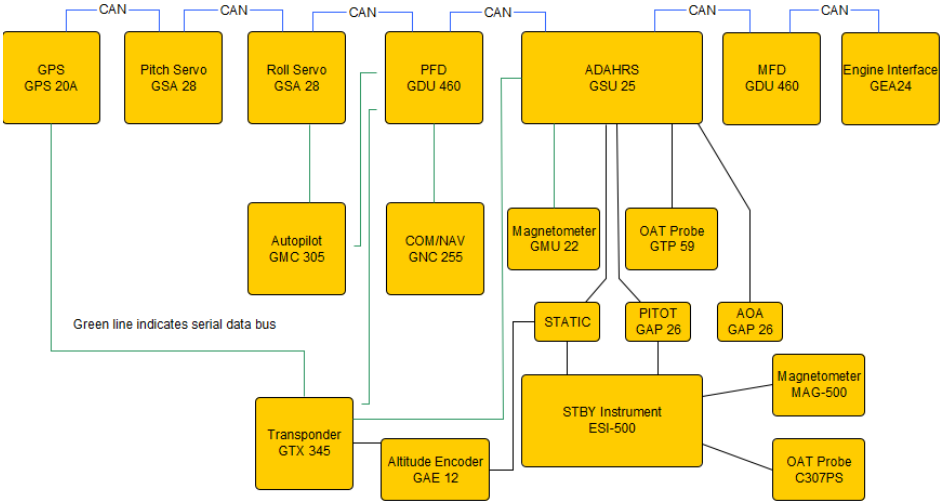
WARNING

Make sure the safety pin of the handle is engaged at all times that the airplane is not operated.



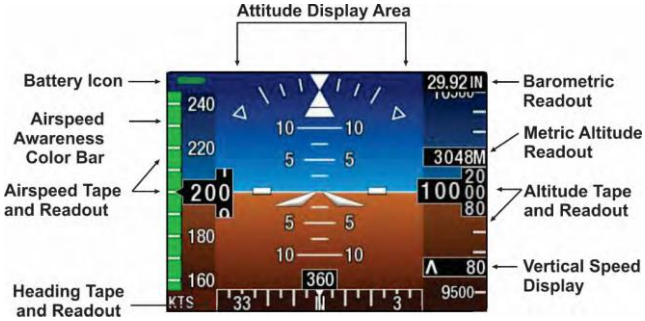
7.14 Avionics

The Avionics system installed in the B23-915 is composed of panel mounted and remote mounted units of the G3X system as well as a standby EFIS. Common interface between the two systems are only pitot and static pressure sources. An overview is given in the figure below. Various units are powered from various sources, see chapter 7.11



7.14.1 L-3 EFIS, L3 ESI-500

The L3 EFIS provides indication of knots indicated airspeed, heading, roll-pitch-attitude, vertical speed (ft), pressure altitude (ft) or optionally in meter (m), barometric correction, selected course for display and slip/skid information.



Basic operation

The MicroSD-card slot must be empty before booting. The ESI-500 does not have a power ON Switch. The device boots when switching on an electric power source of the aircraft. After booting splash screen, the device begins with aligning attitude which may require a couple of minutes to complete. In that time, the aircraft must not be shaken or moved. After alignment is complete, the unit is in normal operation mode.

To shut down the ESI-500, all electric power sources of the aircraft must be shut down. A warning “Press Menu button for Back-up battery mode” appears. After 5 min, the device shut down automatically. To speed up the shut down, press menu button, then select and confirm BATT shutdown.

Adjust barometric pressure by rotating the knob when the pilot menu is not active. Millibars (MB) and Hectopascals (HPA) are adjusted in increments of 1.0 and inches of Mercury (IN) are adjusted of 0.01. Press the knob to set the standard barometric setting (29.92 In.Hg, 1013 hPa, 1013 mb) when the menu is not active. The barometric display will indicate “STD“.

Pilot menu

After pressing the menu button the menu points can be selected by the rotary switch and confirmed by pressing the rotary switch. The menu structure is:

- BATT Shutdown
- Data Field
  - TAS
  - OFF
  - OAT
- Set BRT Trim (brightness)
- Metric ALT
- Aligh Attitude
- BATT Calibration
- System Status

Emergency operation

If all electric power sources of the aircraft collapse, the warning “Press Menu button for Back-up battery mode” appears, the menu button must be pressed within the next 5 min. Alternatively, press and hold the Menu button for approximately 10 seconds to start the ESI-500 with internal back-up battery power.

