



PILOT'S OPERATING HANDBOOK

AND FLIGHT TRAINING SUPPLEMENT

ALPHA Trainer PRO

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PIPISTREL VERTICAL SOLUTIONS d.o.o.

Vipavska cesta 2

SI-5270 Ajdovščina

Slovenia

Tel: + 386 5 36 63 873

Fax: + 386 5 36 61 263

Email: info@pipistrel-aircraft.com

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Pilot's Operating Handbook



ALPHA Trainer PRO

The technical content of this document is approved under the authority of the DOA ref. SLO.DOA.002

The airplane must be operated in compliance with information and limitations contained herein.

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WARNING: Means that the non-observance of the corresponding procedures lead to an immediate or significant degradation in flight safety.

CAUTION: Means that the non-observance of the corresponding procedures leads to a minor or to a 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.

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Pages to be removed or replaced in this pilot's operating handbook (POH) are determined by the log of effective pages located in this section. This log contains the page number and revision number for each page within the POH. As revisions to the POH occur, the revision number on the affected pages is updated and the page number in the log is highlighted with bold font type. When two pages display the same page number, the page with the latest revision shall be used in the POH.

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Index of document revisions

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SECTION

1

SECTION 1 – GENERAL

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1.1. INTRODUCTION

This section contains information of general interest to pilots and owners. You will find the information useful in acquainting yourself with the airplane, as well as in loading, fueling, sheltering, and handling the airplane during ground operations. Additionally, this section contains definitions or explanations of symbols, abbreviations, and terminology used throughout this handbook.

1.2. DESCRIPTION

The ALPHA Trainer PRO is a two-seat aircraft of composite construction. The aircraft is arranged as a high wing mono-plane with cantilevered wings and a conventional empennage with a T-tail. The aircraft incorporates a tricycle landing gear and is equipped with a 59.6 kW Rotax 912 UL (or A2, available as option).

The seats are side-by side with full dual flight controls and joint levers for throttle, choke and flaps control. Access to cockpit is via two large gull-wing doors. Baggage area is behind the seats. The ALPHA Trainer PRO is equipped with a ballistic parachute system.

The load-bearing structure of the airplane is made of carbon, glass and aramid fiber composite material, the components of which, epoxy resin as well as fiber materials, are in compliance with worldwide accepted aviation specifications. The proven low-pressure wet lay-up method from the sailplane industry is used to build the airplane structure.

1.3. DESIGN BASIS

The aircraft is compliant with ASTM F2245 (design and construction) and ASTM F3198 for continued airworthiness. For detailed compliance declaration please refer to the applicable LSA Compliance Statement as issued by the manufacturer for this aircraft's serial number.

1.4. THREE VIEW DRAWING



ALPHA Trainer PRO

1.5. AIRCRAFT OVERVIEW

Basic Dimensions	Metric	Imperial
Length	6.5 m	21' 4"
Span	10.50 m	34' 5"
Height	2.05 m	6' 9"
Wing		
Area	9.29 m ²	99.9 ft ²
Mean aerodynamic chord	0.90 m	2' 11.4"
Aspect ratio	11.8	
Horizontal Tail		
Area	1.08 m ²	11.6 ft ²
Vertical Tail		
Area	1.1 m ²	11.8 ft ²
Weights		
Maximum takeoff weight	550 kg	1212 lb
Typical empty weight	310 kg	684 lb
Typical useful load	240 kg	528 lb
Maximum baggage weight*	10 kg*	22 lb*
Performance**		
Max horizontal / top speed (V _h)	Pipistrel prop. FP02-80: 110 KIAS (115 KCAS) (SL)	
	Helix prop. H50F R-SSI-18-2: 100 KIAS (104 KCAS) (SL)	
Cruise speed (5300 RPM)	100 KIAS (SL)	
Endurance at cruise speed	3h + 30' reserve	
Best climb	76 KIAS (V _y)	1220 ft/min
Best angle climb	58 KIAS (V _x)	
Stall speed full flap (+2)	42 KIAS	
Stall speed clean (0)	49 KIAS (45 KCAS)	
Fuel ***		
Total capacity	50 L	13.2 US gal
Unusable fuel	2 L	0.5 US gal
Engine		
Max power rating (5 min.)	59.6 kW at 5800 RPM	
Max continuous power	58 kW at 5500 RPM	

*use only allowed when Baggage Compartment Assembly
(p/n 161-25-50-000) is installed and CG limitations are respected.

** Please see Section 5 - Performance - for more information.

*** Please see Section 2 - Limitations - for information about approved fuel types.

1.6. SYSTEMS

1.6.1. POWERPLANT

The engine installed is Rotax 912 UL providing 59.6 kW takeoff power. All limits as defined by the engine manufacturer apply. The engine can be operated with AVGAS 100LL or MOGAS (min. RON 90 antiknock properties and max. 10% ethanol content) as by Rotax specification. The propeller is driven by a gearbox.

The engine is provided with a liquid cooling system for the cylinder heads and a ram-air cooling system for the cylinders. There is also an oil cooling system.

1.6.2. PROPELLER

The airplane can be equipped with:

- 2-blade, fixed-pitch propeller, Helix H50F R-SSI-18-2, composite propeller with 1.65m (65") diameter.
- 2-blade, fixed-pitch propeller, Pipistrel FP02-80, wooden propeller with 1.66 m (65") diameter.

1.6.3. FUEL SYSTEM

The airplane uses single tank located in the fuselage, behind the cabin. Maximum usable fuel quantity is 34.5 kg / 48 L (36 kg / 50 L max tank capacity). The fuel system is provided with a mechanical pump mounted on the engine. A gascolator that removes water from the fuel system is mounted on the firewall and equipped with filter. A second fuel filter and an auxiliary electrical fuel pump are positioned downstream from the tank.

1.6.4. LANDING GEAR

The airplane has as a tricycle type fixed landing gear. The nose wheel is steerable via rudder pedals. The main wheels are equipped with hydraulic brakes, which are operated with an handle located between the seats.

1.6.5. BALLISTIC PARACHUTE RESCUE SYSTEM (BPRS)

The airplane is equipped with a ballistic deployed parachute rescue system GRS 6/473 SPEEDY.

1.7. SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

1.7.1. GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

- KCAS** Knots Calibrated Airspeed is the indicated airspeed corrected for position and instrument error. Calibrated airspeed is equal to true airspeed in standard atmosphere at sea level.
- IAS** Knots Indicated Airspeed is the speed shown on the airspeed indicator. The IAS values published in this handbook assume no instrument error.
- KTAS** Knots True Airspeed is the airspeed expressed in knots relative to undisturbed air which is KCAS corrected for altitude and temperature.
- VG** Best Glide Speed is the speed at which the greatest flight distance is attained per unit of altitude lost with power idle.
- VA** Operating Maneuvering Speed is the maximum speed at which application of full control movement will not overstress the airplane.
- VFE** Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.
- VNO** Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air, and then only with caution.
- VNE** Never Exceed Speed is the speed that may not be exceeded at any time.
- VAE** Maximum Airbrakes Extended Speed is the maximum speed at which the airbrakes may be extended.
- VSO** Stalling Speed is the minimum steady flight speed at which the aircraft is controllable in the landing configuration (100% flaps) at the most unfavorable weight and balance.
- V_x** Best Angle of Climb Speed is the speed at which the airplane will obtain the highest altitude in a given horizontal distance. The best angle-of-climb speed normally increases slightly with altitude.
- V_y** Best Rate of Climb Speed is the speed at which the airplane will obtain the maximum increase in altitude per unit of time. The best rate-of-climb speed decreases slightly with altitude.
- SL** Sea Level.

1.7.2. METEOROLOGICAL TERMINOLOGY

- IMC** Instrument Meteorological Conditions are meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima for visual flight defined in FAR 91.155.
- ISA** International Standard Atmosphere (standard day) is an atmosphere where
- (1) the air is a dry perfect gas,
 - (2) the temperature at sea level is 15 °C,
 - (3) the pressure at sea level is 1013.2 millibars (29.92 inHg), and
 - (4) the temperature gradient from sea level to the altitude at which the temperature is -56.5 °C is -0.00198 °C per foot and zero above that altitude.
- MSL** Mean Sea Level is the average height of the surface of the sea for all stages of tide. In this Handbook, altitude given as MSL is the altitude above the mean sea level. It is the altitude read from the altimeter when the altimeter's barometric adjustment has been set to the altimeter setting obtained from ground meteorological sources.
- OAT** Outside Air Temperature is the free air static temperature obtained from inflight temperature indications or from ground meteorological sources. It is expressed in either degrees Celsius or degrees Fahrenheit.
- Pressure Altitude is the altitude read from the altimeter when the altimeter's barometric adjustment has been set to 1013 mb (29.92 inHg) corrected for position and instrument error. In this Handbook, altimeter instrument errors are assumed to be zero.
 - Standard Temperature is the temperature that would be found at a given pressure altitude in the standard atmosphere. It is 15 °C at sea level pressure altitude and decreases approx. 2 °C for each 1000 feet of altitude increase.
- DA** Density Altitude (ft) is pressure altitude corrected for non-standard temperature. As temperature and altitude increase, air density decreases.

1.7.3. ENGINE POWER TERMINOLOGY

- HP** Horsepower is the power developed by the engine.
- MCP** Maximum Continuous Power is the maximum power that can be used continuously.
- MAP** Manifold Pressure is the pressure measured in the engine's induction system expressed as inHg.
- RPM** Revolutions Per Minute is engine rotational speed.

1.7.4. PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY

- g** One "g" is a quantity of acceleration equal to that of earth's gravity.
- Demonstrated Crosswind Velocity is the velocity of the crosswind component for which adequate control of the airplane during taxi, takeoff, and landing was actually demonstrated during certification testing.
 - Service Ceiling is the maximum altitude at which the aircraft at maximum weight has the capability of climbing at a 100 ft/min.
 - Unusable Fuel is the quantity of fuel that cannot be used in flight.
 - Usable Fuel is the fuel available for flight planning.

1.7.5. WEIGHT AND BALANCE TERMINOLOGY

- C.G. or CG** **Center of Gravity** is the point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
- **Arm** is the horizontal distance from the reference datum to the center of an item's gravity. The airplane's arm is obtained by adding the airplane's individual moments and dividing the sum by the total weight.

- **Aircraft Empty Weight** is the actual weight of the airplane including all optional equipment installed on the airplane in the current configuration and can be found in the applicable weight and balance document log. The aircraft empty weight includes the weight of unusable fuel, hydraulic fluid, coolant and oil.

MAC **Mean Aerodynamic Chord** is the chord drawn through the centroid of the wing plan area.

LEMAC **Leading Edge of Mean Aerodynamic Chord** is the forward edge of MAC aft of the reference datum.

- **Maximum Takeoff/Landing Weight** is the maximum permissible weight of the airplane and its contents at takeoff/landing as listed in the aircraft specifications.
- **Moment** is the product of the items weight multiplied by its arm.
- **Useful Load** is the aircraft empty weight subtracted from the maximum weight of the aircraft. It is the maximum allowable combined weight of pilot, passengers, fuel and baggage.
- **Reference Datum** is an imaginary vertical plane from which all horizontal distances are measured for balance purposes.
- **Tare** is the weight of all items used to hold the airplane on the scales for weighing. Tare includes blocks, shims, and chocks. Tare weight must be subtracted from the associated scale reading.

MLE **Minimum List of Equipment** is a list of the basic serviceable equipment that is required to safely operate the aircraft under the listed kind of operations.

1.8. CONVERSION TABLE

SI	US	US	SI
1 bar	14.5037 psi	1 psi	0.0689 bar
1 mm ²	0.0016 in ²	1 in ²	625 mm ²
1 cm ²	0.1550 in ²	1 in ²	6.4510 cm ²
1 daN	2.2481 lbf	1 lbf	0.4448 daN
1 g	0.0353 oz	1 oz	28.328 g
1 hPa	0.0295 inHg	1 inHg	33.898 hPa
1 kg	2.2046 lb	1 lb	0.4536 kg/min
1 kg/min	2.2046 lb/min	1 lb.min	0.4536 kg/min
1 l	0.2641 US gal	1 US gal	3.7864 l/min
1 l	1.057 US quart	1 US quart	0.9461 l
1 l/min	0.2641 US gal/min	1 US gal.min	3.7864 l/min
1 daNm	88.4956 lbf.in	1 lbf.in	0.0113 daNm
1 daNm	7.3801 lbf.ft	1 lbf.ft	0.1355 daNm
1 m	3.2809 ft	1 ft	0.3040 m
1 mm	0.0394 in	1 in	25.4 mm
1 cm ³	0.06102 in ³	1 in ³	16.393 cm ³
1 hPa	0.0145 psi	1 psi	68.965 hPa



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SECTION

2

SECTION 2 – LIMITATIONS

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2.1 INTRODUCTION

This section provides operating limitations, instrument markings and basic placards necessary for the safe operation of the airplane and its standard systems and equipment. Refer to section 9 for operating limitations for optional equipment.

2.2 AIRSPEED LIMITATIONS

Speeds in the table below are KIAS.

Speed	KIAS	Remarks
V_{NE}	130	Never Exceed Speed is the speed limit that may not be exceeded at any time.
V_{SO}	42	Stall speed - landing configuration is the stall speed with full flaps (+2) at MTOM.
V_S	49	Stall speed - clean configuration is the stall speed with flaps retracted (0) at MTOM.
V_{NO}	104	Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air.
V_A	92	Operating Maneuvering Speed is the maximum speed at which full control travel may be used.
V_{FE}	70	Maximum Flap Extended Speed is the highest speed permissible with wing flaps extended at (+1) stage, 60 KIAS for (+2) stage.
V_{AE}	70	Maximum Airbrakes Extended Speed is the highest speed permissible with the airbrakes extended (if applicable).

2.3 AIRSPEED INDICATOR MARKINGS

MARKING	VALUE (KIAS)	REMARKS
White Arc	42 - 70	Flap Operating Range. Lower limit is the most adverse stall speed in the landing configuration. Upper limit is the maximum speed permissible with flaps extended at 1 st stage (+1).
Green Arc	49 - 104	Normal Operating Range. Lower limit is the maximum weight stall at most forward C.G. in clean configuration. Upper limit is the maximum structural cruising speed.
Yellow Arc	104 - 130	Caution Range. Operations must be conducted with caution and only in smooth air.
Red Line	130	Never exceed speed. Maximum speed for all operations.
Blue line	76	Best climb rate speed (V_y)

2.4 ENGINE LIMITATIONS

Engine (Rotax 912 UL): please refer to Rotax 912 Series Operators Manuals for additional information.

Maximum Power rating	59.6 kW / 5800 RPM Max 5 min
Maximum RPM	5800 RPM
Normal RPM	1400 - 5500 RPM
Maximum continuous RPM	5500 RPM (58 kW)
Minimum Oil Pressure	0.8 bar (12 psi)
Normal Oil Pressure	2.0 – 5.0 bar (27 - 73 psi)
Maximum Oil Pressure	7.0* bar (102 psi) *permissible for a short period after cold start
Minimum Oil Temperature	50 °C (122 °F)
Normal Oil Temperature	90 °C - 110 °C (190 - 230 °F)
Maximum Oil Temperature	140°C (285 °F)
Minimum Coolant Temperature	not limited
Maximum Coolant Temperature	120 °C (248 °F)

Maximum Exhaust Gas Temperature	880 °C (1616 °F)
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NOTE: the parameters listed above are directly reported from OEM documentation and do not take into account possible effects of installation and engine integration with aircraft systems. Please refer to Section 2.5 for engine instrument markings and parameter operational ranges.

2.5 ENGINE INSTRUMENT MARKINGS

NOTE: Values represented in instrument marking tables are defined by the manufacturer and might differ from the values found in the OEM documentation.

2.5.1 KANARDIA ENGINE MONITORING DISPLAY

These markings are applicable to aircraft equipped with Kanardia DIGI:

INSTRUMENT (RANGE)	RED LINE	GREEN ARC	YELLOW ARC	RED LINE
	MINIMUM	NORMAL	CAUTION	MAXIMUM
Tachometer (0 - 7000 RPM)	1400	1400 - 5500	5500 - 5800	5800
Coolant Temp. (/ - 120 °C) (/ - 248 °F)	—	/ - 120 °C (/ - 248 °F)	—	120 °C (248 °F)
Exhaust Gas Temp. (650 - 925 °C) (1202 - 1697 °F)	650 °C (1202 °F)	750 - 850 °C (1382-1562 °F)	850 - 925 °C (1562-1697 °F)	925 °C (1697 °F)
Manifold Pressure (0 - 35 inHg)	—	15 - 29.5 inHg	—	—
Fuel Pressure (0 - 0.4 bar) (0 - 5.8 psi)	0.15 bar (2.2 psi)	0.15 - 0.4 bar (2.2 - 5.8 psi)	—	0.4 bar (5.8 psi)
Oil Temperature (0 - 140 °C) (0 - 285 °F)	50 °C (122 °F)	90 - 110 °C (190 - 230 °F)	110 - 125 °C (230 - 257 °F)	125 °C (257 °F)
Oil Pressure (0 - 7 bar) (0 - 101 psi)	1 bar (14.5 psi)	1.5 - 5 bar (21.7 - 72.5 psi)	5 - 6.5 bar (72.5 - 94.2 psi)	6.5 bar (94.2 psi)
Voltmeter (10 - 16 V)	11.4 V	11.4-14.4 V	—	14.4 V

2.5.2

GARMIN G3X PFD/MFD MARKINGS

These markings are applicable to aircraft equipped with Garmin PFD/MFD:

Tachometer (0 - 6000 RPM)	WHITE RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT		
	0 - 1750	1750 - 5500	5500 - 5800	5800 - 6000		
Coolant Temp. (30 - 130 °C) (86 - 266 °F)	WHITE RANGE		RED RANGE + ALERT			
	30 - 120 °C (86 - 248 °F)		120 - 130 °C (248 - 266 °F)			
Exhaust Gas Temp. (400 - 930 °C) (752 - 1706 °F)	WHITE RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT		
	400 - 550 °C (752 - 1022 °F)	550 - 865 °C (1022 - 1589 °F)	865 - 880 °C (1589 - 1616 °F)	880 - 930 °C (1616 - 1706 °F)		
Manifold Press. (0.0 - 35.0 In Hg)	WHITE RANGE	GREEN RANGE	WHITE RANGE			
	0.0 - 15.0 in Hg	15.0 - 29.5 in Hg	29.5 - 35.0 in Hg			
Fuel Flow (0.0 - 30.0 lph) (0.0 - 7.9 gph)	WHITE RANGE	GREEN RANGE	WHITE RANGE			
	0.0 - 5.0 lph (0.0 - 1.3 gph)	5.0 - 25.0 lph (1.3 - 6.6 gph)	25.0 - 30.0 lph (6.6 - 7.9 gph)			
Fuel Press. (0.0 - 0.5 bar) (0.0 - 7.3 psi)	WHITE RANGE	GREEN RANGE	WHITE RANGE			
	0.0 - 0.15 bar (0.0 - 2.2 psi)	0.15 - 0.40 bar (2.2 - 5.8 psi)	0.40 - 0.50 bar (5.8 - 7.3 psi)			
Oil Temp. (40 - 149 °C) (104 - 300 °F)	BLACK RANGE	WHITE RANGE	GREEN RANGE	WHITE RANGE	YELLOW RANGE	RED RANGE + ALERT
	40 - 50 °C (104 - 122 °F)	50 - 90 °C (122 - 194 °F)	90 - 110 °C (194 - 230 °F)	110 - 120 °C (230 - 248 °F)	120 - 140 °C (248 - 284 °F)	140 - 149 °C (284 - 300 °F)
Oil Press. (0.0 - 7.8 bar) (0 - 113 psi)	RED RANGE + ALERT	WHITE RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT	
	0.0 - 0.8 bar (0 - 12 psi)	0.8 - 2.0 bar (12 - 29 psi)	2.0 - 5.0 bar (29 - 73 psi)	5.0 - 7.0 bar (73 - 102 psi)	7.0 - 7.8 bar (102 - 113 psi)	
Voltmeter (10.0 - 16.0 V) (11.5 - 16.0 V)	RED RANGE	YELLOW RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT	
	lead acid - type batteries:					
	10 - 11.8	/	11.8 - 14.4	14.4 - 14.7	14.7 - 16.0	
	lithium - type batteries:					
	11.5 - 12.8	12.8 - 13.2	13.2-14.6	14.6 - 15.5	15.5 - 16.0	
Ammeter (-40 - 40 A)	GREEN LINE			GREEN LINE		
	0.0			20.0		

2.5.3 DYNON SKYVIEW PFD/MFD MARKINGS*

These markings are applicable to aircraft equipped with Dynon PFD/MFD:

Tachometer (0 - 6000 RPM) (Oil T. > 50 °C/ 122 °F)	RED RANGE + ALERT	YELLOW RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT
	0 - 1400	1400 - 1800	1800 - 5500	5500 - 5800	5800 - 6000
Coolant Temp. (30 - 130 °C) (86 - 266 °F)	WHITE RANGE		RED RANGE + ALERT		
	30 - 120 °C (86 - 248 °F)		120 - 130 °C (248 - 266 °F)		
Exhaust Gas Temp. (400 - 930 °C) (752 - 1706 °F)	WHITE RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT	
	400 - 550 °C (752 - 1022 °F)	550 - 865 °C (1022 - 1589 °F)	865 - 880 °C (1589 - 1616 °F)	880 - 930 °C (1616 - 1706 °F)	
Manifold Press. (0.0 - 35.0 In Hg)	WHITE RANGE		GREEN RANGE	WHITE RANGE	
	0.0 - 15.0		15.0 - 29.5	29.5 - 35.0	
Fuel Flow (0.0 - 30.0 lph) (0.0 - 7.9 gph)	WHITE RANGE		GREEN RANGE	WHITE RANGE	
	0.0 - 5.0 lph (0.0 - 1.3 gph)		5.0 - 25.0 lph (1.3 - 6.6 gph)	25.0 - 30.0 lph (6.6 - 7.9 gph)	
Fuel Press. (0.0 - 0.5 bar) (0.0 - 7.3 psi)	WHITE RANGE		GREEN RANGE	WHITE RANGE	
	0.0 - 0.15 bar (0.0 - 2.2 psi)		0.15 - 0.40 bar (2.2 - 5.8 psi)	0.40 - 0.50 bar (5.8 - 7.3 psi)	
Oil Temp. (37 - 140 °C) (99 - 300 °F) (Oil T. < 88 °C/ 190 °F)	YELLOW RANGE	BLACK RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT
	37 - 50 °C (99 - 194 °F)	50 - 90 °C (122 - 194 °F)	90 - 110 °C (194 - 230 °F)	110 - 130 °C (230 - 266 °F)	130 - 140 °C (266 - 284 °F)
Oil Press. (0.0 - 7.8 bar) (0 - 113 psi)	RED RANGE + ALERT	WHITE RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT
	0.0 - 0.8 bar (0 - 12 psi)	0.8 - 2.0 bar (12 - 29 psi)	2.0 - 5.0 bar (29 - 73 psi)	5.0 - 7.0 bar (73 - 102 psi)	7.0 - 7.8 bar (102 - 113 psi)
Voltmeter (10.0 - 16.0 V) (11.5 - 16.0 V)	RED RANGE	YELLOW RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT
	lead acid - type batteries:				
	10 - 11.8	/	11.8 - 14.4	14.4 - 14.7	14.7 - 16.0
	lithium - type batteries:				
	11.5 - 12.8	12.8 - 13.2	13.2-14.6	14.6 - 15.5	15.5 - 16.0
Ammeter (-20 - 40 A)	RED RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE	
	(-20) - 0	0 - 20	20 - 35	35 - 40	

***NOTE:** tachometer and oil temperature indication ranges are factory set by Dynon. The color ranges automatically change depending on actual oil temperature (see *Dynon Skyview Pilot's User Guide* for more information).

2.6 WEIGHT AND CENTER OF GRAVITY LIMITS

Maximum takeoff weight	550 kg / 1212 lbs
Maximum landing weight	550 kg / 1212 lbs
Typical empty weight	310 / 684 lbs
Typical useful load	240 kg / 528 lbs
Most forward CG	25 % MAC 267 mm or 10 7/16"
Most rearward CG	37 % MAC 373 mm or 14 11/16"

NOTE: The reference datum is wing's leading edge at root.

2.7 OCCUPANCY

Max. Occupancy	Pilot and 1 Passenger
Maximum weight / per seat	110 kg / 242 lbs, 200 kg/ 440 lbs total
Minimum weight solo pilot	55 kg / 121 lbs
Maximum baggage weight *	10 kg / 22 lbs

* use allowed only when solid Baggage Compartment Assembly (p/n 161-25-50-000) is installed and CG limitations are respected

2.8 FUEL

Approved fuels include MOGAS or AVGAS 100LL, as per Rotax specification*, with max. 10% ethanol and the following antiknock properties: min. RON 90 (min. AKI 87)

Total fuel capacity	50 liters / 13.2 US gal 36 kg / 79 lbs
Total usable fuel (all flight conditions)	48 liters / 12.7 US gal 34.5 kg / 76 lbs

* See latest edition of Rotax *Service Instruction SI-912-016 "Selection of suitable operating fluids"*.

NOTE: Operation with leaded fuels (including AVGAS) results in shorter oil filter replacement intervals of 50 hours.

NOTE: Unusable fuel is 2 liters (0.5 US gal).

2.9 OIL/COOLANT

Recommended oil: Aero Shell Oil Sport Plus 4 (as per Rotax specification*).

Maximum oil capacity	3.5 liter / 3.0 quart
Minimum oil required	marked on dipstick
Approved coolant*	50/50 water/antifreeze mixture
Min/max coolant quantity	marked on overflow bottle

* as per Rotax specification - see SI-912-016 "Selection of suitable operating fluids" latest issue.

2.10 FLIGHT LOAD FACTOR LIMITS

+ 4.0 g / - 2.0 g

NOTE: Engine will not operate below 0.0 g due to design of engine's fuel and oil system. Limitations from Rotax Specification apply.

2.11 MANEUVER LIMITS

This airplane is compliant to LSA regulations and is not designed for aerobatic operations. Only those operations incidental to normal flight are approved. These operations include normal stalls, chandelles, lazy eights, and turns in which the angle of bank is limited to a maximum of 60°.

Intentional spinning is NOT approved!

2.12 ALTITUDE LIMITS

Maximum operating altitude	18,000 ft MSL
----------------------------	---------------

NOTE: In most countries operating rules require the use of supplemental oxygen at specified altitudes below the maximum operating altitude.

2.13 TEMPERATURE LIMITS

Flight when the temperature of the aircraft's surface is at risk of exceeding 55° C is prohibited.

2.14 MINIMUM FLIGHT CREW

The minimum flight crew is one pilot.

2.15 KINDS OF OPERATION

The airplane is approved for the following operations:

- *VFR-day*

NOTE: The airplane must be equipped according to the MLE for the planned kind of operation, see 2.15.1.

- *VFR-night*

NOTE: The minimum list of equipment for Night VFR is identical that for DAY-VFR, but shall include any additional equipment deemed necessary by local regulations in the given area of operation.

- *IFR (VMC conditions only)*

The minimum list of equipment for IFR-VMC is identical that for DAY-VFR, but shall include any additional equipment deemed necessary by local regulations in the given area of operation. Operator must ensure that installed IFR equipment is operated and serviced in accordance with local regulation requirements and OEM documentation guidelines (e.g. when executing Performance Based Navigation operations, Receiver Autonomous Integrity Monitoring check is also required).

NOTE: IFR flight only allowed in VMC conditions and with approved IFR instruments and appropriate pilot rating/certification.

2.15.1 MINIMUM LIST OF EQUIPMENT

The MLE lists the basic serviceable equipment that is required to safely operate the aircraft under the listed kind of operations.

NOTE: Additional minimum equipment may be required by national regulations or the nature of the operation.

SYSTEM, INSTRUMENT, EQUIPMENT	MLE - REQUIRED FOR KIND OF OPERATION	
	VFR Day	Remarks
VHF COM / (NAV)	-	<i>The number of items required depends on the type of operation and applicable local regulations.</i>
Interphone including headsets and microphones	-	<i>The number of items required depends on the type of operation and applicable local regulations.</i>
Autopilot disconnect (if installed)	-	<i>May be inoperative, provided the autopilot is not used and disconnected</i>
Battery	1	
Battery voltage indication	1*	
GEN Fail Light	1	
Safety belts and Harnesses	2	<i>One may be inoperative if the flight is conducted in single pilot operations, and if the affected seat is not occupied.</i>
Emergency Locator Trans. (ELT) (if installed)	1	<i>Depends on the type of operation and applicable local regulations</i>
Ballistic Parachute Rescue System	1	<i>Needs to be operative when installed.</i>
Stall Warning System	1*	<i>If more than 1 is installed, at least 1 must be operative.</i>
Pitch Trim Indicator	1	
Pitch Trim System	1	
Electric Fuel Pump	1	
Fuel Quantity Indicator	1*	
Fuel Shutoff Valve	1	
Hourmeter	1*	<i>May be inoperative provided a procedure is established to record flight time.</i>
Clock	1*	<i>Also a wristwatch indicating hours, minutes, seconds is acceptable</i>
Airspeed Indicator	1*	
Altimeter	1*	
Magnetic Compass	1	
Transponder	-	<i>The number of items required depends on the type of operation and applicable regulations.</i>
MAP Indicator	1*	
Tachometer (RPM Indicator)	1*	
Coolant Temperature Ind.	1*	
Oil Temperature Indication	1*	
Oil Pressure Indication	1*	

* The indication is integrated into the PFD-MFD system/display

2.16 OPERATIONAL RESTRICTIONS

Flight into known icing conditions is prohibited.

No flights in heavy rainfall or blizzard conditions.

Areas with risk of thunderstorms should be avoided.

Smoking is prohibited.

Engine: -25°C / -13°F (oil temperature) to 50°C / 122°F (ambient temperature) as per Rotax OM.

The 12 V power outlets are not approved to supply power to flight-critical communication or navigation devices.

GPS is for information only and should not be used for primary navigation heading references.

Do not take-off or land when crosswind component exceeds 18 kts (9 m/s).

Do not take-off with flaps retracted (0).

Do not take-off with airbrakes extended (if applicable)

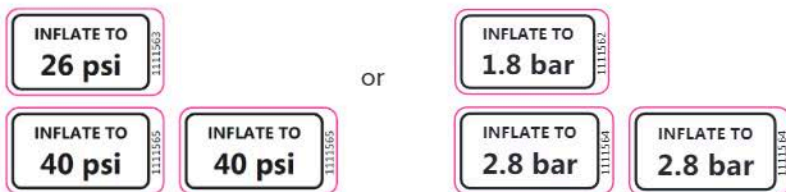
2.17 PLACARDS

2.17.1. PLACARDS (EXTERNAL)

Next fuel tank filler neck:



Next to wheel tire pressure hatches:



On each main landing gear wheel fairing (if installed) - 2x:



On vent/drain holes:



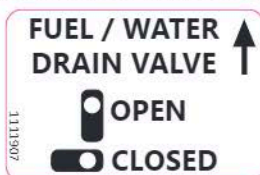
Around each static port - 2x:



Next to door opening latches:



Next to fuel drain outlet on bottom engine cowl:



Near the oil system
breather:



On the fuel system
breather:



2.17.2 PLACARDS (ENGINE COMPARTMENT)

On coolant bottle, oil bottle:



2.17.3 PLACARDS (INSTRUMENT PANEL)

APPROVED TO FLY IN VISUAL METEOROLOGICAL CONDITIONS (VMC) ONLY!
FLIGHTS IN INSTRUMENTAL METEOROLOGICAL CONDITIONS (IMC) ARE PROHIBITED!

BAGGAGE WEIGHT limit 22 lbs (10 kg)

See Pilot's Operating Handbook for details.

EAW	<input type="text"/>	lbs
MTOW	1212	lbs
CREW WT	min. 121	lbs

or

EAW	<input type="text"/>	kg
MTOW	550	kg
CREW WT	min. 55	kg

PASSENGER WARNING
THIS AIRCRAFT WAS MANUFACTURED
IN ACCORDANCE WITH THE LIGHT
SPORT AIRCRAFT AIRWORTHINESS
STANDARDS AND DOES NOT
CONFORM TO STANDARD CATEGORY
AIRWORTHINESS REQUIREMENTS

(if applicable)

CABIN LIGHT
<input type="radio"/> ON
<input type="radio"/> OFF

ON
<input type="radio"/> OFF
INTERCOM

ONLY FOR
DIAGNOSTICS
AND UPGRADES

ONLY FOR
POWER FLARM

OPERATING SPEEDS			
V _{S0}	42	KIAS	V _N
V _S	49	KIAS	130 KIAS
V _A	92	KIAS	
V _{NO}	104	KIAS	

MAX EXTENSION SPEED FLAPS		
V _{FE+2}	+2	60 KIAS
V _{FE+1}	+1	70 KIAS
V _{FE0}	0	130 KIAS

On the side of the instrument panel (if applicable):

**STALL WARNING
CALIBRATION**

2.17.4 PLACARDS (CENTER CONSOLE)

Next to fuel shut off valve:



Next to choke and throttle levers (2x):



On flap lever (2x):



Next to cabin-air control lever:



Next to brake lever (2x):



2.17.5 PLACARDS (CABIN)

In front of control sticks - rudder pedal adjustment (2x):



Below each door to depict door handle operation:



On upper tube in front of pilot:



Next to the microphone
and headphone jacks:

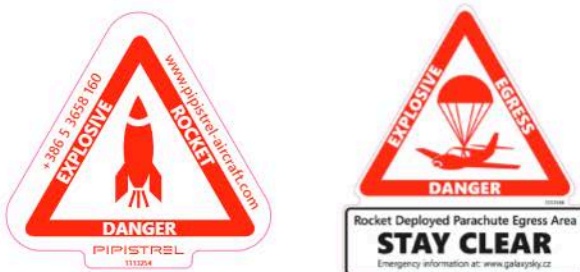


On the dashboard:

DATE:		Calibrated with radio						ON	OFF
For	N	30	60	E	120	150			
Steer									
For	S	210	240	W	300	330			
Steer									

2.17.6 PLACARDS (BALLISTIC PARACHUTE RESCUE SYSTEM)

On/adjacent to parachute rescue system hatch and over rocket position:



Next to doors (2x):



Next to rocket exhaust (bottom of fuselage):



Next to activation handle (cockpit):



On the parachute rescue system canister (OEM made placards):

 Galaxy GRS GALAXY RESCUE SYSTEMS BALLISTIC PARACHUTE GALAXY HOLDING s.r.o. Czech Republic - Liberec Ph/Fax: +420 485 104 492 www.galaxysky.cz Se.No. _____ Part No. GRS _____	RESCUE BALLISTIC PARACHUTE	
	GRS	ASTM F 2316-12
	Model: (max MTOW) _____	
	Allowed speed under: _____ km/h _____ Mph	
	WARNING! Exceeding these limitations, or using improper installation, may cause deployment failure and death or serious injury to occupants.	
Modification: _____		
Patent: CZ 859-94 Patent No: US, 997,535 B2 / 16.8.11		
Manufacture date: _____ Must be rechecked by the co. GRS only and inspected before: _____		

Galaxy rescue ballistic parachute system GRS

WARNING!

Patent: CZ 859-94
Patent No: US, 997,535 B2 / 16.8.11

- The system GRS is loaded and ready to fire!
- It is prohibited to remove or open any part that have been marked by a red seal.
- After the montage cut the red yarn on the handle and the system is ready for use.
- All the other instructions see in a manual book on www.galaxysky.cz

ATTENTION!

**Pyrotechnical device
DANGER OF DEPLOYMENT!**



Rocket Deployed Parachute Egress Area

STAY CLEAR

GRS GALAXY RESCUE BALLISTIC PARACHUTE SYSTEMS
GALAXY HOLDING s.r.o.

Contact your local agent: www.galaxysky.cz



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SECTION

3

SECTION 3 – EMERGENCY PROCEDURES

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3.1 INTRODUCTION

This section provides procedures for handling emergencies and critical flight situations. Although emergencies caused by airplane, systems, or engine malfunctions are extremely rare, the guidelines described in this section should be considered and applied as necessary should an emergency arise.

En-route emergencies caused by weather can be minimized or eliminated by careful flight planning and good judgment when unexpected weather is encountered.

In-flight mechanical problems will be extremely rare if proper preflight inspections and maintenance are practiced. Always perform a thorough walk-around preflight inspection before any flight to ensure that no damage occurred during the previous flight or while the airplane was on the ground. Pay special attention to any oil/fluid leaks or fuel stains that could indicate engine problems.

Aircraft emergencies are very dynamic events. Because of this, it is impossible to address every action a pilot might take to handle a situation. However, four basic actions can be applied to any emergency:

Maintain Aircraft Control

Many minor aircraft emergencies turn into major ones when the pilot fails to maintain aircraft control. Remember, do not panic and do not fixate on a particular problem. To avoid this, even in an emergency: aviate, navigate, and communicate, in this order. Never let anything interfere with your control of the airplane. Never stop flying.

Analyze the Situation

Once you are able to maintain control of the aircraft, assess the situation. Look at the engine parameters. Listen to the engine. Determine what the airplane is telling you.

Take Appropriate Action

In most situations, the procedures listed in this section will either correct the aircraft problem or allow safe recovery of the aircraft. Follow them and use good pilot judgment.

SECTION 3

EMERGENCY PROCEDURES

The Ballistic Parachute Rescue System (BPRS) should be activated in the event of a life-threatening emergency where BPRS deployment is determined to be safer than continued flight and landing.

Land immediately

Continuation of the flight may be more hazardous than ditching or landing in terrain normally considered unsuitable.

Land as soon as possible

Find the nearest suitable area, such as an open field, at which a safe approach and landing is assured, and land without delay.