On back-up power, the ESI-500 has a run time capacity for a green battery indicator of at least 1 hour.

Abnormal occurrences

During flight, if air data is not failed and the “HDG DEGRADED” indication is displayed, cross check the heading with another source or outside reference. Return to straight and level until the message clears for full performance

During flight, if air data is failed and “HDG DEGRADED” indication is displayed, cross check the heading with another source or outside reference.

Basic settings for operations

Increase display brightness: When the pilot menu is not active, pressing and holding the menu button will increase the display brightness. Use the pitot menu item “Set brightness Offset” to adjust the brightness.

Limitations

Internal back-up battery operation can be inhibited due to low voltage or exceeding the battery temperature limits of -20°C or +60°C.

When air data failed, the ESI-500 can operate in an Attitude Degraded Mode, indicated as amber “ATT DEGRADED” message, which means that the ESI-500 is not operating within the normal performance parameters. When air data failed, heading is invalid.

If the roll value is greater than 11.5° for three minutes or the “ATT DEGRADED” is shown, the heading degraded operation occurs and the heading indication has a lesser performance, shown by the amber “HDG DEGRADED” message.

For detailed information see L3 ESI-500 Electronic Standby Indicator Pilots Guide, Document No. 0040-15000-01 Rev.B, dated November 16, 2015 (or later FAA approved revision)

For limitations information see L3 ESI-500 Installation Manual 0040-15001-01 Revision J dated February 9, 2021

7.14.2 Garmin PFD / MFD screens

In this AFM only the basic features of the Garmin touch display installation are explained. For the full range of options, settings, flight planning and accessible information refer to the Garmin G3X pilot guide.

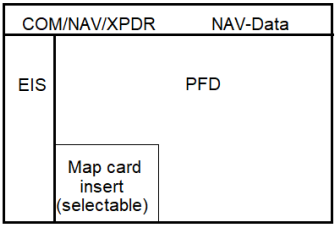
The Garmin GDU460 displays (pilot+co-pilot) features PFD, MFD and split screen mode

On Battery bus on the pilot side goes into full screen PFD mode with a (selectable) map insert and EIS on side bar. After switching on the Avionic bus the co-pilot side goes full screen MFD mode. The EIS side bar changes from pilot to co-pilot side.

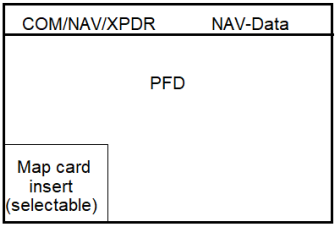
Several screen options can be selected on either side, independent from the other side.

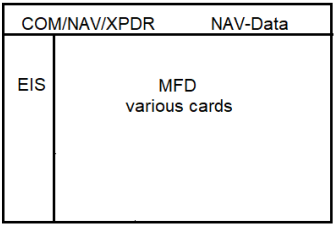
On pilot side display failure the PFD is added to the co-pilot display which goes in split screen mode.