Land as soon as practical

The continuation of the flight and the landing site, such as the nearest available runway, is at discretion of the pilot. It is not recommended to continue the flight beyond the nearest suitable landing area.

CAUTION: The following procedures apply to an aircraft configured with all the optional equipment and systems. Skip steps that do not apply to the specific aircraft if the equipment is not installed. See Chapter 7 for additional information.

3.2 AIRSPEEDS FOR EMERGENCY OPERATIONS

Maneuvering speed:	92 KIAS
Best Glide speed (flaps 0):	69 KIAS
Minimum sink speed (flaps 0):	58 KIAS
Minimum sink rate (flaps 0):	460 ft/min
Best L/D ratio (flaps 0):	15:1

3.3 GROUND EMERGENCIES

3.3.1 ENGINE FIRE DURING ENGINE START

A fire during engine start may be caused by fuel igniting in the fuel induction system. If this occurs, attempt to draw the fire back into the engine by continuing to crank the engine.

1	Fuel Valve	CLOSED
2	Fuel (Booster) pump	OFF
3	Brakes	ENGAGE

Once the aircraft has stopped:

4	Starter	KEEP CRANKING
5	Throttle Lever	FULL POWER

If fire is extinguished:

6	Ignition Switch or MAG L / MAG R Switches	OFF
7	Master Switch or Master GEN & Master BAT	OFF

If fire persist, perform Emergency Engine Shutdown on Ground and Emergency Ground Egress checklists.

3.3.2 EMERGENCY ENGINE SHUTDOWN ON GROUND

1	Throttle Lever	IDLE
2	Ignition Switch or MAG L / MAG R Switches	OFF
3	Fuel Valve	CLOSED
4	Master Switch or Master GEN & Master BAT Switches	OFF
5	Fuel (Booster) pump	CHECK OFF

3.3.3 EMERGENCY GROUND EGRESS

1	Engine	SHUTDOWN
2	Brakes / Parking Brake	ENGAGED
3	Seat Belts	RELEASE
4	Airplane	EXIT

While exiting the airplane, make sure evacuation path is clear of other aircraft, spinning propellers, and other hazards. If the engine is left running, set the parking brake prior to evacuating the airplane.

3.4 IN-FLIGHT EMERGENCIES

3.4.1 ENGINE FAILURE AT TAKEOFF (LOW ALTITUDE)

If the engine fails immediately after take-off, abort by landing on the runway. If this is not possible and altitude is not sufficient enough to restart the engine, lower the nose to maintain airspeed and establish a glide attitude. In most cases, the landing should be made straight ahead, turning only to avoid obstructions. After establishing a glide for landing, perform as many of the checklist items as time permits.

WARNING: If a turn back to the runway is elected, be very careful not to stall the airplane.

1	Best Glide or Landing Speed (as appropriate)	ESTABLISH
2	Fuel Valve	CLOSED
3	Ignition Switch or MAG L / MAG R Switches	OFF
4	Flaps	AS REQUIRED
5	Fuel (Booster) pump	CHECK OFF

If time permits:

1	Throttle Lever	IDLE
2	Seat Belts	ENSURE SECURED
3	Master Switch or Master GEN & Master BAT Switches	OFF (just before touch down)

WARNING: The MASTER Switch disconnects the battery with main bus. Avionics will therefore shut down after turning off master switch.

3.4.2 ENGINE FAILURE IN FLIGHT

If the engine fails at altitude, pitch as necessary to establish best glide speed (69 KIAS). While gliding toward a suitable landing area, attempt to identify the cause of the failure and correct it. If altitude or terrain does not permit a safe landing, BPRS deployment may be required.

Best Glide Speed and Best Glide Ratio conditions:

Propeller	STOPPED
Flaps	0
Max. Glide (L/D) Ratio (flaps 0):	15:1
Best Glide speed (flaps 0):	69 KIAS
Minimum sink speed (flaps 0):	58 KIAS
Minimum sink rate (flaps 0):	460 ft/min

WARNING: If engine failure is accompanied by fuel fumes in the cockpit or internal engine damage is suspected, set fuel valve and fuel (booster) pump to OFF and do not attempt a restart.

1	Best Glide Speed (69 KIAS)	ESTABLISH
2	Fuel Valve	CHECK OPEN
3	Ignition Switch or MAG L / MAG R Switches	BOTH / ON

3.4.3 ENGINE START IN FLIGHT

NOTE: Engine Start in flight may be performed during 1g flight anywhere within the normal operating envelope of the airplane.

1	Master Switch or Master BAT Switch	ON
2	Throttle Lever	10 mm OPEN
3	Ignition switch or Starter	START / ENGAGE (Propeller not windmilling)
4	Throttle Lever	slowly INCREASE
5	Master GEN Switch (if applicable)	ON (after the engine has started)

NOTE: If engine does not start, perform Landing Emergencies procedure.

3.4.4 ENGINE PARTIAL POWER LOSS

Indications of a partial power loss include fluctuating RPM, reduced or fluctuating manifold pressure, low oil pressure, high oil temperature and a rough-running engine. Mild engine roughness in flight may be caused by one or more spark plugs becoming fouled. A sudden engine roughness or misfiring is usually evidence of an ignition system malfunction.

NOTE: Low or no oil pressure may be indicative of an imminent engine failure.

NOTE: A damaged propeller may cause extremely rough operation. If an out-of-balance propeller is suspected, immediately shut down engine and perform Emergency Landing procedure.

If a partial engine failure permits level flight, land at a suitable airfield as soon as possible. If conditions do not permit safe level flight, use partial power as necessary to set up a emergency landing pattern over a suitable landing field. Always be prepared for a complete engine failure and consider BPRS deployment if a suitable landing site is not available.

WARNING: If there is a strong smell of fuel in the cockpit, divert to the nearest suitable landing field. Fly an emergency landing pattern and shut down the engine fuel supply once a safe landing is assured.

The following procedure provides guidance to determine and correct some of the conditions contributing to a rough running engine or a partial power loss:

1 Throttle Lever

SWEEP

Move the Throttle Lever through the complete range to obtain the best operation possible.

2 Ignition Switch
or
MAG L / MAG R Switches

**Check single MAG
operation**

Cycling the ignition switch(es) momentarily from BOTH to only MAG L and then to only MAG R may help identify the problem. An obvious power loss in single ignition operation indicates ignition system or spark plug trouble. Return switches to both ON position unless extreme roughness dictates the use of a single ignition circuit.

3 Land

AS SOON AS POSSIBLE

3.4.5 LOW OIL PRESSURE

If low oil pressure is accompanied by a rise in oil temperature, the engine has probably lost a significant amount of its oil and engine failure may be imminent. Immediately reduce engine power to idle and select a suitable field for emergency landing.

WARNING: Prolonged use of high power settings after loss of oil pressure will lead to engine mechanical damage and total engine failure.

1	Throttle Lever	MINIMUM REQUIRED
2	Land	AS SOON AS POSSIBLE

NOTE: Full power should only be used following a loss of oil pressure when operating close to the ground and only for the time necessary to climb to an altitude permitting a safe landing or analysis of the low oil pressure indication to confirm oil pressure has actually been lost.

If low oil pressure is accompanied by normal oil temperature, it is possible that the oil pressure sensor, gauge, or relief valve is malfunctioning. In any case, land as soon as practical and determine cause.

3.5 STALL RECOVERY

1	Reduce angle of attack	Release stick to neutral, to reduce angle of attack
2	Throttle Lever	Full Power
3	Horizontal Flight	Resume

The aircraft is equipped with a stall warning system warning that is activated as aerodynamic stall condition is imminent. See Section 7.12 for more details.

3.6 SPINS

The airplane is NOT approved for intentional spins.

While the stall characteristics of the airplane make accidental entry into a spin extremely unlikely, spinning is possible. Spin entry can be avoided by using good airmanship: coordinated use of controls in turns, proper airspeed control and never abusing the flight controls with accelerated inputs when close to the stall.

If the controls are misapplied or abrupt inputs are made to the control surfaces at or around stall, a sudden wing drop may be felt and a spiral or spin may be entered. In some cases it may be difficult to determine if the aircraft has entered a spiral or the started spinning.

The aircraft is equipped with haptic stall warning system in the control stick handles that is activated as aerodynamic stall condition is imminent.

In any case, spin recovery technique is classic:

1	Throttle IDLE
2	Apply full rudder deflection in direction opposite the spin
3	Lower the nose towards the ground to build speed (Stick forward)
4	As rotation stops, neutralize rudder
5	Establish horizontal flight without exceeding g-load or airspeed limitations

3.7 FIRE IN FLIGHT

3.7.1 SMOKE IN THE COCKPIT

If smoke and/or fumes are detected in the cabin, check the engine parameters for any sign of malfunction. If a fuel leak has occurred, actuation of electrical components may cause a fire. If there is a strong smell of fuel in the cockpit, divert to the nearest suitable landing field. Land and shut down the fuel supply to the engine once a safe landing is assured.

1	Cabin Air Selector	OFF (Push)
2	Door Vents, Roof outlet (if installed)	OPEN
- If source of smoke and fumes is firewall forward (smoke decreases):		
3	Fan Toggle Switch (if installed)	OFF
4	Land	AS SOON AS POSSIBLE

- If source of smoke and fumes is inside the cabin (smoke increasing, cause is most likely electric):

3	Cabin Air Selector	ON (Pull)
4	Fan Toggle Switch (if installed)	ON

- If time/situation permits:

5	Circuit Breakers on Switch Panel	Disengage one at a time until the failed system is found and source of smoke eliminated
6	Land	AS SOON AS POSSIBLE

- If time/situation does not permit individual load disconnection, or if it is not successful (smoke does not decrease):

5	Master Switch or Master GEN & BAT Switches	OFF
6	Land	AS SOON AS POSSIBLE

CAUTION: When Master Switch is turned OFF, the engine will continue to run but the power to the Electronic Flight Displays will be cut if not equipped with a backup battery. Refer to analogue/backup instruments for the continuation of flight.

NOTE: Door structure/hinge is not designed for intentional open-door operations. Be advised that the chances of door failure occurring is higher, as the airspeed at which the door's opened at increases.

3.7.2 ENGINE FIRE IN FLIGHT

If an engine fire occurs during flight, do not attempt to restart the engine.

1	Fuel Valve	CLOSED
2	Fuel (Booster) pump	OFF
3	Cabin Air Selector	OFF
4	Throttle Lever	Full Forward
5	Ignition Switch or MAG L / MAG R Switches	OFF (after engine stops)
6	Land	IMMEDIATELY
7	Master Switch or Master GEN & Master BAT Switches	OFF (just before touchdown)

WARNING: The MASTER Switch disconnects the battery with main bus. Avionics will therefore shut down after turning off master switch.

NOTE: As an alternative, putting the airplane into a dive may put the fire out.

3.7.3 COCKPIT FIRE IN FLIGHT

If the cause of the fire is apparent and accessible, use a fire extinguisher (if available), or any other means, to extinguish flames and land as soon as possible. Opening the vents may feed the fire, but to avoid incapacitating the crew from smoke inhalation, it may be necessary to rid cabin of smoke or fumes.

1	Cabin Air Selector	OFF
2	Battery disconnect switch (if installed)	PULL
3	MASTER Switch or Master GEN & Master BAT Switches	OFF
4	Fire Extinguisher (if available)	ACTIVATE
5	Door Vents / Roof outlet (if installed)	AS REQUIRED

WARNING: If turning off the master switch eliminates the fire situation, leave the master switch OFF. Do not attempt to isolate the source of the fire by checking each individual electrical component.

WARNING: After pulling the battery disconnect switch an engine restart will no longer be possible! To reconnect the battery, which is only permitted on the ground, see Section 7.8.4.

CAUTION: When Master Switch is turned OFF, the engine will continue to run but the power to the Electronic Flight Displays will be cut if not equipped with a backup battery. Refer to analogue/backup instruments for the continuation of flight.

WARNING: Should the fire extinguisher contain Halon gas, its operation can be toxic, especially in a closed area. After extinguishing fire, ventilate cabin by opening air vents and unlatching door (if required).

- If airflow is not sufficient to clear smoke or fumes from cabin after the fire has been extinguished:

6 Land

AS SOON AS POSSIBLE

NOTE: The door structure/hinge is not designed for intentional open-door operations. Be advised that the chance of door failure occurring is higher, as the airspeed at which the door is opened at increases.

3.8 BPRS DEPLOYMENT

The Ballistic Parachute Rescue System (BPRS) should be activated in the event of a life-threatening emergency where BPRS deployment is determined to be safer than continued flight and landing.

WARNING: BPRS deployment is expected to result in loss of the airframe and, depending upon adverse external factors such as high deployment speed, low altitude, or rough terrain may result in severe injury or death to the occupants. Because of this, BPRS should only be activated when any other means of handling the emergency would not protect the occupants from serious injury.

CAUTION: Expected impact in a fully stabilized deployment is equivalent to a drop from approximately 3 meters.

Once it is decided to deploy BPRS, the following actions should be taken:

1	Airspeed	MINIMUM POSSIBLE
----------	-----------------	-------------------------

NOTE: The maximum demonstrated deployment speed is 170 TAS.

Reducing airspeed allows minimum parachute loads and prevents structural overload and possible parachute failure.

2	Ignition Switch or MAG L / MAG R Switches	OFF (if time and altitude permit)
----------	--	--

Generally, a distressed airplane will be safer for its occupants if the engine is not running.

3	Activation Handle	PULL
----------	--------------------------	-------------

Pull the activation T-handle from its holder. Pull down/forward on handle with both hands in a strong, steady, and continuous motion. Maintain maximum pull force until the rocket activates.

NOTE: Pull handle strongly at least 30 centimeters to make sure activation is successful.

WARNING: Rapidly pulling the activation T-handle will greatly increase the pull forces required to activate the rocket. Use a firm and steady pulling motion.

After Deployment:

4	Fuel Valve	CLOSED
5	Fuel (Booster) pump	OFF

Shutting off fuel supply to engine will reduce the chances of fire resulting from impact at touchdown.

6	Master Switch or Master GEN & Master BAT Switches	OFF
7	ELT	ACTIVATE
8	Seat Belts and Harnesses	TIGHTEN

All occupants must have seat belts securely fastened.

9	Loose Items	SECURE
----------	--------------------	---------------

If time permits, all loose items should be secured to prevent injury from flying objects in the cabin at touchdown.

10	Assume emergency landing body position
-----------	---

The emergency landing body position is assumed by placing both hands on the lap, clasping one wrist with the opposite hand, and holding the upper torso erect and against the seat backs.

After the airplane comes to a complete stop, evacuate quickly and move upwind.

As occupants exit the airplane, the reduced weight may allow winds to drag the airplane further. As a result of landing impact, the doors may jam. If the doors cannot be opened, break out the windows. Crawl through the opening.

3.9 LANDING EMERGENCIES

If all attempts to restart the engine failure and an emergency landing is imminent, select a suitable field and prepare for the landing. If flight conditions or terrain does not permit a safe landing, BPRS deployment may be required.

A suitable field should be chosen as early as possible so that maximum time will be available to plan and execute the emergency landing. For emergency landings on unprepared surfaces, use full flaps if possible. Land on the main gear and hold the nose wheel off the ground as long as possible. If engine power is available, before attempting an "off airport" landing, fly over the landing area at a low but safe altitude to inspect the terrain for obstructions and surface conditions.

NOTE: Use of full (+2) flaps will reduce glide distance. Full flaps should not be selected until landing is assured.

3.9.1 EMERGENCY LANDING WITHOUT ENGINE POWER

1	Best Glide Speed	ESTABLISH - 69 KIAS
2	Throttle Lever	IDLE
3	Fuel Valve	CLOSED
4	Fuel (Booster) pump	OFF
5	Ignition Switch or MAG L / MAG R Switches	OFF
6	Transponder	SQUAWK 7700
7	ELT switch	ON (if necessary)
8	Radio	Transmit (121.5 MHz) MAYDAY, giving locations and intentions

9	Flaps (when landing is assured)	+2
10	Master Switch or Master GEN & Master BAT Switches	OFF (just before touch down)
11	Seat Belts	SECURED

WARNING: The MASTER Switch disconnects the battery with main bus. Avionics will therefore shut down after turning off master switch.

3.9.2 DITCHING

1	Radio	Transmit (121.5 MHz) MAYDAY, giving location and intentions
2	ELT switch	ON
3	Transponder	SQUAWK 7700
4	BPRS	PULL
5	Doors	UNLATCH before impact with water
6	Airplane	EVACUATE
7	Flotation Devices	INFLATE WHEN CLEAR OF AIRPLANE

NOTE: If available, life preservers should be donned and life raft should be prepared for immediate evacuation upon touchdown. Consider OPENING a door prior to assuming the emergency landing body position in order to provide a ready escape path.

It may be necessary to allow some cabin flooding to equalize pressure on the doors. If the doors cannot be opened, break out the windows and crawl through the opening.

3.9.3 LANDING WITH A DEFECTIVE MAIN LANDING GEAR TIRE

1	Land the airplane at the edge of the runway that is located on the side of the intact tire, so that changes in direction during roll-out due to the braking action of the defective tire can be corrected on the runway.
2	Land with the wing low on the side of the intact tire.

3

Direction should be maintained using the rudder. This should be supported by use of the brake. It is possible that the brake must be applied strongly - if necessary to the point where the wheel locks.

CAUTION: A defective tire is not easy to detect. The damage normally occurs during take-off or landing and is hardly noticeable during fast taxiing. It is only during the lower taxiing speeds that a tendency to swerve occurs.

3.9.4 LANDING WITH DEFECTIVE BRAKES

1

Seat belts

CHECK FASTENED AND
TIGHTENED

After a safe touch-down:

2

Ignition Switch
or
MAG L/ MAG R Switches

OFF

3

Fuel Valve

CLOSED

4

Fuel (Booster) pump

OFF

5

Master Switch
or
Master GEN & Master BAT Switches

OFF

WARNING: The MASTER Switch disconnects the battery with main bus. Avionics will therefore shut down after turning off master switch.

3.10 PFD-MALFUNCTION

In case of ADAHRS failures:

PFD - Loss of Air Data

In the event the PFD detects a loss of air data (ADAHRS failure), or data is unreliable, the affected indicator is removed from the display and replaced with a red "X". If loss of air data occurs, refer to the mechanical instruments (altitude, airspeed).

PFD - Loss of Attitude Data

In the event the PFD detects a loss of attitude data (ADAHRS failure), or data is unreliable, the affected indicator is removed from the display and replaced with a red "X".

WARNING: When subjected to a power loss of less than 20 seconds, the PFD is capable of performing a warm start. In this event, a "PLEASE STAND-BY" message will be displayed for 2 seconds followed by a "ATTEMPTING QUICK RESTART" message. In the event of a power loss greater than 20 seconds, a warm start is unlikely, and the power interruption will result in loss of attitude information until the PFD can be restarted on the ground.

In the unlikely event of a total single-display configuration's PFD failure, respective circuit breaker may be pulled and the airplane flown using the mechanical instruments.