BATT ON
FULL SCREEN

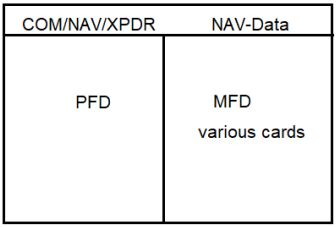


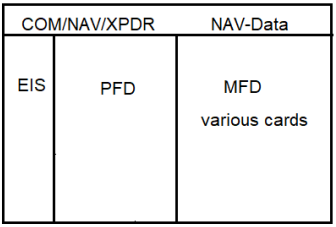
BATT ON
AVIONIC ON
FULL SCREEN





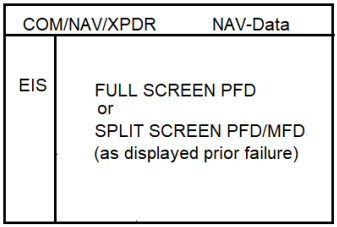
SELECTABLE
SPLIT SCREEN



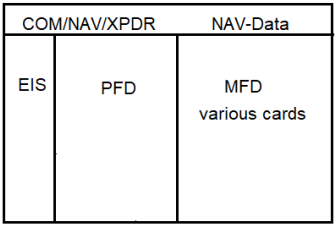


DISPLAY
FAILURE

Co-Pilot side failure



Pilot side failure



NRST Key	Press to display the Nearest Page for viewing the nearest airports, intersections, NDBs, VORs, waypoints, frequencies, and airspaces
Direct-To Key	Press to activate the Direct-To function, enter a destination waypoint and establish a direct-to course to the selected destination
MENU Key	Press once to view the Page Menu Press twice to view the Main Menu Press a third time to clear the Main Menu Press and hold to save a screenshot to the SD Card
BACK Key	Press to return to the previous screen Press and hold to return to the default MFD Page Press and hold to toggle between full-screen and split-screen modes
Knobs	The display unit knobs are highly customizable and can be configured for a variety of functions, especially for PFD functions. The two options that configure the PFD knobs are found in the PFD Setup menu. On the PFD display unit, press the MENU button and touch the More Options... on-screen button. The "main" PFD knobs are by default on the left-hand side of the display, and "alternate" knobs on the right. This can be changed by pressing the MENU key twice and touching the PFD icon, then changing PFD Split Screen Side from Right to Left. By default the main inner knob will adjust the HSI's heading bug, and the main outer knob will adjust the altitude bug. The alternate inner knob will adjust the HSI course selection (in OBS mode), and the alternate outer knob will adjust the local barometric pressure setting.

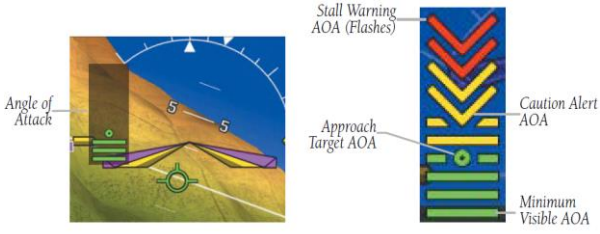
Basic operation

The Pilots PFD is launch by switch on any electric power source, the co-pilots MFD is launch by switching on the avionics toggle. During booting the ADAHRS is aligning. The AHRS can align itself both while taxiing and during level flight. Generally the pilot side launch into the PFD, while the co-pilot side display launch into MFD + EIS (see figures on page above)

Adjust the barometric pressure by turning the large right Knob associated with the PFD to set the barometric pressure. The barometric pressure setting is displayed below the Altimeter in inches of mercury (in Hg) or hectopascals (hPa).

Stall warning, angle of attack indicator

The AoA displays next the attitude indicator with increasing AoA, which output an aural warning when reaching the allowable AoA.



Angle of Attack (AOA) Angle of Attack Display (AOA)

EIS

The EIS indicates manifold pressure (inHg), manifold temperature (°C), engine speed (RPM), oil pressure (bar), oil temperature (°C), coolant temperature. (°C), exhaust gas temp. (°C), fuel quantity (litre) and fuel pressure (bar) and fuel low (liter/h). The indicator are furnished with markings of optimum ranges (green), non-optimum or caution ranges (yellow) and limits (red line). Warning and cautions are indicated as highlighted labels and messages in PFD.

The EIS further shows throttle setting (prior engine start) respectively engine power in percent after engine start.

Display-Modes

Selectable main pages are: Map Page (Map), Charts Page (Cht), Waypoint Page (Wpt), Active Flight Plan Page (FPL), Terrain Page (Ter), Info Page (Info) and Engine Page (Eng).