3.11 GENERATOR FAILURE

Steady illumination of the "GENERATOR FAIL" caution light on the switch panel indicates a failure of the generator. The most likely the cause of the generator failure is a wiring fault, a malfunctioning generator, or a malfunctioning voltage regulator. Usually, electrical power malfunctions are accompanied by an excessive rate of charge or a discharge rate shown on the ammeter. In this condition on board battery should provide power for at least 30 minutes.

If generator failure persists

1	Unnecessary equipment	OFF (to reduce loads)
2	Voltage	Monitor
3	Land	AS SOON AS PRACTICAL

CAUTION: The generator in this airplane is self-exciting. This generator requires battery power for generator starting; however, once started, the generator will provide self-generated field power to continue operation in case of a battery failure. To assure generator restart power is available if the generator fails, the battery should not be disconnected during flight.

NOTE: If it is necessary to reduce electrical loads due to an generator malfunction, switch off electrical components and/or systems that are not essential for the current flight conditions rather than pulling circuit breakers. Load shedding in this manner will prevent accidental circuit breaker disconnection and loss of power to flight-critical systems.

NOTE: The generator in this airplane is self-exciting. This generator requires battery power for starting; however, once started, the generator will provide self-generated power to continue operation in case of a battery failure.

3.12 COMMUNICATION SYSTEM FAILURE

1	Switches, Controls, Volume	CHECK
2	Frequency	CHANGE
3	Circuit Breakers	CHECK
4	Headset	CHANGE
5	Transmission	ATTEMPT
6	If unsuccessful	TRANSPONDER 7600

3.13 PITOT STATIC MALFUNCTION

Static Source Blocked

If erroneous readings of the static source instruments (airspeed, altimeter and vertical speed) are suspected, the information from the GPS system should be used for situational awareness. Set cabin air ON.

NOTE: Referring to the GPS for flying, adjust indicated airspeed during climb or approach. Use +10 KTS on top of standard procedure as guidance and observe the wind situation.

Pitot Tube Blocked

If only the airspeed indicator is providing erroneous information, and in icing conditions, the most probable cause is pitot ice. Descend into warmer air. If an approach must be made with a blocked pitot tube, use known pitch and power settings and the GPS groundspeed indicator, taking surface winds into account.

1	Groundspeed indicator	+10 KTS for procedures, observe winds
---	-----------------------	---------------------------------------

3.14 ELECTRIC TRIM / AUTOPILOT FAILURE

Any failure or malfunction of the electric trim or autopilot may be overpowered by use of the control stick. If runaway trim and/or autopilot servo is the problem, cut the electric power by pulling the circuit breaker (P/R SERVO or AP PANEL or TRIM) and land as soon as conditions permit.

3.14.1 ELECTRIC TRIM RUNAWAY

1	Airplane Control	GRASP STICK, MAINTAIN MANUALLY
2	Elevator Trim Circuit Breaker	PULL/DISENGAGE
3	Autopilot (if installed)	DISCONNECT
4	Throttle Lever	AS REQUIRED
5	Control Stick	MANUALLY HOLD PRESSURE
6	Land	AS SOON AS PRACTICAL

3.14.2 ELECTRIC TRIM FAILURE

1	Airplane Control	GRASP STICK, MAINTAIN MANUALLY
2	Elevator Trim Circuit Breaker	Verify ENGAGED

CAUTION: In case of automatic circuit breaker disengagement, pilot can try to re-engage it only once.

If problem is not corrected:

3	Elevator Trim Circuit Breaker	RESET
---	-------------------------------	-------

If problem is not corrected:

4	Elevator Trim Circuit Breaker	DISENGAGE
5	Autopilot (if installed)	DISCONNECT
6	Throttle Lever	AS REQUIRED
7	Control Stick	MANUALLY HOLD PRESSURE
8	Land	AS SOON AS PRACTICAL

3.15 BATTERY OVERVOLTAGE / MALFUNCTION

If overvoltage occurs (over 14.4 V lead-acid battery, 14.6 V lithium battery), the battery must be disconnected from the system to prevent adverse effects.

If Battery Disconnect switch is installed:

1	Battery Disconnect Switch	PULL
---	---------------------------	------

If Battery Disconnect switch is not installed:

1	MASTER Switch or MASTER BAT Switch	OFF
---	--	-----

WARNING: Battery Disconnect Switch / The MASTER Switch disconnect the battery with main bus. Avionics will therefore shut down thereafter.

WARNING: Engine restart is not possible with MASTER switch in OFF position or once the Battery Disconnect Switch is pulled.

The EarthX battery disconnects itself in case of over- or undervoltage.

NOTE: When EarthX battery type is installed, battery over-voltage, low voltage or other battery system malfunctions, are additionally indicated by the Batt Caution light on the switch panel. The rate at which the light flashes, indicates what type of malfunction or error is in question. Please refer to *EarthX ETX lithium battery user's manual* for additional information about how to troubleshoot any battery errors/malfunctions.

3.16 EXCEEDING V_{NE}

Should the VNE be exceeded, pull the stick gently in order to reduce airspeed and continue flying using gentle control deflections. Land safely as soon as possible and have the aircraft verified for airworthiness by authorized service personnel.

3.17 ICE BUILD-UP

Turn back or change altitude to exit icing conditions. Consider lateral or vertical path reversal to return to last "known good" flight conditions. Maintain VFR flight! Set cabin air/heating ON. Watch for signs of icing on the pitot tube. In case of pneumatic instrument failures, use the GPS information to reference to approximate ground speed. Plan the landing at the nearest airport, or a suitable off airport landing site in case of an extremely rapid ice build-up. Increase the speed to avoid stall.

CAUTION: Maneuver the airplane gently and leave the flaps retracted. When ice is built-up at the horizontal stabilizer, the change of pitching moment due to flaps extension may result of loss of elevator control. Approach at elevated speeds (+15 KTS, also if using the GPS as a reference).

WARNING: Failure to act quickly may result in an unrecoverable icing encounter.

WARNING: If control is lost, it may be necessary to deploy the Ballistic Parachute Rescue System (BPRS).



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CHECKLISTS

EMERGENCY PROCEDURES

NOTE: Use of the following checklists is not obligatory
and at the discretion of the owner/operator.



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GROUND EMERGENCIES

ENGINE FIRE DURING ENGINE START

Fuel Valve	CLOSED
------------	--------

Fuel (Booster) pump	OFF
---------------------	-----

Brakes	ENGAGE
--------	--------

Once aircraft has stopped:

Starter	KEEP CRANKING
---------	---------------

Throttle Lever	Full Power
----------------	------------

If flames are extinguished:

Ignition Switch or MAG L / MAG R Switches	OFF
---	-----

Master Switch or Master GEN & Master BAT	OFF
--	-----

If flames persist: perform Emergency engine shutdown on Ground and Emergency egress checklist.

EMERGENCY ENGINE SHUTDOWN

Throttle Lever	IDLE
----------------	------

Ignition Switch or MAG L / MAG R Switches	OFF
---	-----

Fuel Valve	CLOSED
------------	--------

Master Switch or Master GEN & Master BAT	OFF
--	-----

Fuel (Booster) pump	CHECK OFF
---------------------	-----------

EMERGENCY GROUND EGRESS

Engine	SHUTDOWN
Brakes / Parking Brake	ENGAGED
Seat Belts	RELEASE
Airplane	EXIT

IN FLIGHT EMERGENCIES

ENGINE FAILURE AT TAKE OFF (LOW ALT)

Best Glide or Landing Speed (as appropriate)	ESTABLISH (see POH)
Fuel Valve	CLOSED
Ignition Switch or MAT L / MAG R Switches	OFF
Flaps	as required
Fuel (Booster) pump	OFF

If time permits:

Throttle Lever	IDLE
Seat belts	ensure secured
Master Switch or Master GEN & Master BAT	OFF (just before touch down)

ENGINE FAILURE IN FLIGHT

Best Glide Speed	ESTABLISH (69 KIAS)
------------------	---------------------

Fuel Valve	CHECK OPEN
------------	------------

Ignition Switch or MAG L / MAG R Switches	BOTH / ON
---	-----------

Restart the engine in flight:

ENGINE START IN FLIGHT

Master Switch or Master BAT	ON
-----------------------------------	----

Throttle Lever	10 mm OPEN
----------------	------------

Ignition switch or Starter (Propeller not windmilling)	START / ENGAGE
---	----------------

Throttle Lever	Slowly INCREASE
----------------	-----------------

Master GEN (if installed)	ON
------------------------------	----

ENGINE PARTIAL POWER LOSS

Throttle Lever	Sweep
----------------	-------

Ignition Switch or MAG L / MAG R Switches	Check single MAG operation
---	-------------------------------

Land	AS SOON AS POSSIBLE
------	---------------------

If engine stops: perform engine failure
in flight check-list

LOW OIL PRESSURE

Throttle Lever	Minimum Required
----------------	------------------

Land	AS SOON AS POSSIBLE
------	---------------------

SMOKE IN THE COCKPIT

Cabin Air Selector	OFF (Push)
--------------------	------------

Door Vents /Roof outlet (if installed)	OPEN
--	------

If source of smoke is firewall forward:

Fan Toggle Switch (if installed)	OFF
-------------------------------------	-----

Land	AS SOON AS POSSIBLE
------	---------------------

If source of smoke and fumes is inside the cabin
(smoke increasing, cause is most likely electric):

Cabin Air Selector	ON (Pull)
--------------------	-----------

Fan Toggle Switch (if installed)	ON
-------------------------------------	----

If airflow is not sufficient to clear smoke
or fumes from cabin:

Circuit Breakers on Switch Panel	Disengage one at a time until the failed system is found and source of smoke eliminated
-------------------------------------	--

Land	AS SOON AS POSSIBLE
------	---------------------

If time/situation does not permit individual load dis-
connection, or if it is not successful (smoke does not
decrease):

Master Switch or Master GEN & BAT	OFF
---	-----

Land	AS SOON AS POSSIBLE
------	---------------------

ENGINE FIRE FLIGHT

Fuel Valve	CLOSED
Fuel (Booster) pump	OFF
Cabin Air Selector	OFF
Throttle Lever	Full Forward
Ignition Switch or Mat L / MAG R Switches	OFF (after engine stops)
Master Switch or Master GEN & Master BAT	OFF (just before touchdown)
Land	IMMEDIATELY

COCKPIT FIRE IN FLIGHT

Cabin Air Selector	OFF
Battery disconnect switch (if installed)	PULL
MASTER Switch or Master GEN & Master BAT	OFF
Fire Extinguisher (if available)	ACTIVATE
Door Vents / Roof outlet (if installed)	As required

If airflow is not sufficient to clear smoke
or fumes from cabin - When fire extinguished:

Land	AS SOON AS POSSIBLE
------	---------------------

STALL RECOVERY

Reduce AoA	Release stick to neutral, to reduce angle of attack
Throttle Lever	Full Power
Horizontal Flight	Resume

SPIN RECOVERING TECHNIQUE

Throttle Lever	IDLE
Rudder	Full deflection - direction opposite to the spin
Stick	Forward - lower the nose to build us speed

As rotation stops:

Rudder	Neutralize
Establish horizontal flight without exceeding g-load or airspeed limitations	

BPRS DEPLOYMENT

Airspeed	MINIMUM POSSIBLE
Ignition Switch or MAG L / MAG R Switches	OFF (if time/altitude permits)
Activation Handle	PULL

After Deployment:

Fuel Valve	CLOSED
Fuel (Booster) pump	OFF
Master Switch or Master GEN & Master BAT	OFF
ELT	ACTIVATE
Seat Belts	TIGHTEN
Loose Items	SECURE

Assume emergency landing body position.
After the impact break out the windows to exit if doors are jammed.

LANDING EMERGENCIES

EMERGENCY LANDING WITHOUT ENGINE POWER

Best Glide Speed	ESTABLISH - 69 KIAS
Transponder	SQUAWK 7700
ELT switch	ON (if necessary)
Throttle Lever	IDLE
Fuel Valve	CLOSED
Fuel (Booster) pump	OFF
Ignition Switch or MAG L / MAG R Switches	OFF
Radio	Transmit (121.5 MHz) MAYDAY
Flaps (when landing is assured)	+2
Master Switch or Master GEN & Master BAT	OFF (just before touchdown)
Seat Belts	SECURED

DITCHING

Radio	Transmit (121.5 MHz) MAYDAY
ELT Switch	ON
Transponder	SQUAWK 7700
BPRS	ACTIVATE
Doors	UNLATCH before impact with water
Airplane	EVACUATE
Floatation Devices	INFLATE when clear of the airplane

LANDING WITHOUT ELEVATOR CONTROL

Flaps	+2
Trim	SET 60 KIAS
Throttle Lever	as required for glide angle

LANDING WITH DEFECTIVE BRAKES

Seat Belts	SECURED
------------	---------

After safe touch-down

Ignition Switch or MAG L / MAG R Switches	OFF
Fuel Valve	CLOSED
Fuel (Booster) pump	OFF
Master Switch or Master GEN & Master BAT	OFF

GENERATOR FAILURE

Unnecessary equipment	Switch OFF (to reduce loads)
Voltage	monitor
Land	AS SOON AS PRACTICAL

PITOT STATIC MALFUNCTION

Refer to GPS for flying:

Ground speed indicator	+10 KTS for procedures, observe winds
------------------------	--

COMMUNICATION FAILURE

Switches, Controls, Volume	CHECK
Frequency	CHANGE
Circuit Breakers	CHECK
Headset	CHANGE
Transmission	ATTEMPT

If unsuccessful:

TRANSPONDER	SQUAWK 7600
-------------	-------------

BATT OVERVOLTAGE / MALFUNCTION

If Battery Disconnect Switch is installed:

Battery Disconnect Switch	PULL
---------------------------	------

If Battery Disconnect Switch is not installed:

Master Switch or Master BAT Switch	OFF
--	-----

TRIM RUNAWAY

Airplane Control	Grasp stick - maintain manually
------------------	---------------------------------

If problem is not corrected:

Trim Circuit Breaker	PULL
Throttle Lever	As required
Control Stick	Manually hold pressure
Land	AS SOON AS PRACTICAL

TRIM / AUTOPILOT FAILURE

Airplane Control

Graps stick - maintain manually

Trim Circuit Breaker

Verify ENGAGED

If problem is not corrected:

Trim Circuit Breaker

RESET
(ONLY once!)

If problem is not corrected:

Trim Circuit Breaker

DISENGAGE

Autopilot (if installed)

DISCONNECT

Throttle Lever

As required

Control Stick

Manually hold pressure

Land

AS SOON AS PRACTICAL

SECTION

4

SECTION 4 – NORMAL PROCEDURES

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4.1 INTRODUCTION

This section provides amplified procedures for normal operation.

CAUTION: The following procedures apply to an aircraft configured with all the optional equipment and systems. Skip steps that do not apply to the specific aircraft if the equipment is not installed. See Chapter 7 for additional information.

4.2 AIRSPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum mass of 550 kg (1212 lbs) and may be used for any lower actual mass. However, to achieve the performance specified in Section 5 for takeoff and landing distance, the speed correction appropriate to the particular mass must be used.

TAKEOFF ROTATION		
Normal	Flaps +1	45-49 KIAS

CLIMB		
Normal	Flaps 0	76 KIAS
Best rate of climb (SL)	Flaps 0	76 KIAS (V_Y)
Best angle of climb (SL)	Flaps 0	58 KIAS (V_X)

LANDING APPROACH		
Normal approach	Flaps +1	60 KIAS
Normal approach	Flaps +2	55 KIAS

GO AROUND		
Full power	Flaps 0 or +1	65 KIAS

Maximum crosswind velocity

Takeoff or landing	18 Knots (9 m/s)
--------------------	------------------

4.3 PREFLIGHT INSPECTION

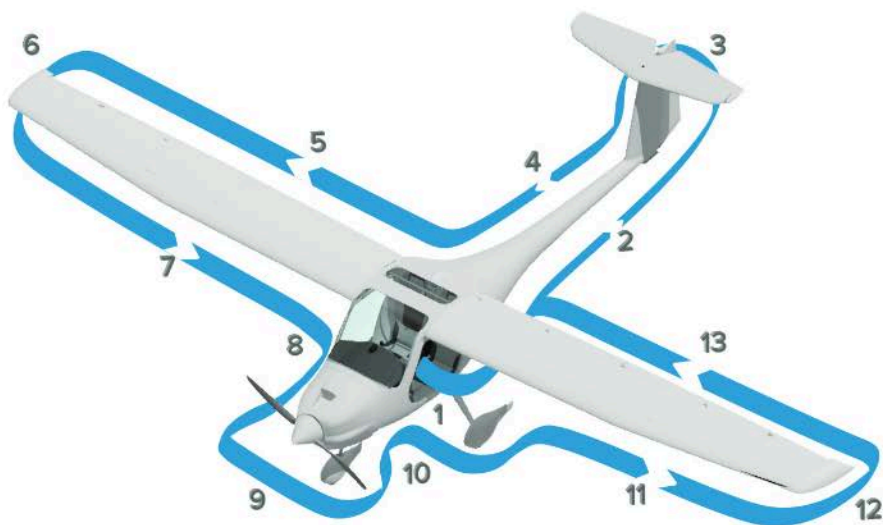
Before carrying out preflight inspections, ensure that all required maintenance has been performed. Review your flight plan and compute weight and balance.

NOTE: Throughout the walk-around: check all visible hinges, hinge pins, and bolts for security; check skin for damage, condition, and evidence of cracks or delaminations; check all control surfaces for proper movement and excessive free play; check area around liquid reservoirs and lines for evidence of leaking; check all visible cable connections for wear. All drain holes shall be clean, unblocked and checked before the first flight of the day

In cold weather, remove all frost, ice, or snow from fuselage, wing, stabilizers and control surfaces. Ensure that control surfaces are free of ice or debris. Check that wheels and wheel fairings (if installed) are free of snow and ice accumulation.

4.3.1 PREFLIGHT WALK-AROUND

Preflight walk-around should be performed according to the flow indicated in the following picture.