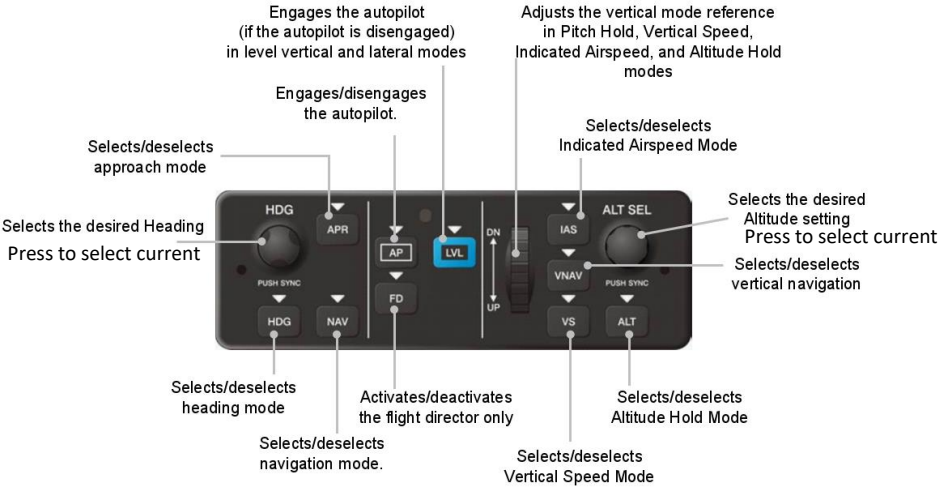
For splitting the display into several pages: Press Split or Full in the upper left or right hand corner of the display to toggle between split and full screen. Or, press and hold the BACK Key to toggle between split and full screen.

NOTE

See Garmin G3X Touch Pilots Guide for further features: Barometric pressure settings, Altitude alerting, Flight Director, Glide path indication, horizontal situation indicator, course deviation indicator, G-meter, vertical navigation, GPS navigation, Flight planning, Hazard avoidance, synthetic vision, data logging, SD-Cards usage, etc.

7.14.3 Garmin GMC 307-20 Autopilot control panel (optional)

The GMC 307-20 is part of the Garmin AUTOMATIC FLIGHT CONTROL SYSTEMS (AFCS) and provides a user interface for the autopilot function of the G3X system. Aileron and elevator control and trim are interfaced by the AFCS. The rudder control is not interfaced. Especially in high power climb configuration the pilot must correct the lateral control for best performance.



Basic operations

Flight Director (FD) commands are displayed on the PFD, which provides: Command Bars showing pitch/roll guidance, Vertical/lateral mode selection and processing, Autopilot communication. With the flight director active, the aircraft can be hand-flown to follow the path shown by the Command Bars. For setting the FD, press the MENU Key of the PFD1 twice to display the Main Menu, then touch Setup and Flight Director.

Autopilot (AP) provides servo monitoring and automatic flight control in response to flight director steering commands, Air Data and Attitude and Heading Reference System (ADAHRS) attitude, rate information, and airspeed.

The Autopilot is manually disengaged by pushing the disconnect button on the autopilot unit, by pressing the autopilot disconnect button on the

control stick (CWS), by pressing any trim button or by pressing the AP Key on the GMC 307.

NOTE

In case of trim system failure (loss of power to trim system) the AP disconnect by trim button is also inoperative

Manual disengagement is indicated by a five-second flashing yellow 'AP' annunciation and an aural alert. Cancel the aural alert by pressing and releasing the AP/CWS Button again (GSA 28 autopilot only) Automatic disengagement is indicated by a flashing red 'AP' annunciation and an aural alert. Touch to acknowledge. Automatic disengagement occurs due to: System failure, Invalid sensor data or Inability to compute default autopilot modes.

A small amount of pressure or force on the pitch controls can cause the autopilot automatic trim to run to an out-of-trim condition. Therefore, any application of pressure or force to the controls should be avoided when the autopilot is engaged. Overpowering the autopilot during flight will cause the autopilot's automatic trim to run, resulting in an out-of-trim condition or cause the trim to hit the stop if the action is prolonged. In this case, larger than anticipated control forces are required after the autopilot is disengaged.

Abnormal occurrences

If an autopilot failure or trim failure is suspected to have occurred, perform the

following steps:

1) Firmly grasp the control stick.

2) Press and hold the AP DISC Switch. The autopilot will disconnect and power is removed from the trim motor. Power is also removed from all primary servo motors and engaged solenoids. Note the visual and aural alerting indicating autopilot disconnect.

3) Retrim the aircraft as needed. Substantial trim adjustment may be needed.

4) Pull the appropriate circuit breaker(s) to electrically isolate the servo and solenoid components.

5) Release the AP DISC Switch.

Envelope protection, Electronic Stability & Protection (ESP-X)

ESP monitor the aircraft and provide control input feedback when necessary to discourage operating the aircraft at potentially unsafe attitudes and/or airspeeds. If enabled (which is the default setting), this feature will automatically arm when the aircraft is above 500 feet AGL and the autopilot is not engaged, and disarm when below 200 feet AGL. When selected, ESP engages automatically when the aircraft approaches or exceeds one or more predetermined airspeed or attitude limitations.