1) CABIN		
1	Doors	UNLOCK/OPEN/ CLOSE/SECURE
2*	All accessible electrical harnesses, fuel system components, pitot-static lines and control system components behind the cabin. *(only before the first flight of the day)	Remove seats. CHECK condition. VERIFY no fuel odor
3	All electrical, fuel and pitot-static wing connections	CHECK condition.
4	BPRS handle, pin inserted	CHECK
5	Ignition Switch or MAG L / MAG R Switches	CHECK OFF
6	Green electrical switches	ALL OFF
7	ELT switches (remote and transmitter)	CHECK armed position
NOTE: Check that ELT transmitter and remote switch are BOTH in the ARM position. Check also that antenna and cable harness are properly connected to ELT transmitter! Periodical testing of ELT is required. See OEM for details about testing procedure.		
8	Required documents	On board
9	Flight Controls, Flap handle	Free and Correct
10	Visible rudder cables	CHECK condition
11	Circuit breakers	IN
12	Battery Disconnect Switch (if installed)	CONNECTED
13	Master & Avionics Switches or Master BAT & Master GEN Switches	ON
14	Haptic Stall Warning Self-Test	Check
Five seconds after the BAT Master is turned ON, the haptic stall warning system is tested. See <i>Section 7</i> for more information.		
15	Generator FAIL light	Verify ON
16	Displays	Verify ON
17	Voltmeter	12 - 14 Volts
18	Lights	Check operation
19	Fuel quantity	CHECK
20	Fuel Valve	OPEN

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NORMAL PROCEDURES

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21	Avionics & Master Switches or Master BAT & Master GEN Switches	OFF
22	Circuit breakers	CHECK IN
23	ELT (if installed)	ARMED

2) LEFT FUSELAGE

1	COM/XPDR antennas	Condition and attachment
2	Wing / fuselage seal	CHECK
3	Fuel cap	Check fuel quantity and secure

3) EMPENNAGE

1	Tiedown rope	REMOVE
2	Horizontal and vertical stabilizers	CHECK CONDITION
3	Elevator and elevator U-piece	Condition and movement
4	Rudder	Freedom of movement
5	Tail light (if installed)	Condition and security
6	Attachment hinges, bolts, springs and pins	SECURE

4) RIGHT FUSELAGE

1	Wing / fuselage seal	CHECK
2	Door lock	Unlock
3	Parachute cover, strap covers	Sealed and secure
4	Fuel system breather	Check for blockage

5), 6), 7) RIGHT WING

1	Flaperon	Condition and movement
2	Flaperon gap seal	Condition, no wrinkles
3	Hinges, bolts and safety nuts	Secured
4	NAV/AC lights	Condition and security
5	Leading edge	CHECK condition
6	Water drain holes	Clean
7	Pitot tube	Cover removed, tube clear
8	Airbrake	CHECK condition

8) RIGHT MAIN LANDING GEAR		
1	Landing gear	General condition
2	Tire	Condition, inflation, and wear
3	Wheel and brakes	Fluid leaks, evidence of overheating, general condition and wear
4	Wheel Fairing (if applicable)	CHECK attachment
5	Chocks and tiedown rings/ropes	Remove

9) PROPELLER AND COWLINGS AREA		
1	Cowlings	Attachment secured
2	Propeller	Condition
3	Spinner	Condition, security
4	Air inlets, outlets	Unobstructed
5	Oil system breather	Check for blockage

WARNING: Keep clear of propeller rotation plane. Do not allow others to approach propeller.

9)ENGINE AND NOSE LANDING GEAR AREA		
1	Engine oil	Check quantity, leaks, cap and door secure
2	Exhaust pipe	Condition, security and clearance
3	Gascolator	Drain 1 cup, sample
4	Landing light	Attachment, security, lens
5	Strut	CHECK condition
6	Nose landing gear	General condition
7	Wheel and tire	Condition, inflation and wear
8	Wheel Fairing (if applicable)	CHECK attachment
9	Shock absorber	CHECK functionality

10) LEFT MAIN LANDING GEAR		
1	Landing gear	General condition
2	Tire	Condition, inflation and wear
3	Wheel and brakes	Fluid leaks, evidence of overheating, general condition and wear
4	Wheel Fairing (if applicable)	CHECK attachment
5	Chocks and tiedown rings/ropes	Remove

11), 12), 13) LEFT WING		
1	Leading edge	Condition
2	NAV/AC lights	Condition and attachment
3	Flaperon	Condition, attachment, movement
4	Flaperon gap seal	Condition, no wrinkles
5	Hinges, bolts and safety nuts	Secure
6	Airbrake	CHECK condition

4.4 STARTING ENGINE

4.4.1 BEFORE STARTING ENGINE

1	Preflight Inspection / Logbook	Completed
2	Fuel quantity	Sufficient
3	Emergency Equipment	On board
4	Passenger	Briefed
5	BPRS Safety Pin	Removed
6	Seats, Pedals, Seat Belts and Baggage net	Adjust and Secure
7	Doors	Closed and latched

CAUTION: Ensure seat belt harnesses are not twisted.

4.4.2 STARTING ENGINE

If the engine is warm, no choke is required. For the first start of the day and in cold conditions, applying choke will be necessary.

If the airplane will be started using external power, keep all personnel and power unit cables well clear of the propeller rotation plane.

1	Parking brake	ENGAGE
2	Fuel Valve	OPEN
3	Master & Avionics Switches or Master BAT & Master GEN Switches	ON
4	Haptic Stall Warning Self-Test (if installed)	Check

If haptic stall system is installed, five seconds after the BAT Master / Avionics is turned ON, the warning system is tested. See Section 7 for more information.

5	Generator Fail Light	CHECK ON
6	Choke	As required
7	Propeller Area	Clear
8	Throttle Lever	Open 10 mm
9	Oil Pressure Indication	Available
10	Ignition Switch or MAG L / MAG R Switches	BOTH / ON
11	Ignition switch or Starter	START / ENGAGE

CAUTION: Limit cranking to intervals of 10 seconds only (without interruption), followed by a cooling period of 2 minutes.

12	Oil Pressure	Check
13	Throttle Lever	Slowly increase, maintain 2000 RPM for two mins, then set 2500 RPM for warm up
14	Choke	Slowly close
15	Engine Parameters	Monitor
16	Ammeter/Indication	Check
17	Generator Fail Light	CHECK OFF
18	NAV/AC Lights	ON

CAUTION: After starting, if the oil gauge does not begin to show pressure within 30 seconds in warm weather and about 60 seconds in very cold weather, shut down engine and investigate cause. Lack of oil pressure indicates loss of lubrication, which can cause severe engine damage. In this time also consider the time the avionics suite needs to start displaying engine information.

4.4.3 BEFORE TAXIING

1	Flaps	(0)
2	NAV/COM, GPS, XPDR	SET as required
3	Cabin Heating	As required
4	ELT	Armed and CHECK (refer to OEM for periodical testing)
5	Parking brake	DISENGAGE

4.4.4. TAXIING

When taxiing, directional control is accomplished with rudder/steering deflection. Use only as much power as is necessary to achieve forward movement. Deceleration or taxi speed control using brakes but without a reduction in power will result in increased brake temperature and may in extreme cases cause fire. Taxi over loose gravel at low engine speed to avoid damage to the propeller tips.

WARNING: Maximum continuous engine speed for taxiing is 1800 RPM on flat, smooth, hard surfaces. Power settings slightly above 1800 RPM are permissible to start motion, for turf, soft surfaces, and on inclines. Use minimum power to maintain taxi speed.

If the 1800 RPM taxi power limit and proper braking procedures are not observed, the brake system may overheat and result in brake damage or brake fire.

If due to soft terrain a higher RPM setting is required, please consider not to exceed 2500 RPM before a 50° C oil temperature is achieved.

Check the brakes functionality during taxi.

4.4.5 BEFORE TAKEOFF / HOLDING POINT

During cold weather operations, the engine should be properly warmed up before takeoff. In most cases this is accomplished when the oil temperature has reached at least 50° C (120 °F). In warm or hot weather, precautions should be taken to avoid overheating during prolonged ground engine operation. Additionally, long periods of idling may cause fouled spark plugs.

WARNING: Do not takeoff with frost, ice, snow, or other contamination on the fuselage, wing, stabilizers, and control surfaces.

ENGINE TEST		
1	Parking Brake (brake pin)	ENGAGED
2	Doors	Latched
3	Choke	Verify closed
4	Throttle Lever	4000 RPM

Increase the RPM slowly to assure braking force is sufficient for holding the plane in position.

5	Generator Fail Light	CHECK OFF
6	Voltage	Check value
7	Ignition Switch or MAG L Switch	RIGHT, note RPM, then BOTH or OFF, note RPM, then ON
8	Ignition Switch or MAG R Switch	LEFT, note RPM, then BOTH or OFF, note RPM, then ON

WARNING: RPM drop must not exceed 500 RPM for either "magneto" and the difference in drop should not exceed 150 RPM.

9	Engine Parameters	CHECK
10	Throttle lever	Set to just above idle
11	Parking Brake (brake pin)	DISENGAGED

NOTE: RPM drop must not exceed 500 RPM for either "magneto" and the difference in drop should not exceed 150 RPM. If there is doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists. An absence of RPM drop may indicate faulty grounding of one side of the ignition system or magneto timing set in advance of the specified setting.

BEFORE TAKEOFF		
1	Seat Belts	Secure
2	BPRS activation handle	Verify Pin Removed
3	Airbrakes (if installed)	Check closed *
4	Flaps	Set (+1)
5	Trim	Set neutral
6	Fuel Valve	CHECK OPEN
7	Fuel Quantity	CHECK
8	Fuel (Booster) pump	ON
9	NAV/AC Lights	As required
10	Landing Light	As required
11	Circuit breakers	CHECK
12	NAV/COM, GPS, XPDR	SET
13	Autopilot (if installed)	CHECK disengaged
14	Altimeter	SET
15	Engine Parameters	CHECK
16	Flight Controls	CHECK free and correct

* **WARNING:** Ensure the airbrakes are closed for takeoff! See *SPOH-161-00-41-050 Electric airbrakes POH supplement* for additional information about use, setting and testing.

4.5 TAKEOFF

4.5.1 POWER CHECK

Check full-throttle engine operation early in takeoff run. The engine should run smoothly and turn approximately 5300-5600 RPM. Oil temperature should be above 50 °C (120 °F) and other engine parameters should read in the green range. If power is not developed, abort take-off.

NOTE: For takeoff over a gravel or grass surface, advance power lever slowly. This allows the airplane to start rolling before high RPM is developed, and gravel will be blown behind the propeller rather than pulled into it.

4.5.2 FLAP SETTING

Normal takeoffs are accomplished with flaps set at (+1). For short field Take-offs (+2) flap setting is possible. Using flaps (0) are permissible, however, no performance data is available for takeoffs in the flaps up configuration. is not approved.

Soft or rough field takeoffs are performed with (+2) flaps by lifting the airplane off the ground as soon as practical in a tail-low attitude. If no obstacles are ahead, the airplane can be accelerated immediately to a higher climb speed, while considering the flap limit airspeed.

Takeoffs into strong crosswinds are normally performed with the flaps set at (+1) to minimize the drift angle immediately after takeoff. With the control column deflected into the wind, accelerate the airplane to a speed slightly higher than normal while decreasing the aileron deflection as speed increases then rotate to prevent possibly settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

NORMAL TAKEOFF		
1	Brakes	Release
2	Throttle lever	Full forward
3	Engine Parameters	Check
4	Airspeed indication	Check
5	Elevator Control	Rotate smoothly at about 45-49 KIAS
6	At safe altitude, set flaps/RPM	Flaps (0) / RPM 5500

SHORT FIELD TAKEOFF		
1	Flaps	(+2)
2	Brakes	Hold
3	Throttle Lever	Full forward
4	Engine Parameters	Check
5	Brakes	Release
6	Airspeed indication	Check
7	Elevator Control	Rotate Smoothly at about 45-49 KIAS

8	Airspeed at Obstacle	58 KIAS
9	At 60 KIAS, Flaps	(+1)
10	At safe altitude, set flaps/RPM	Flaps (0) / RPM 5500

4.6 CLIMBING

Normal climbs are performed flaps UP (0) and maximum continuous power (MCP) and best rate-of-climb speed (V_Y). Climb airspeeds of 10 to 20 km/h (5 to 10 knots) higher than best rate-of-climb speeds provide the best combination of performance, visibility and engine cooling. Remember to keep the temperatures and RPM within operational limits during climb.

CAUTION: RPM above 5500 is limited to 5 minutes!

CAUTION: While climbing with high power settings, should oil temperature rise and approach the maximum limit, reducing power will help to stabilize or reduce it.

For maximum rate of climb, use the best rate-of-climb speeds shown in Section 5. If an obstruction dictates the use of a steep climb angle, the best angle-of-climb speed should be used. Climbs at speeds lower than the best rate-of-climb speed should be of short duration to avoid engine-cooling problems.

NOTE: V_X : 58 KIAS [flaps (0)], V_Y : 76 KIAS [flaps (0)]

1	Climb Power/RPM	Set
2	Best Climb Speed	$V_Y = 76$ KIAS
3	Engine Parameters	CHECK

CAUTION: Avoid prolonged use of more than 75% rudder deflection as this may result in a pitch-down moment. Should this occur, first neutralize rudder to recover.

4.7 CRUISE

NOTE: For optimal cruise regime and fuel consumption data, please refer to the performance section.

1	Flaps	(0)
2	Fuel (Booster) pump	OFF
3	Cruise Power	SET
4	Engine Parameters	CHECK
5	Autopilot (if installed)	As required

CAUTION: Should you experience turbulence, reduce airspeed below V_{NO} .

CAUTION: Should the fuel (booster) pump should be re-engaged when performing steep climbs, when vapor lock situations are suspected or rough engine running experienced.

NOTE: If installed, autopilot can be used as required. See section 7 for system details. Make sure to grasp stick firmly prior to autopilot disengagement.

4.8 DESCENT/APPROACH

1	Altimeter	Set
2	Autopilot (if installed)	Disengage
3	Cabin Heating	As required
4	Landing Light	ON
5	Fuel System	CHECK
6	Engine Parameters	CHECK
7	Parking brake	CHECK Disengaged
8	Seat Belts	Secure

4.9 BEFORE LANDING

1	Approach Speed	Reduce below 70 KIAS
2	Flaps	As required (+1)
3	Fuel (Booster) pump	ON
4	Flaps (on final)	(+2) below 60 KIAS
5	Airbrakes (on final) (if installed)	As required *
6	Trim	As required
7	Final Speed	55 KIAS

* **WARNING:** Ensure the airbrakes are closed in event of go around maneuver! See *SPOH-161-00-41-050 Electric airbrakes POH supplement* for additional information about use, setting and testing.

4.10 LANDING

CAUTION: Landings should be made with full flaps. Glideslope should be controlled with throttle. Landings with less than full flaps are recommended in crosswinds or if the flaps fail to deploy, or to extend the aircraft's glide distance due to engine malfunction.

NOTE: For flapless approach and landing increase speeds by 5 kts.

NOTE: Flapless landings are permitted only during day-time operations.

NOTE: Airbrakes can be used for landing. See *SPOH-161-00-41-050 Electric airbrakes POH supplement* - for additional information about use, setting and testing.

Normal Landing

Normal landings are made with full flaps and airbrakes (if installed) with power on or idle. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds (55 - 60 KIAS).

Actual touchdown should be made with power idle and on the main wheels first to reduce the landing speed and subsequent need for braking. Gently lower the nose wheel to the runway after airplane speed has diminished. This is especially important for rough or soft field landings.

Short Field Landing

For a short field landing in smooth air conditions, make an approach at 60 KIAS with full flaps and fully extended airbrakes (if installed), using enough power to control the glide path (slightly higher approach speeds should be used under turbulent air conditions). After all approach obstacles are cleared, progressively reduce power to reach idle just before touchdown and maintain the approach speed by lowering the nose of the airplane. Touchdown should be made power idle and on the main wheels first. Immediately after touchdown, lower the nose wheel and apply braking as required. For maximum brake effectiveness, retract the flaps, hold the control stick full back, and apply maximum brake pressure without skidding. If installed, keep airbrakes open until reaching taxi speeds.

Crosswind Landing

Normal crosswind landings are made with (+1) flaps. Avoid prolonged slips. After touchdown, hold a straight course with rudder. The maximum allowable crosswind velocity is dependent upon pilot capability as well as aircraft limitations. Crosswind landings require higher final approach speed to ensure maneuverability. Increase the approach speed by 1 kts for every 1 kts of crosswind component.

Max Crosswind Component:	18 Kts (9 m/s)
--------------------------	----------------

4.11 BALKED LANDING

In a balked landing (go around), apply full power and pitch up (climb), then reduce the flap setting to (+1). If obstacles must be cleared during the go around, climb at 57-60 KIAS with (+1) flaps. After clearing any obstacles, retract the flaps and accelerate to the normal climb speed.

1	Throttle Lever	Full Forward
2	Airbrakes (if installed)	Close*
3	Flaps	(+1)
4	Airspeed	57 - 60 KIAS

After clear of obstacles:

5	Flaps	(0)
6	Airspeed	Best climb speed V_y (76 KIAS)

* **WARNING:** Ensure the airbrakes are closed immediately after the go around is initiated! See *SPOH-161-00-41-050 Electric airbrakes POH supplement* for additional information about use, setting and testing.

4.12 AFTER LANDING

1	Throttle Lever	IDLE
2	Flaps	(0)
3	Fuel (Booster) pump	OFF
4	Transponder	CHECK not transmitting
5	Lights	As required
6	Airbrakes	Close at taxi speed

NOTE: After a hard landing, the ELT may activate (flashing red light on ELT remote switch). If this happens, stop immediately ELT transmission (see table Section 7-14). Please check OEM for additional information.

4.13 SHUT DOWN

Leave the engine running at idle RPM for a minute in order to cool it down.

1	Green electrical switches	All OFF
2	Throttle lever	IDLE
3	Ignition Switch or MAG L / MAG R Switches	OFF
4	Avionics & Master Switches or Master GEN & Master BAT Switches	OFF
5	BPRS safety pin	Insert
6	ELT	Transmit Light OUT

4.14 PARKING

1	BPRS safety pin	CHECK Inserted, secured
2	Parking brake	Engaged only if necessary
3	Fuel Valve	CLOSED
4	Chocks, Tie-downs, Pitot Covers	As required

4.15 SOFT FIELD OPERATIONS

As described in 4.5.2. and 4.10.



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CHECKLISTS

NORMAL PROCEDURES

NOTE: Use of the following checklists is not obligatory
and at the discretion of the owner/operator.



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PREFLIGHT WALK-AROUND

CABIN

Doors	UNLOCK/OPEN/ CLOSE/SECURE
All accessible electrical harnesses, fuel lines and control system assemblies behind the cabin*	Remove Seats CHECK condition VERIFY no fuel odor
BPRS Handle / Pin	CHECK, Pin inserted
Ignition Switch or MAG L / MAG R Switches	CHECK OFF
Green Electrical Switches	ALL OFF
ELT switches (remote and transmitter)	CHECK armed
Required Documents	On Board
Flight Controls, Flaps	Free and Correct
Visible rudder cables	CHECK condition
Circuit Breakers	IN
Battery Disconnect Switch (if installed)	CONNECTED
Master & Avionics or Master BAT & Master GEN	ON
Generator Fail light	Verify ON
Displays	Verify ON
Voltmeter	12 - 14 V
Lights	CHECK operation
Fuel Quantity	CHECK
Fuel Valve	OPEN

* Only before first flight of the day.