NOTE

If AGL height data is unavailable (i.e., GPS altitude or terrain data is unavailable), automatic engagement of Level mode is not supported

Stability protection for each flight axis is provided by the autopilot servos, which apply force to the appropriate control surface(s) to discourage pilot control inputs that would cause the aircraft to exceed the normal or "protected" flight envelope. This is perceived by the pilot as resistance to control movement in the undesired direction when the aircraft approaches a steep attitude, and/or the airspeed is below the minimum or above the maximum configured airspeed. As the aircraft deviates further from the normal attitude and/or airspeed, the force increases proportionally (up to an established maximum) to encourage control movement in the direction necessary to return to the normal attitude and/or airspeed range. When ESP has been engaged for more than fifteen seconds (cumulative; not necessarily consecutive seconds) of a 30-second interval, the autopilot can be configured to engage with the flight director in Level Mode, bringing the aircraft into level flight. An aural “Autopilot” alert is played and the flight director mode annunciation will indicate ‘LVL’ for vertical and lateral modes. Level mode as activated by ESP is limited by altitude. ESP will not be able to activate Level mode until the aircraft climbs above 2000 feet AGL. ESP will be locked out of automatically activating Level mode after the aircraft descends below 1500 feet AGL as well. Also note that Level mode as activated by ESP is different than manually selected Level mode. Manually selected Level mode is not limited by altitude at all. The pilot can interrupt ESP by pressing and holding the Autopilot Disconnect / Control Wheel Steering (AP DISC / CWS) switch. Upon releasing the AP DISC / CWS switch, ESP force will again be applied. ESP can also be overridden by overpowering the servo’s torque limit. ESP is enabled or disabled from the Automatic Flight Control System page

1) From the PFD, touch the Autopilot Status Box. The Automatic Flight Control System page is displayed.

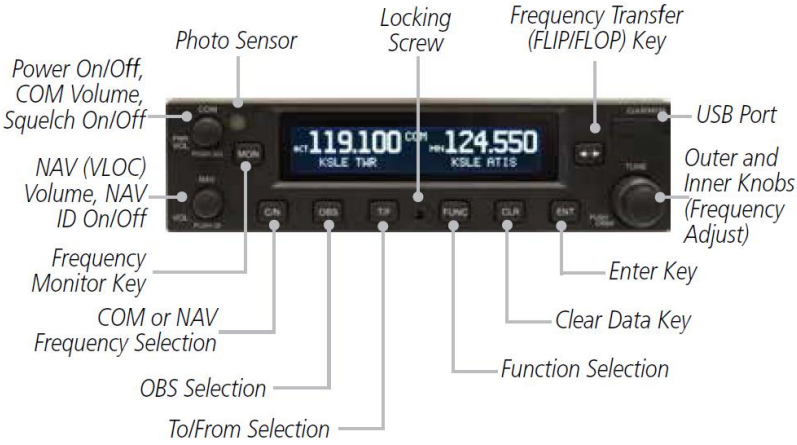
2) Touch the ESP button on the Automatic Flight Control System page to enable/disable ESP.

NOTE

See Garmin G3X Touch Pilots Guide for details and further features:
Pitch Hold Mode (PIT), Selected Altitude Capture Mode (ALTS), Vertical Speed Mode (VS), Indicated Airspeed Mode (IAS)

7.14.4 Garmin GNC 255 COM/NAV

The GNC 255 COM/NAV combines VHF communications transceiver and VOR. Besides traditional NAV/COM features, the GNC 255 also incorporates workload-reducing functions such as automatic decoding of the Morse code station identifier for VOR/LOC, most-used frequency storage in memory, built-in course deviation indicator, and more.



GNC 255 Front Panel Description

NOTE

Refer to GARMIN GNC 255A/255B Pilot's Guide for detailed product description, operation, and functions.
Basic operation of GNC 255 is provided on next pages.

Selecting a COM frequency

New frequencies are first selected as a standby frequency and then toggled to the active side with the **FLIP/FLOP** key. While viewing the standby frequency display, use the outer and inner knobs on the right side of the GNC 255 to select the desired frequency.

COM Frequency Selection

1. Press **C/N**, if necessary, to reach the COM radio function. The COM annunciator on the top line of the display will show.
2. Turn the outer knob to change the values in one MHz increments. The MHz selection range is between 118 and 136 in one MHz steps.
3. Turn the inner knob to change the values in 25 kHz or 8.33 kHz increments. The kHz selection range is between 000 and 975 kHz in 25 kHz steps or 000 and 990 kHz in 8.33 kHz steps.
4. Turn the outer and inner knobs clockwise to increase and counterclockwise to decrease the frequency values. Standby frequency selection is not inhibited during transmit.
5. When connected to a position source, the nearest station identifier will be shown for the selected frequency. Frequencies with multiple types will have an asterisk next to the identifier.
6. Press and release the **FLIP/FLOP** key to toggle the standby frequency to the active frequency.

Note

PRESS LONG of FLIP/FLOP kay (or COM button on control stick) changes freq. to emergency freq. **121.500** and locks the freq. To unlock PRESS LONG again.

Monitoring the Standby Channel

COM Frequency Monitor Annunciation

The Frequency Monitoring function allows you to monitor the standby frequency for activity, while listening to the active frequency.

Press the **MON** key in the COM function to listen to the standby frequency. A small "MN" will replace the "STB" to the left of the standby frequency.

When the active frequency receives a signal, the unit will switch automatically to the active frequency. The active frequency quality is not affected. The Frequency Monitor function is turned off by pressing the **MON** key again. Monitoring is not canceled by switching to NAV mode.

Saving a COM Channel

The current standby frequency may be saved into the COM User Frequency database from the COM display or the COM User Function. The COM User Frequency database can hold up to fifteen frequencies.

***NOTE:** When switching from 8.33 kHz to 25 kHz mode, any 8.33 kHz-specific user frequencies will be deleted from the user frequency list. This only affects the user frequencies within the 8.33 kHz spectrum.*

COM User Frequency Name Selection

1. Press **ENT**.
2. Turn the inner knob to select characters.
3. Turn the outer knob to move the cursor.
4. After selecting characters, press **ENT**.
5. Turn the outer knob to select the waypoint type.
6. Turn the inner knob to select the type from the list.
7. Press **ENT** to save displayed value.
   Press **CLR** to cancel the changes.

7.14.5 Garmin GTX 345 transponder

The GTX 345 includes ADS-B In functionality, when connected to a suitable display.

GTX 345 Features:

- ADS-B Out
- Dual-band ADS-B In traffic display output and aural alerting
- Integration with TCAD/TAS/TCAS I traffic systems
- FIS-B weather and flight information display output
- Bluetooth interface provides traffic, weather, and attitude data to a Portable Electronic Device (PED)
- Altitude deviation alerting
- Timers: count up, count down, flight, trip
- Static (Outside) air temperature display
- Density and pressure altitude display
- Internal GPS (Optional)

Panel mount Transponder controls

The GTX 3X5 series transponders have an auto-dimming display and keypad layout. The keys access the transponder's controls and features.

ON Powers on, disables altitude reporting.
ALT Powers on, enables altitude reporting.
VFR Changes to the preprogrammed squawk code for VFR.
OFF Powers off.
SBY Powers on or changes into standby mode.
IDNT Activates the Ident function.

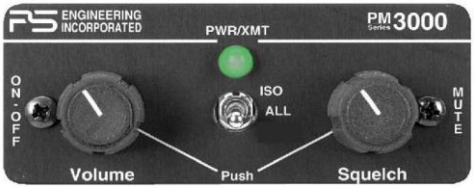
NOTE

Refer to GARMIN GTX 335/345 Series All-In-One ADS-B Transponder Pilot's Guide for detailed product description, operation, and functions.

In case of malfunction of the transponder use the CB to switch OFF the transponder completely.

7.14.6 Intercom

A PM3000 Intercom is installed.



Basic operations

The volume control knob adjusts the loudness of the intercom and does not affect the volume level of the aircraft radio. By turning the control clockwise, the audio level will increase simultaneously.

With the engine running, set the squelch control knob by slowly rotating the squelch control knob clockwise until you no longer hear the background noise in the earphones. When the microphone is positioned properly near the lips, normal speech levels should open the channel. When you have stopped talking, there is a delay of about one half second before the channel closes. This prevents squelch closure between words, and helps eliminate choppy intercom conversations.