CABIN (continue)

Avionics & Master or Master BAT & Master GEN	OFF
ELT (if installed)	ARMED
Circuit Breakers	CHECK IN

LEFT FUSELAGE

COM/XPDR antennas	Condition and attachment
Wing / Fuselage Seal	CHECK condition
Fuel cap	CHECK fuel quantity and secure

EMPENNAGE

Tiedown Rope	Remove
Horizontal and Vertical Stabilizers	CHECK condition
Elevator and Elevator U-Piece	Condition and movement
Rudder	Condition and movement
Tail lights	CHECK condition
Hinges, Bolts, Springs and Pins	Secure

RIGHT FUSELAGE

Wing / Fuselage Seal	CHECK
Door Lock	Unlock
Parachute cover, strap covers	Sealed and secure
Fuel system breather	CHECK for blockage

RIGHT MAIN LANDING GEAR

Landing Gear	CHECK condition
Tire	Condition, inflation and wear
Wheel and brake	Fluid Leaks, evidence of overheating, general condition and wear
Wheel Fairing (if applicable)	CHECK attachment
Checks and Tiedown rings / ropes	REMOVE

RIGHT WING

Flaperon	Condition and movement
Flaperon Gap Seal	CHECK condition, no wrinkles
Hinges, Bolts, Safety Nuts	CHECK condition and secured
NAV/AC lights	CHECK condition
Leading Edge	CHECK condition
Water Drain Holes	Clean
Fuel Cap	CHECK quantity and secure
Pitot Tube	Cover REMOVED Tube clear
Airbrake	CHECK condition

PROPELLER AND COWLINGS AREA

Engine Cowlings	Attachment secured
Propeller	CHECK condition
Spinner	Condition, attachment
Air inlets and Outlets	Unobstructed
Oil system breather	CHECK for blockage

ENGINE AND NOSE LANDING GEAR AREA

Engine Oil	CHECK quantity, leaks, cap and door secured
Exhaust Pipe	CHECK and condition
Gascolator	Drain 1 cup, sample
Landing Light	Attachment and condition
Nose Landing Gear	CHECK condition
Strut	CHECK condition
Wheel and Tire	Condition, inflation and wear
Wheel Fairing (if applicable)	CHECK attachment
Shock Absorber	CHECK functionality

LEFT MAIN LANDING GEAR

Landing Gear	CHECK condition
Tire	Condition, inflation and wear
Wheel and brake	Fluid Leaks, evidence of overheating, general condition and wear
Wheel Fairing (if applicable)	CHECK attachment
Checks and Tiedown rings / ropes	REMOVE

LEFT WING

Leading edge	Condition
NAV/AC lights	Condition and attachment
Flaperon	Condition, attachment, movement
Flaperon gap seal	Condition, no wrinkles
Hinges, bolts and safety nuts	Secure
Airbrake	CHECK condition

STARTING ENGINE

BEFORE STARTING ENGINE

Preflight Inspection / Logbook	Completed
Fuel Quantity	Sufficient
Emergency Equipment	On board
Passenger	Briefed
BPRS Safety Pin	Removed
Seats, Pedals, Seat belts and Baggage	Adjust and Secure
Doors	Closed and latched

STARTING ENGINE

Parking Brake	ENGAGE
Fuel Valve	OPEN
Master & Avionics or Master BAT & Master GEN	ON
Generator Fail Light	CHECK ON
Choke	As required
Propeller Area	Clear
Throttle Lever	Open 10 mm
Oil Pressure Indication	Available
Ignition Switch or MAG L / MAG R Switches	BOTH / ON
Ignition switch or Starter	START / ENGAGE

STARTING ENGINE (continue)

Throttle Lever	2000 RPM for 2 mins then 2500 RPM for warm up
Oil Pressure	CHECK
Choke	Slowly close
Engine Parameters	Monitor
Ammeter / Indication	CHECK
Generator Fail Light	CHECK OFF
NAV/AC Lights	ON

BEFORE TAXIING

Flaps	(0)
NAV/COM, GPS, XPDR	SET as required
Cabin Heating	As required
ELT	CHECK (refer to OEM)
Parking Brake	DISENGAGE

BEFORE TAKEOFF

ENGINE TEST

Parking Brake (brake pin)	ENGAGED
Doors	Latched
Choke	Verify CLOSED
Throttle Lever*	4000 RPM

*Increase the RPM slowly to assure braking force is sufficient for holding the plane in position

Generator Fail Light	CHECK OFF
Voltage	CHECK Value
Ignition switch or MAG L switch	RIGHT, note RPM, then BOTH or OFF, note RPM, then ON
Ignition switch or MAG R switch	LEFT, note RPM, then BOTH or OFF, note RPM, then ON
Engine Parameters	CHECK
Throttle Lever	Set to just above idle
Parking Brake (brake pin)	DISENGAGED

BEFORE TAKEOFF

Seat Belts	Secured
BPRS Activation Handle	Verify Pin Removed
Airbrakes (if installed)	CHECK closed
Flaps	(+1)
Trim	Set Neutral
Fuel Valve	CHECK OPEN
Fuel Quantity	CHECK
Fuel (Booster) pump	ON

BEFORE TAKEOFF (continue)

NAV / Strobe / Landing Lights	As required
Circuit Breakers	CHECK
NAV/COM, GPS, XPDR	SET
Autopilot (if installed)	CHECK disengaged
Altimeter	SET
Engine Parameters	CHECK
Flight Controls	Unobstructed and Correct

TAKEOFF

NORMAL TAKEOFF

Brakes	Release
Throttle Lever	Full Forward
Engine Parameters	CHECK
Airspeed Indication	CHECK
Elevator Control	Rotate smoothly at about 45-49 KIAS
at safe altitude	Flaps (0) / RPM 5500

SHORT FIELD TAKEOFF

Flaps	(+2)
Brakes	HOLD
Throttle Lever	Full Forward
Engine Parameters	CHECK
Brakes	Release
Airspeed Indication	CHECK
Elevator Control	Rotate smoothly at about 45-49 KIAS
Airspeed at Obstacle	58 KIAS
at 60 KIAS, FLAPS	(+1)
at safe altitude	Flaps (0) / RPM 5500

CLIMB

Climb Power / RPM	SET
Flaps	Verify (0)
Engine Parameters	CHECK
Best Climb Speed (V_y)	76 KIAS



CRUISE

Flaps	Verify (0)
Fuel (Booster) pump	OFF
Cruise Power	SET
Engine Parameters	CHECK
Autopilot (if installed)	As required

DESCENT / APPROACH

Altimeter	SET
Autopilot (if installed)	Disengage
Cabin heating	As required
Landing Light	ON
Fuel System	CHECK
Engine Parameters	CHECK
Parking Brake	CHECK Disengaged
Seat Belts	Secure

BEFORE LANDING/LANDING

Approach Speed	Reduce below 70 KIAS
Flaps	As required (+1)
Fuel (Booster) pump	ON
Flaps (on final)	(+2) below 60 KIAS
Airbrakes (if installed)	As required
Trim	As required
Final Speed	55 KIAS



BALKED LANDING

Throttle Lever	Full Forward
----------------	--------------

Airbrakes (if installed)	CLOSE
--------------------------	-------

Flaps	(+1)
-------	------

Airspeed	57 - 60 KIAS
----------	--------------

After Clear of Obstacles:

Flaps	(0)
-------	-----

Airspeed V_y	76 KIAS
----------------	---------

AFTER LANDING

Throttle Lever	IDLE
----------------	------

Flaps	(0)
-------	-----

Fuel (Booster) pump	OFF
---------------------	-----

Transponder	CHECK not transmitting
-------------	------------------------

Lights	As required
--------	-------------

Airbrakes	Close at taxi speed
-----------	---------------------

SHUT DOWN

Green electrical switches	All OFF
Throttle lever	IDLE
Ignition Switch or MAG L / MAG R Switches	OFF
Avionics & Master or Master GEN & Master BAT	OFF
BPRS safety pin	Insert
ELT	Transmit Light OUT

PARKING

BPRS Safety Pin	CHECK Inserted / Secured
Parking Brake	ENGAGED Only if necessary
Fuel Valve	CLOSED
Pitot Covers	Installed
Chocks, Tie-downs	As required



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SECTION

5

SECTION 5 – PERFORMANCE DATA

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5.1 INTRODUCTION

The performance tables and diagrams on the following pages show the performance of the airplane. The data presented in these tables and diagrams has been derived from test-flights using an airplane and engine in good operating condition, and was corrected to standard atmospheric conditions 15° C and 1013.25 mbar at sea level.

The performance tables do not take into account the expertise of the pilot or the maintenance condition of the airplane. The performance illustrated in the tables can be achieved if the indicated procedures are followed and the airplane is in good maintenance condition.

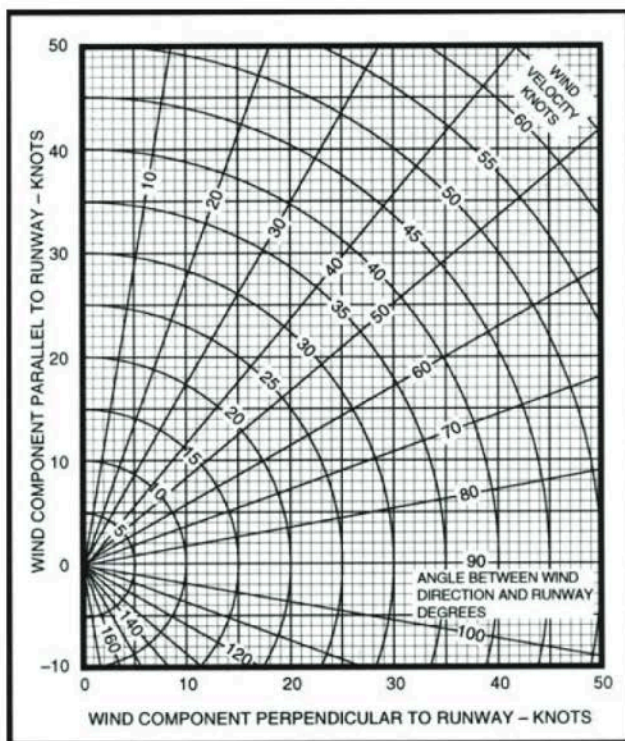
Some undefined variables such as the operating condition of the engine, contamination of the aircraft's surface, or turbulence could have influences on flights distance and flights duration. For this reason, it is of utmost importance that all available data is used when calculating the required amount of fuel for a flight.

NOTE: Performance data outlined in this section is applicable for the Pipistrel FP02-80 propeller installed. In case if Helix H50F R-SSI-18-2 propeller option is installed, see Supplement 9-S2 for the applicable performance data.

5.2 OUTSIDE AIR TEMPERATURE FOR ISA-CONDITION

Pressure Altitude [ft]	ISA-40 °C	ISA-20 °C	ISA	ISA+10 °C	ISA+20 °C
SL	-25	-5	15	25	35
1000	-27	-7	13	23	33
2000	-29	-9	11	21	31
3000	-31	-11	9	19	29
4000	-33	-13	7	17	27
5000	-35	-15	5	15	25
6000	-37	-17	3	13	23
7000	-39	-19	1	11	21
8000	-41	-21	-1	10	20
9000	-43	-23	-3	7	17
10000	-45	-25	-5	5	15
11000	-47	-27	-7	3	13
12000	-49	-29	-9	1	11
13000	-51	-31	-11	-1	9
14000	-53	-33	-13	-3	7
15000	-55	-35	-15	-5	5
16000	-57	-37	-17	-7	3
17000	-59	-39	-19	-9	1
17500	-60	-40	-20	-10	0
18000	-61	-41	-21	-11	-1

5.3 WIND COMPONENT



EXAMPLE:

Runway Heading:	10°
Wind Direction:	60°
Angle between wind and runway:	50°
Wind Velocity:	15 Knots
Component parallel:	~9,6 Knots
Component perpendicular:	~11,5 Knots

5.4 AIRSPEED CALIBRATION

KIAS/KCAS Table

The pitot tube's mounting point and construction makes IAS to CAS correction values relevant. Therefore, pilots should take into consideration the IAS to CAS correction.

Conditions

Power: power level for level flight, or max. continuous power whichever is less

The IAS-CAS relation is shown in the table below:

KIAS	49	60	100	120	130
KCAS	45	59	104	124	135

5.5 STALL SPEED

Conditions

Power: idle
Attitude: level flight
Weight: MTOM (1212 lbs / 550 kg)

NOTE: The recovery altitude necessary is very dependent on the tempo of recovery.

Typical loss of altitude for recovery:	
Slow recovery without power:	150-250 ft
Normal recovery with power:	100 ft
Aggressive recovery	less than 100 ft
Normal recovery with extended air-brakes (if installed)	150 ft

Depending on pilot skill the altitude loss during wings level stall may be 250 feet or more.

NOTE: KIAS values may not be accurate at stall.

STALL SPEED		
Flaps (+0)	Flaps (+1)	Flaps (+2)
KIAS	KIAS	KIAS
49	45	42

5.6 TAKE-OFF

5.6.1 TAKE-OFF PERFORMANCE

Conditions	Weight:	MTOM (1212 lbs / 550 kg)
	Power:	throttle full open
	Flaps:	(+1)
	Runway:	dry, paved and level
	Wind:	calm

Conditions		DISTANCE [ft] / [m]
SL 15° C/ISA	Ground roll (MTOM)	555 / 170
	50 ft / 15 m obstacle	870 / 265

NOTE: In order to meet the data for takeoff runway length over 50 ft / 15m obstacle maintain V_x (58 KIAS) after takeoff.

CAUTION: Soft (grass) runways increase the published takeoff performance data by 20%.

Takeoff performance may vary depending on the wind, temperature, elevation and wing/propeller surface condition.

5.6.2 EFFECTS OF ELEVATION

The table below provides data about the effect of elevation on takeoff runway length.

DISTANCE [ft] / [m]	RUNWAY ELEVATION			
	0 ft / m	1650 ft/ 500 m	3280 ft/ 1000 m	4920 ft/ 1500 m
Atm. pressure	29.92 inHg 1013 hPa	28.17 inHg 954 hPa	26.52 inHg 898 hPa	24.95 inHg 845 hPa
Outside temperature	59 °F / 15 °C	53 °F / 11.7 °C	47 °F / 8.5 °C	41 °F / 5.2 °C
Ground roll	555 / 170	700 / 213	870 / 265	1090 / 332
50 ft / 15 m obstacle	870 / 265	1035 / 316	1295 / 395	1420 / 433

5.6.3 EFFECTS OF OUTSIDE AIR TEMPERATURE

The table below provides data about the effect of outside air temperature on takeoff runway length. Data is referenced for sea level (SL) performance at MTOM.

DISTANCE [ft] / [m]	OUTSIDE AIR TEMPERATURE				
	32 °F / 0 °C	50 °F / 10 °C	59 °F / 15 °C	68 °F / 20 °C	77 °F / 25 °C
Ground roll	455 / 140	490 / 150	555 / 170	670 / 205	820 / 250
50 ft / 15 m obstacle	785 / 240	835 / 255	870 / 265	965 / 295	1045 / 320

DISTANCE [ft] / [m]	OUTSIDE AIR TEMPERATURE			
	86 °F / 30 °C	95 °F / 35 °C	104 °F / 40 °C	113 °F / 45 °C
Ground roll	935 / 285	1020 / 310	1040 / 317	1110 / 338
50 ft / 15 m obstacle	1280 / 390	1410 / 430	1490 / 455	1640 / 500

CAUTION: Calculation of altitude and temperature on takeoff runway length can be performed using the following formula.

$$L = 1,10 \cdot (L_h + L_t - L_0)$$

Abbreviations are as follows:

L_h = takeoff runway length at present elevation, ISA standard conditions (effect of the elevation).

L_t = takeoff runway length at sea level at same temperature as on the given location (effect of the temperature).

L_0 = zero wind takeoff runway length at 15°C at sea level (basic data).

Example: if outside temperature is 25°C and you are on 500 m elevation, your takeoff runway length will be: $L = 1,10 \cdot (L_h + L_t - L_0) = 1,10 \cdot (213 \text{ m} + 250 \text{ m} - 170 \text{ m}) = 322 \text{ meters}$.

5.6.4 EFFECTS OF THE WIND

Wind (head, cross or tailwind) affects aircraft's ground speed (GS).

Headwind on takeoff or landing causes the takeoff and landing distance length to shorten as the GS is slower during these two flight stages. The opposite holds true for tailwind on takeoff and landing as tailwind increases takeoff and landing distances significantly.

The table below provides data about the effect of the wind (headwind "+", tailwind "-") on takeoff runway length. Data is referenced for sea level (SL) performance at MTOM.

DISTANCE [ft] / [m]	WIND SPEED						
	-6 kts	-4 kts	-2 kts	0 kts	+4 kts	+8 kts	+12 kts
Ground roll	680 / 270	645 / 197	605 / 184	555 / 170	525 / 160	495 / 151	480 / 146
50 ft / 15 m obstacle	1130 / 345	1065 / 325	965 / 294	870 / 265	810 / 247	760 / 232	720 / 220

WARNING: Tailwind affects takeoff and landing performance by more than twice as much as headwind does.

CAUTION: The maximum allowed crosswind component speed on takeoff and landing is 18 kts (9 m/s). In these conditions it is recommended not to takeoff with flaps positioned at +2.

CAUTION: The runway length required increases by 10 % for every 5 kts of crosswind component.

5.7 CLIMB

5.7.1 CLIMB PERFORMANCE

Climb performance may vary depending on, temperature, altitude, humidity and wing propeller surface condition.

Conditions	Power:	throttle full open
	Weight:	MTOM (1212 lbs / 550 kg)
	Flaps:	(0)

Best Climb Speed (V_y)	76 KIAS
Best Climb rate	1220 ft/min
Climb rate at 100 KIAS	800 ft/min
Best Angle Climb Speed (V_x)	58 KIAS

5.7.2 EFFECTS OF OUTSIDE AIR TEMPERATURE

For every 5°C of OAT increase versus ISA, the climb rate decreases by 60 ft/min.

5.7.3 EFFECTS OF ELEVATION

The table below provides data about the effect of elevation on climb rate at best climb speed (V_y) at MTOM.

ALTITUDE:	CLIMB RATE:
0 ft / m	1220 ft/min
1600 ft / 500 m	1180 ft/min
3300 ft / 1000 m	1100 ft/min
5000 ft / 1500 m	1020 ft/min

NOTE: Climb rate is measured at max continuous power (5500 RPM), flaps (0) at V_y and MTOM.

5.8 CRUISE

5.8.1 CRUISE PERFORMANCE

Conditions	Weight:	MTOM (1212 lbs / 550 kg)
	Temperature:	ISA
	Wind:	zero
	Altitude:	sea level
	Flaps:	(0)

Reference cruise parameters:

RPM	KIAS	FF [US gal] / [liter/h]	ENDURANCE
5300	104	3.6 / 13.6	3 hrs + 30 min reserve

NOTE: Best economy cruising level for the ALPHA Trainer is 6000 ft. There, cruise performance is equivalent or better than above due to IAS-TAS relation, but fuel consumption is lower. At these parameters the fuel burn is around 13.6 litres per hour. For detailed fuel consumption determination for various cruising regimes consult the Rotax 912 Operators manual.

NOTE: Max horizontal speed V_h (SL) is 110 KIAS (115 KCAS) with the Pipistrel FP02-80 propeller.