Both pilot and copilot have transmit capabilities over the radio. The PM3000 only allows the voice of the person who presses their PTT (Push To Talk) to be transmitted over the aircraft radio. If both pilot and copilot press the PTT at the same time, the copilot will override. When either pilot or co-pilot presses PTT, all other microphones are disabled. The pilot can regain priority by switching the unit off.

Mode ISO (Isolate): The pilot is isolated from the intercom and is connected only to the aircraft radios. He will hear the aircraft radio reception (and sidetone during radio transmissions).

Mode ALL: Pilot and Co-pilot hear each other and a/c radio

Pressing the squelch knob mutes the Entertainment Input (unused feature). Pressing the Volume knob switches the intercom on/off.

Abnormal occurrences

In case of failure of the intercom power supply normal radio transmission and reception on the pilot side is still possible. However, this functions not in stereo but only on one channel of the headset

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SECTION 8

8 AEROPLANE HANDLING, SERVICING AND MAINTENANCE

8.1 Introduction

This section contains factory-recommended procedures for proper ground handling and servicing of the aeroplane. It also identifies certain inspection and maintenance requirements which must be followed if the aeroplane is to retain that new-plane performance and dependability. It is wise to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered.

8.2 Aeroplane inspection periods

Maintenance of the aircraft shall be performed according to the referenced documents below:

Airframe:

ADxC-73-003-AMM Airplane Maintenance Manual

Engine:

Maintenance Manual Line for ROTAX Engine Type 915iScA, MML-915 i A, Chapter 05–20–00 Scheduled Maintenance Checks.

Propeller:

OPERATION , INSTALLATION and MAINTENANCE MANUAL for MTV-34 propeller.

BRS AEPS Parachute (if installed - optional equipment) :

Installation and user's manual, Ballistic rescue parachute systems series

Other installed equipment:

Refer to the manuals and/or other documents supplied with installed equipment for inspection periods, if any.

8.3 Aeroplane alterations or repairs

Alterations or repair are no pilot action!

It is essential that all alterations on the aeroplane are based on approved data and executed by authorized personnel and organizations to ensure that airworthiness of the plane is not violated.

Approved data for repairs is subject to be published.

Always use only the original spare parts produced by the airplane (engine, prop) manufacturer.

Approved data for alterations (beyond CS-Stan changes) must be received through the type design holder ADC EASA DOA 21.J.411 or any other qualified entity.

If the aircraft weight is affected by an alternation, a new weighing is necessary. In such a case, record the new empty weight into the Weight and Balance record / Permitted payload range in SECTION 6

8.4 Ground handling

8.4.1 Parking

It is advisable to park the airplane inside a hangar or alternatively inside any other suitable space 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.

In this case it is also recommended to cover up all cowling air inlets.

8.4.2 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 tie-down points located on the lower surfaces of the wings. The installation is a pan-fitting ring which can be swivelled up for flight and down for parking and mooring.

Mooring procedure:

1. Flaps up
2. All electric switches off
3. Fuel Selector shut off
4. Fix the controls. For control stick fixation use safety harness.

NOTE

Locking controls on the pilot side means that ground gust loads on control surfaces will be transmitted through the entire control system potentially causing non detected damage. Therefore, locking at the control surface with adequate locks featuring “remove before flight” warning is recommended

5. Close air vents
6. Close and lock canopy
7. Cover static ports and pitot tube
8. Moor the aircraft to the ground by means of a mooring rope passed through the tie-down points.

NOTE

In 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.
* to adhere to engine conservation procedures.

8.5 Cleaning and care

8.5.1 Painted exterior surfaces

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 during “dry” conditions and never use gas or chemical solvents!

8.5.2 Propeller

For propeller cleaning refer to the OPERATION, INSTALLATION and MAINTENANCE MANUAL for MTV-34 propeller, 7.0 MAINTENANCE.

8.5.3 Engine

For engine cleaning refer to the Maintenance Manual Line for ROTAX Engine Type 915iScA, MML-915 i A, Chapter 12-20-00, SCHEDULED MAINTENANCE.

8.5.4 Interior surfaces, seats and carpets

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.

SECTION 9

9 SUPPLEMENTS

9.1 Introduction

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

9.2 List of supplements

Date	Doc. No. & issue	Title supplement	Installed in this SN? (x =yes; − =no)