5.8.2. EFFECTS OF OUTSIDE AIR TEMPERATURE

For every 10°C of OAT increase versus ISA, the cruising speed at 5300 RPM decreases by 3 kts.

5.9 DESCENT

Reference values:

Sink rate - 58 KIAS - flaps (0)	460 ft/min
Best L/D ratio speed - flaps (0)	69 KIAS
Best L/D ratio - flaps (0)	15:1

5.10 LANDING

5.10.1 LANDING PERFORMANCE

Conditions	Weight:	MTOM (1212 lbs / 550 kg)
	Wind:	zero
	Runway:	dry, level and paved
	Flaps:	(+2)
	Airspeed:	55 KIAS

CAUTION: Minimum recommended runway length for approaches is 1640 feet (500 m) with no obstacles inside the 3 deg glide slope area and runway heading in order ensure safe flying activity. Use of shorter strips should be considered a major exception and requires a lot of skill, heavy use of slipping until the last moment before touchdown and is performed at own risk.

PRESSURE Altitude [ft]	DISTANCE [ft] / [m]	
SL	Ground roll	410 / 125
	50 ft / 15 m obstacle	1510 / 460

CAUTION: Landing roll increases by 10 % for every 2000 ft increase in density altitude.

CAUTION: Total landing distance increases by 2% for every 2000 ft increase in density altitude.

5.10.2 CROSSWIND LANDINGS

The maximum allowed crosswind component speed on landing is 18 kts (9 m/s). Normal crosswind landings are made with flaps extended to +1.

Avoid prolonged slips. After touchdown, hold a straight course with rudder.

Only in case of high crosswind component it is permitted to land with flaps retracted (0°).

CAUTION: The runway length required increases by 10 % for every 5 kts of crosswind component.

5.11 NOISE CHARACTERISTICS

Noise levels are measured from the ground. The aircraft at MTOM overflies the microphone at a height of 150 meters (500 feet), exactly at V_{NE} , with engine set at maximum continuous power. The measured noise level produced by the ALPHA Trainer aircraft under full power is 55.8 dB.

SECTION

6

SECTION 6 – WEIGHT AND BALANCE

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6.1 INTRODUCTION

This section provides information about how to calculate the in-flight weight and C.G. of the aircraft. Once calculated, these two values can be used to find a point on the weight and balance chart (see section 6.3) and thus determine whether aircraft is within the flight limits (see section 2.6). A sample calculation is provided for reference.

WARNING: It is the owner and/or operator's responsibility to ensure that the aircraft's weight and CG are within the envelope presented in the weight and balance chart (see section 6.3) and lie within the prescribed limitations for the whole duration of flight, from take-off to landing after the use of any fuel reserve, considering the CG shift due to fuel burn.

NOTE: The aircraft's empty weight and empty weight C.G. are the starting point for all weight and balance calculations. Please refer to the aircraft's weight and balance report for the current empty weight data.

6.2 C.G. SAMPLE CALCULATION

The calculation below is an example of how to calculate the aircraft's takeoff weight and C.G.. Except for the arm values in *italic* font, the values do not apply to any particular aircraft and are for illustration purposes only. The arm values in *italic* font are accurate and shall be used for any preflight calculations. The calculation results (i.e. Total weight and C.G.) shall be entered into the weight and balance chart in section 6.3, to determine whether the aircraft is within the flight limits prescribed in section 2.6.

NOTE: Calculate the moment for each item by multiplying its weight by its arm. Add up the moments to get the total moment and then divide by the total weight to get the C.G..

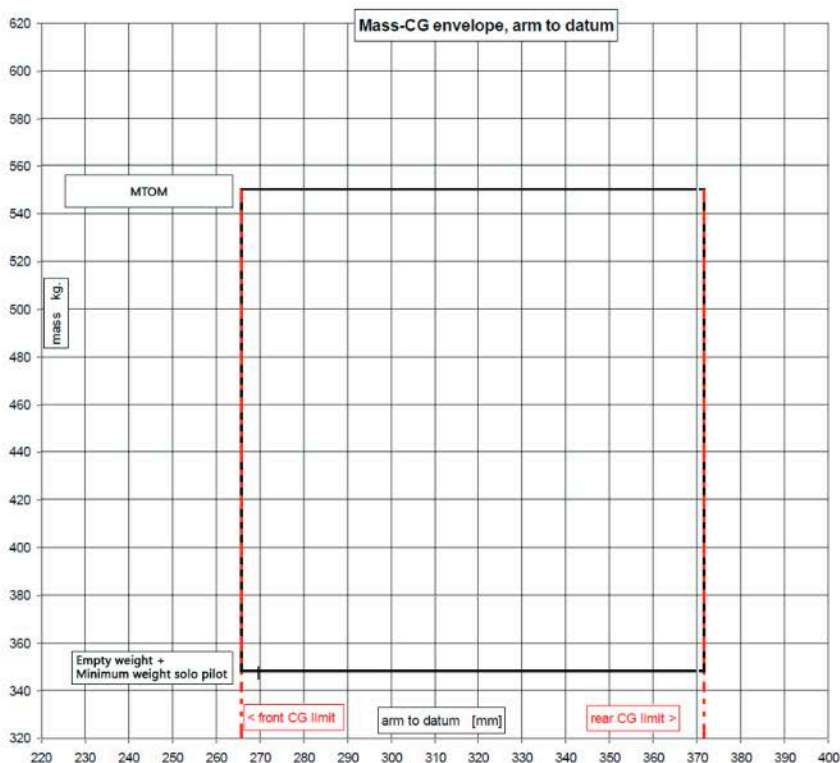
	WEIGHT	ARM	MOMENT
	[lbs] ([kg])	[inches]([mm])	[lbs*inches] ([kgmm])
Aircraft empty weight	679 (308)*	10 (254)*	6790 (78232)
Pilot	154 (70)	<i>14.5 (370)</i>	2233 (25900)
Co-pilot	176 (80)	<i>14.5 (370)</i>	2552 (29600)
Fuel	79 (36)	<i>44.5 (1130)</i>	3515.5 (40680)
Baggage compartment	22 (10)	<i>36.6 (930)</i>	805.2 (9300)
Total weight / moment	1110 (504)	-	15895.7 (183712)
C.G.	-	14.3 (364.5)	-

* These values are to be obtained from the applicable aircraft's weight and balance report.

NOTE: $CG_{\%MAC} = 100 \times (CG_{mm} - 40) / 900$.

6.3 WEIGHT AND BALANCE CHART

The chart below shows the ALPHA Trainer PRO's mass-CG envelope. Once the aircraft's takeoff weight and C.G. have been calculated, they can be used to find a point in the chart and determine whether or not the aircraft is within the flight limits.





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SECTION

7

SECTION 7 – AIRPLANE DESCRIPTION

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7.1 INTRODUCTION

This section provides a basic description and operation of the standard airplane and its systems. Optional equipment described within this section is identified as optional.

7.2 AIRCRAFT STRUCTURE

7.2.1 FUSELAGE

The fuselage is designed as a carbon fiber honeycomb-sandwich construction using aramide as inner laminate in the cockpit area. The main bulkhead is designed as a carbon / honeycomb sandwich. The undercarriage is attached directly to the engine mount, which is attached to the main bulkhead. The firewall is made out of CFRP prepreg honeycomb sandwich. It has a ceramic insulation with stainless steel sheet on top. In the baggage compartment there is a CFRP container for the ballistic rescue system. Primary and secondary control rods are covered by CFRP fairings to protect them from luggage. The baggage compartment floor is made out of CFRP. It is bolted to the bulkheads and to the CFRP tunnel, that covers the elevator control rod. The back rest is made out of GFRP and fixed to the bulkhead by velcro for easy access to the baggage compartment. The cabin floor is also the lower seat structure and made out of CFRP with aramide. The external structure is covered by a protective acrylic paint coating, which has already been applied in the mold.

7.2.2 WINGS

The detachable wing is a single spar cantilever wing. The left and right wing are connected by two bolts through the spar ends. The wing structure is made mostly from carbon fibre. The main spar shear web and the root ribs are made from glass fibre. This is for visual inspection and easier damage detection reasons. The spar caps are produced using carbon roving. The wing spar is designed as double-T-type spar. Lateral loads and twisting moments are conventionally transferred to the fuselage through root ribs and lateral-force bolts. The wing shell is designed as a 2-cell CFRP sandwich shell which is closed by a rear shear web to which the flaperons are attached. The wings are connected as it is classic with gliders by two spar ends being connected with two main bolts. There is also the third middle bolt to provide torsion stiffness mating the wings to the fuselage. The wings attach with shear pins to bushes at the fuselage root ribs.

7.2.3 EMPENNAGE

The empennage consists of a horizontal stabilizer, a single piece elevator, a vertical fin and a rudder. All of the empennage components are conventional spar (shear web) and skin construction.

The horizontal stabilizer is attached to an aluminum bracket that is pivoted to the vertical stabilizer and can be removed. The shell of the horizontal tail is designed as CFRP sandwich. The horizontal tail is attached to an aluminum bracket at the back C-spar and a self locking bolt at the location of the front C-spar.

The elevator is designed as a bottom surface supported hinged flap. The elevator is actuated through a pushrod connected to the elevator control bracket. The elevator shell is designed as a 1-cell CFRP sandwich shell. The elevator is hinged in maintenance-free bushings mounted on stainless steel brackets at the stabilizer rear spar and bottom shell. Counterbalance weights are integrated into the elevator tips.

The vertical fin is designed to be one part with the tail fuselage, made of carbon honeycomb sandwich with carbon spars. The bending moment is carried by one C-type spar which is reinforced by CFRP tapes at the flanges.

The rudder is designed as a centrally supported hinged flap. The rudder shell is designed as single-cell GFRP sandwich shell. The rudder is hinged in two maintenance-free spherical plain bearings. Balancing weights are mounted at the front end of the rudder.

Aircraft can optionally be equipped with the hoist system, which consists of built in hanging points for easier under ceiling storage of the aircraft.

7.3 FLIGHT CONTROL SYSTEM

The aircraft uses conventional flight controls for ailerons, elevator and rudder. The control surfaces are pilot controlled through either of two control sticks positioned centrally in front of each pilot. The location and design of the control sticks allow easy, natural use by the pilots. The control system uses a combination of push rods, cables and bell cranks for control of the surfaces.

Pitch trim is available through an electric button located on the instrument panel.

7.3.1 ELEVATOR CONTROL SYSTEM

The sticks are mounted on a common lateral rod which actuates the elevator longitudinal pushrod, running the length of the fuselage behind the cockpit control levers. A bell-crank is located on the bottom side of the vertical fin and can be inspected through a provision in the vertical stabilizer end-rib. The hook-up to the elevator is via a U-member which conforms to the shape of the elevator. In case the horizontal tail plane is removed the U-member remains attached to the fuselage whereas the elevator remains attached to the horizontal stabilizer. There are no cables in the pitch control system.

7.3.2 AILERON CONTROL SYSTEM

Roll control is achieved by torsional activation of flaperon control surfaces via an all-pushrod mechanisms. A conventional center control stick is available to each pilot. The sticks are mounted on a common lateral rod which actuates the elevator longitudinal pushrod. There is a bell-crank located on the bottom of the fuselage behind the seats which provides differential motion. The flap handle is connected to this bell-crank, allowing for symmetric displacement of flaperons.

7.3.4 RUDDER CONTROL SYSTEM

Rudder pedals are available to each pilot and are adjustable in-flight in a fore-aft sense. Metal cables in teflon-coated bowdens run from the individual pedal to bellcranks located behind the seats and below the cargo compartment floor. Single cables run from the bellcranks backwards and are attached directly to the rudder. The tension of the cables is adjusted with cable tensioners and rudder neutralization is achieved by means of two retaining springs attached to the bellcranks junctions.

The nose wheel is part of the yaw control system and is moved whenever the pedal is pressed. Cables for nosewheel steering run from the bellcranks behind the seats forward to the nosewheel hinge element, where a anti-shimmy damper (optional) is also connected to.

7.3.5 WING FLAPS CONTROL SYSTEM

There are no separate flap control surfaces in place. Function of flaps is achieved through symmetric deflections of the flaperons.

The flaps are hand activated through a lever common to both pilots, located between the seats. The handle is spring locked in 3 positions, corresponding to flap deflections of 0°, +9°, +19°. The positions are denominated (0), (+1), (+2) respectively. The thumb-lock button prevents inadvertent handle movement. The backside of the flap handle connects to the main flaperon bell-crank.

7.3.6 ELEVATOR TRIM SYSTEM

Spring type elevator trim is activated by a linear servo motor assembly located behind the luggage compartment. The motion of the linear servo is controlled through a cockpit switch and an integral position sensor. Trim position is indicated with discrete steps on a dedicated LED display on the instrument panel.

7.3.7 AIRBRAKES CONTROL SYSTEM (optional)

Airbrakes are optional equipment. Schempp-Hirth Style electric (servo-operated) airbrakes are activated by a control switch on the instrument panel.

CAUTION: The system must be operated according the procedures and limitations explained in the following document: *SPOH-161-00-41-050_Electric airbrakes POH supplement*.

7.4 LANDING GEAR

7.4.1 MAIN GEAR

The landing gear is a conventional, fixed tricycle type. The main landing gear consists of a single composite landing gear strut made of glass fibre and optional CFRP wheel fairing covering the tire for improved aerodynamics. The strut is composed by two parallel elements producing a semi-redundant structure and allowing for predictable locations of stress points. The wheel tire dimensions are 4.00 x 6. Wheel track is 1.60 m, wheel base 1.58 m. Inflate to 40 psi (2.8 bar).

7.4.2 NOSE GEAR

The nose gear is integrated into the engine mount and consists of a spring-loaded strut, wheel fork, nose wheel and optional CFRP wheel fairing. The strut's cylinder, as well as the wheel fork, are made from aluminum, while the strut's inner tube is made of chrome-plated steel. The nose wheel's maximum turning arc is 45 degrees either side of center. The tube-type nose wheel tire is 4.00 x 4. Inflate to 26 psi (1.8 bar).

7.4.3 BRAKE SYSTEM

The main wheels are equipped with hydraulic disc brakes. Brakes are activated by a lever positioned in the central console between the seats. A metal pin on the brake handle is used to keep the handle pulled and thus maintain pressure in the circuit and acting as parking brake function.

The brake system consists of a master cylinder activated by the brake handle, an hydraulic fluid reservoirs, a single drum (disc for Beringer wheels option) brake assembly on each main landing gear wheel, and associated hydraulic plumbing. Braking pressure is initiated by pulling the lever. The reservoir is serviced with DOT-4 hydraulic fluid.

Brake system malfunction or impending brake failure may be indicated by a gradual decrease in braking action after brake application, noisy or dragging brakes, soft or spongy handle, excessive travel, and/or weak braking action. Should any of these symptoms occur, immediate maintenance is required. If, during taxi or landing roll, braking action decreases, release the handle and then reapply the brakes with heavy pressure. If the brakes are spongy or handle travel increases, pumping the handle may build braking pressure.

CAUTION: Do not set the parking brake in flight. If a landing is made with the parking brake set, the brakes will maintain any pressure applied after touchdown.

The main wheel brakes are set for parking by using the parking brake pin on the brake activation handle. To apply the parking brake, set the brakes pulling the handle, and set the pin to keep the handle pulled.

7.5 AIRPLANE CABIN

7.5.1 CABIN DOORS

Windshield, upper window and doors' - windows are made from Lexan shatter-resistant polycarbonate. The fuselage has two cabin doors made out of CFRP frames.

Doors are locked in the closed position via 3 locking pins operated simultaneously by rotating a common central handle.

7.5.2 VENTILATION

The system's primary source of fresh air is a set of adjustable vents that direct fresh ram air into the cabin.

7.5.3 SEATS

The seating arrangement consists of two seats, comprising a bottom cushion and hard padded back panel. The back panel rests on the cockpit aft bulkhead.

The seats are not adjustable in position or recline, however the back panel can be removed/reclined to access the baggage compartment.

7.5.4 BAGGAGE COMPARTMENT

The baggage compartment extends from behind the seats to the aft cabin bulkhead. The use is allowed only when equipped with Baggage Compartment Assembly (p/n 161-25-50-000) (optional) and is limited to 22 lbs (10 kg) of load. All items in the baggage compartment must be secured in place.

7.5.5 CABIN SAFETY EQUIPMENT

Passenger Restraints

The harness is a 4 point restraint system with turn-buckle quick release. The lap belt strands are attached to the composite seat shell that is locally reinforced with M8 bolts. The shoulder harness strand is attached at the bottom of the rear baggage compartment bulkhead with M8 bolt. The attachment point is reinforced with a composite rib.

7.6 POWERPLANT

7.6.1 ENGINE

The engine installed is a Rotax 912 UL engine providing 59.6 kW takeoff power. All limits as defined by the engine manufacturer apply. The engine can be operated with MOGAS or AVGAS 100LL, with max. 10% ethanol and the following antiknock properties: min. RON 90 (min. AKI 87) as by Rotax specification. The propeller is driven by a gearbox. The engine is provided with a liquid cooling system for the cylinder heads and a ram-air cooling system for the cylinders. There is also an oil cooling system for oil common to engine and gearbox.

7.6.2 ENGINE COMPONENTS

Oil System

The dry-sump lubrication system contains 3.5 liters of oil and consists of a tank, an oil cooler and a mechanically-driven pump and optionally with a thermostat. Once the oil temperature reaches 80°C the thermostat opens, allowing the oil to flow through the coolers. A dipstick is present on the oil tank to check oil quantity.

CAUTION: The engine should not be operated with less than minimum indicated quantity of oil (dipstick). For extended flights, oil quantity of at least half-level between min and max delimiters is recommended.

Engine Cooling

The engine is air and water cooled. The water cooling system consists of a cooler and mechanically-driven pump to provide cooling to cylinder heads. The heated air exits the engine compartment through a common outlet on the bottom aft portion of the cowling. No baffles or movable cowl flaps are used.

On some aircraft (produced 2024 onwards or retrofitted), cooling air enters the engine bay through the inlet on the side of the spinner, and is directed and distributed over the engine's cylinders via the composite baffle.

Carburetors

Dual needle-type Bing carburetors are used, each serving one cylinder bank. Lifetime filters are installed directly on the carburetors. There is no additional air induction system or carburetor heat, as the engine receives pre-heated air from the aft side of the cooling radiator.

Engine Fuel Ignition

Dual self-powered electronic ignition drive two spark plugs in each cylinder. The system is denominated as Magnetos, as it mimics the typical functionality of mechanical magnetos. Normal operation is conducted with both magnetos, as more complete burning of the fuel-air mixture occurs with dual ignition.

Engine Exhaust

The exhaust system consists of four exhaust headers, a muffler and a tailpipe. All of its components are made of titanium, making it very light weight. The tailpipe is directed downwards at a 45 degrees angle relative to the aircraft's roll axis, thus decreasing the possibility of any CO finding to enter into the cabin.

7.6.3 ENGINE OPERATING CONTROLS

Engine controls are easily accessible to both pilots on the center console. They consist of a single-lever throttle control and the choke lever.

Throttle Lever

A throttle control lever is located in the central console and controls engine power. The lever acts upon two cables which control the throttle valves of the two carburetors. A wire, which is operated by the choke handle, actuates the choke shaft of the respective carburetor, to provide assistance with cold starts. The engine is not equipped with a carburetor heat device because the carburetor air inlet position inside the engine cowling grants a sufficiently warm air temperature in any condition.

For Start/Ignition and magnetos management, there are two possible system configurations. One consists of single rotary-type switch, the other consist of separate magneto switches and start button.

Rotary Start/Ignition Switch configuration:

Start/Ignition Switch

A rotary-type key switch, located on the main switch panel, controls ignition and starter operation. The switch is labeled OFF-R-L-BOTH-START. In the OFF position, the starter is electrically isolated, the ignition systems ("magnetos") are grounded and will not operate. Normally, the engine is operated on both magnetos (switch in BOTH position) except for magneto checks and emergency operations. The R and L positions are used for individual magneto checks and for single magneto operation when required. When the master switch ON, rotating the switch to the spring loaded START position

energizes the starter and activates both magnetos. The switch automatically returns to the BOTH position when released.

Rotary Start/Ignition Switch configuration:

Start button

A push-type button, located on the main switch panel, activates starter operation. The button is labeled START.

Magnetos/ignition switches

The two ignition circuits are independently activated by two switches positioned on the switch panel and designated MAG L and MAG R. Normally, the engine is operated on both magnetos (both switch OP) except for magneto checks and emergency operations.

7.6.4 ENGINE MONITORING INSTRUMENTS

The aircraft is equipped with electronic engine instrumentation, which can be part of the Primary Flight Display (PFD - Dynon/Garmin), Multi Function Display (MFD - Dynon/Garmin) or the Engine Management System display (EMS - Kanardia Digi).

NOTE: For additional information on instrument limit markings, refer to Section 2, Limitations.

A Data Acquisition Unit, mounted inside the instrument panel, converts analog signals from the coolant temperature, EGT, MAP, oil pressure, oil temperature, fuel pressure, fuel flow, voltage, amperage and tachometer sensors to digital format, which are then transmitted to the MFD / PFD / EMS for display.

The display presents engine and system data in horizontal tape, vertical tape and numeric format.

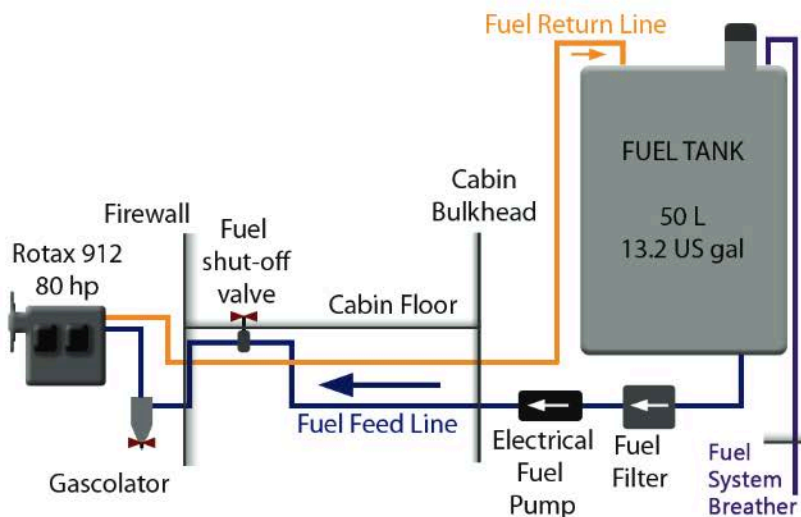
7.6.5 PROPELLER

The airplane can be equipped with:

- 2-blade, fixed-pitch propeller, Helix H50F R-SSI-18-2, composite propeller with 1.65m (65") diameter.
- 2-blade, fixed-pitch propeller, Pipistrel FP02-80, wooden propeller with 1.66 m (65") diameter.

7.7 FUEL SYSTEM

The airplane has single 13.2 US gal (50 L) polyamide fuel tank in the fuselage, positioned behind the cabin. The maximum usable fuel quantity is 12.7 US gal or 76 lbs (34.5 kg or 48 L) (AVGAS or MOGAS, see chapter 2 - Limitations - for applicable fuel grades). Fuel quantity is measured by a level sensor in the tank and indicated on the Engine Management System display. Venting of the fuel tank is through a venting line connected to the bottom of the fuselage. After leaving the tank the fuel goes through a line fuel filter and through the auxiliary electric pump (denominated FUEL or BOOSTER PUMP on the switch panel), located on the bottom-side of the fuselage behind the cabin. Thereafter fuel enters the fuel shut-off valve, activated from the cabin, which has two positions: OPEN and CLOSED. When CLOSED position is selected the valve shuts off the fuel feed line. Once the fuel leaves the fuel valve it is fed through a gascolator, which has a drain valve. The gascolator removes water that may be in the fuel and filters out debris/foreign material. The fuel system features a fuel return line connected directly to the fuel tank.



ALPHA Trainer PRO
Fuel system schematic

NOTE: Indicated fuel flow on Engine Management System display, if available, is for information only and it is calculated indirectly. It should not be used for navigation and flight planning purposes. Refer to fuel quantity indicator for actual fuel quantity on board and for tracking of fuel situation.

WARNING: Fuel system venting is essential to system operation. Blockage of the system will result in decreasing of fuel flow and eventual engine fuel starvation and stoppage.

If takeoff weight limitations for the next flight permit, the fuel tank should be filled after each flight to prevent condensation.

Draining

The sampling location is the gascolator in the engine compartment, accessible from the bottom engine cowl. The drain is used for draining water from the fuel system and is accessible from the outside. Industry standard fuel sampling cups or sticks should be used to perform draining.

7.8 ELECTRICAL SYSTEM

7.8.1 ELECTRICAL SYSTEM

The airplane is equipped with a single-generator, single-battery, 14-volt direct current (VDC) electrical system designed to reduce the risk of electrical system faults. The system provides uninterrupted power for avionics, flight instrumentation, lighting, and other electrically operated and controlled systems during normal operation.

7.8.2 POWER GENERATION

The electrical system is a 12-Volt DC system. Power is supplied by integrated generator with approximately 250 W AC output at 5800 RPM and rectified with electronic full-wave rectifier regulator (RU 912). The generator system is capable of delivering max. 20.5A at 14V which feeds the onboard battery (12V, 11Ah for standard battery or 12.4Ah for Lithium EarthX). In case of emergency, the battery will supply reduced number of necessary direct-current loads with power for at least 30 minutes. The electrical system is controlled by means of switch/fuse which are arranged in one row at the upper half of the switch panel under the instrument panel.

The circuit breakers (CB) are located under the switch/fuses of the switch panel. A voltmeter is integrated in the Engine Management System display system to monitor electrical system operating. Generator failure is indicated by a warning red LED light on the Switch panel (labeled GENERATOR FAIL).

7.8.3 POWER DISTRIBUTION

The Master relay connects the battery with main bus. Main bus supplies the avionics relay which delivers the power to the switch panel and circuit breakers. 12V socket is connected via switch/fuse directly to the main battery.

The 22000uF/25V capacitor provides a continuous control voltage for the regulator/rectifier in the event of momentary interruption of battery voltage. This is necessary as generator output voltage is variable with RPM and may increase to as much as 240V AC.

The avionics bus comprises all avionics loads and electrically operated instruments. Harnesses of the electrical system from the engine is leading through the firewall and connected to the electrical board and to other provided systems.

The electrical system is divided on three main subsystems (engine harness, main electrical board and switch panel) which are than interconnect to all equipment and devices.

Electrical supply from generator and battery is distributed to the following:

NOTE: Tables below reflect some common configurations. Some equipment listed in the following tables is optional and may not be installed in all aircraft. If the equipment, installed on your aircraft is not listed among the items in the tables below, please refer to OEM documentation for details.

Equipment - configuration example	Electrical Consumption [A] @ 14 V
Garmin GDU 460 - Garmin G3X Touch 10" Landscape display	2.0 A
Garmin G3X AP GMC 305	0.50 mA
Garmin G3X AP 2X servo GSA28	0.36 A per servo (Typical) 1.8 A per servo (Max) 2.8A per servo (Max with 1 AMP trim motor at full load)
Garmin GTN 650 GPS/COM/NAV/MFD	2.6 A (Typical) 9.6 A (Max)
Transponder Garmin GTX-45 (remote) for ADS-B OUT & ADS-B IN	0.72 A (Typical) 1.30 A (Max)
Landing light	5 A
NAV/AC lights	1 A (steady) 2 A (Peak)
Electrical trim	0.3 A
Electrical airbrakes (if installed)	2 A
Stall Warning (haptic - if installed)	2 A (Max)

Equipment - configuration example	Electrical Consumption [A] @ 14 V
Kanardia ASI, VSI, ALT, RPM, Engine Management System display	2.3 A (Total)
Garmin GDU 45X - Garmin G3X Touch 7" Land- scape display	2.0 A
Garmin G3X AP 2 servos GSA28	5.4 A (Max)
Garmin GTR200 transceiver	0.51 A (Typical) 2.6 A (Max)
Garmin GTX335 transponder	0.72 A (Typical) 1.22 A (Max)
Landing light	5 A
NAV/AC lights	1 A (steady) 2 A (Peak)
Electrical trim	0.3 A
Electrical airbrakes (if installed)	2 A
Stall Warning (haptic - if installed)	2 A (Max)
Equipment - configuration example	Electrical Consumption [A] @ 14 V
Garmin GDU 460 - Garmin G3X Touch 10" Land- scape display	2.0 A
Garmin G5 backup	0.25 A
Garmin G3X AP GMC 507	0.2 A
Garmin G3X AP 2X servo GSA28	0.36 A per servo (Typical) 1.8 A per servo (Max) 2.8A per servo (Max with 1 AMP trim motor at full load)
Garmin GNX 375 NAV/XPDR ADS-B in/out	1.4 A (Typical) 2.1 A (Max)
Garmin GNC 255A NAV/COM transceiver	0.72 A (Typical) 1.30 A (Max)
Garmin GTR 200 transceiver	0.51 A (Typical) 2.6 A (Max)
Landing light	5 A
NAV/AC lights	1 A (steady) 2 A (Peak)
Electrical trim	0.3 A
Electrical airbrakes (if installed)	2 A
Stall Warning (haptic - if installed)	2 A (Max)

7.8.4 SWITCHES

There are two possible master switch configurations; One consists of Master Switch and Avionics Power Switch, the other consists of MASTER BAT Switch and MASTER Gen Switch.

MASTER + AVIONICS Power switches configuration:

MASTER switch

The MASTER toggle switch activates the relay to connect the battery with main bus. Main bus supplies the avionics relay which delivers the power to the switch panel and circuit breakers. To check or use avionics equipment or radios while on the ground, the AVIONICS power switch must also be turned on. Both 12V sockets are connected via switch/fuse directly to the main battery.

AVIONICS power switch

A toggle switch, labeled AVIONICS, controls electrical power from the main bus to the Avionics Bus. The switch is located next to the MASTER switch. Typically, the switch is used to energize or de-energize all avionics on the Avionics Bus simultaneously. With the switch in the OFF position, no electrical power will be applied to the avionics equipment, regardless of the position of the master switch or the individual equipment switches. For normal operations, the AVIONICS switch should be placed in the OFF position prior to activating the MASTER switches or applying an external power source.

Battery Disconnect Switch (if installed)

If installed, this switch (pull ring) enables the battery disconnection from the circuit. The battery disconnection connector is a red flag-type lever found on the main electric board (cabin-side of the firewall) above the main battery on the right-hand side of the cabin. It is attached to a wire which leads to the battery disconnection ring positioned on the switch panel column. To disconnect the battery from the circuit, pull the battery disconnection ring. To reconnect the battery back to the circuit, use the flag-type lever on the firewall (this lever might be impossible to be reached during flight!). Deflect the lever so that its flag end points towards the firewall. Having done this correctly, you will feel the flag-lever jam into position and reconnecting the battery to the circuit.

MASTER BAT + MASTER GEN switches configuration:

MASTER BAT switch

The MASTER BAT toggle switch activates the relay to connect the battery with main bus. Main bus supplies the avionics relay which delivers the power to the switch panel and circuit breakers. 12V socket is connected via switch/fuse directly to the main battery. Starter button has no function when MASTER BAT switch is OFF.

During normal operation the battery is always connected. It only disconnects then the MASTER BAT switch is OFF.

MASTER GEN Switch

A toggle switch, labeled MASTER GEN, connects the generator to the bus.

7.8.5 WARNING LIGHTS

Generator Fail Light

The red GENERATOR FAIL Light on the upper-left side of the switch panel is connected to the voltage regulator. When ON, this means that the generator is not operating. Normal state (generator operating) is when this LED light is OFF.

NOTE: Engine RPM below 1600 will typically result in GENERATOR FAIL warning light to come ON, however this is not a failure but a case of insufficient RPM to generate electrical power. Increase RPM.

Battery Caution Light

The orange Batt Caution light is installed on the switch panel only when EarthX battery is installed. Batt Caution light is ON when the battery management system (BMS) integrated in the battery detects any malfunctions (See Chapter 3 - Emergency procedures for additional details). Please refer to *EarthX ETX lithium battery user's manual* for additional information about how to troubleshoot any battery errors/malfunctions.

7.8.6 CIRCUIT BREAKERS AND FUSES

Individual electrical circuits connected to the Buses in the airplane are protected by re-settable circuit breakers mounted in the circuit breaker panel, part of the main switch panel below the instrument panel.

NOTE: Circuit Breakers (CB) are not switches and are, therefore, not intended to be disengaged intentionally. In case of a CB disengagement, the pilot can try to re-engage it once. If it gets disengaged again the pilot should consider this as a system failure and act accordingly.

7.8.7 MISCELLANEOUS COMPONENTS

Convenience Outlets

A 12-volt convenience outlet is installed on the switch panel. The receptacle accepts a standard cigarette-lighter plug. The outlet may be used to power portable equipment non essential to flight. Amperage draw through the outlet must not exceed 2 A. Power for the convenience outlet is supplied through the 2-amp 12VDC OUTLET circuit breaker on the Battery Bus. USB sockets are optionally available.

7.9 LIGHTING

7.9.1 EXTERIOR LIGHTING

Navigation Lights

The airplane can be equipped with LED standard wing tip and tail navigation lights. The lights are controlled through the NAV/AC light switch on the switch panel. 12 VDC for navigation light operation is supplied through the NAV/STROBE light switch, which includes a resettable circuit breaker element.

Strobe Light

Anti-collision strobe lights are optionally installed integral with the standard navigation light and controlled by the same switch.

Landing Light

A High Intensity LED landing light can be mounted in the lower engine cowl. The landing light is controlled through the LDG light switch on the switch panel. 12 VDC for navigation light operation is supplied through the LDG light switch, which includes a resettable circuit breaker element. The landing light has a built-in thermal protection and its operation is not time limited.

7.9.2 INTERIOR LIGHTING

Instrument Lights

Digital instrumentation (i.e. Horis, PFD/MFD) has dimmable displays and illuminated buttons.

7.10 ENVIRONMENTAL SYSTEM

There are two separate systems that account for cabin ventilation and heating: the cabin passive inlets/outlets for fresh air routing (passive ventilation) and the cabin heat system (basic or advanced systems).

Cabin passive ventilation

The system's primary source of fresh air is a set of adjustable vents on the doors that direct fresh ram air into the cabin.

Basic heating system (standard equipment)

This is the shut-off valve from the firewall forward compartment into the cabin. This ON/OFF valve is controlled by a push-pull knob on the bottom of the switch panel. Pull to open, twist to lock, push to shut.

Advanced heating and ventilation system (optional equipment)

This system replaces the basic heating system. It is composed of a stainless steel heat muff fastened to the exhaust system muffler that serves as the system's source of hot air. Air from the oil cooler enters the engine bay and is directed into the heat muff. Hot air leaving the heat muff is then directed through scat tubing to a mixer where it meets fresh air coming from a NACA inlet positioned on the upper engine cowl. The mixer regulates the fresh/hot air ratio passing through the cabin air selector, which is fastened to the aircraft's firewall. The system is controlled from the cabin by a cabin heat panel and a stainless steel shut off valve. This ON/OFF valve is controlled by a push-pull knob on the bottom of the switch panel. Pull to open, twist to lock, push to shut.

The cabin heat control panel is positioned on the instrument panel and allows the pilot to control, via rotary knobs and toggles switches, the temperature (fresh/hot air ratio), the flow (fan on/off) and where (cabin or windshield) the air entering the cabin should go.

The following are the offered control possibilities:

One knob on the cabin heat system panel controls the direction of airflow, either towards the windshield (rotate left) or towards pilot's feet (rotate right). Any setting in-between these two results in air flowing in both directions.

A second knob on the cabin heat system panel controls the temperature of the airflow. Rotate left for cooler and rotate right for warmer. Maximum cold position will result in external ambient being delivered to the cabin. In this case the system serves as an additional source of fresh air. Maximum hot position will only let the hot air from the exhaust muff into the cabin.

To activate windshield defrost turn the temperature knob on the cabin heat panel to HOT (full right), select windshield as direction of airflow (full left) and engage the fan (ON).

7.11 PITOT SYSTEM

The pitot-static system consists of a single pitot tube mounted on the star-board wing, approximately 3 meters from fuselage and dual static ports mounted on the fuselage surface below the baggage compartment. The pitot tube drives the total pressure to the applicable ADAHRS unit as well as the mechanical airspeed indicator if installed. Optionally the pitot tube also has a AOA sensing port. The lines from the static ports join together and then drive the static pressure to ADAHRS unit as well as the airspeed indicator, altimeter and other instruments (depending on the configurations).

7.12 STALL WARNING SYSTEM (optional)

Stall onset awareness is greatly improved with optional stall systems; aural, visual and haptic stall warning system. Those are integrated in the PFD by using AOA pressure information from the AOA port on the pitot tube and the associated AOA display on the PFD. A further sign of imminent stall may be an aerodynamic buffet, which can be felt on control stick, if not overlaid with the haptic stall warning.

Visual AOA indication

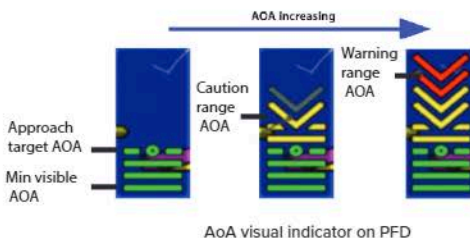
The PFD displays an AOA indicator that provides an intuitive information enhancing pilot's awareness about actual angle of attack and stall margin.

The AOA indicator becomes visible when the AOA exceeds a preset minimum threshold value "minimum visible AOA".

As the AOA increases further, the number of the visible bars increases and the bars change in color (green, yellow, then flashing red) and shape (be-

coming chevrons) as the AOA enters the caution and warning (stall) range.

The GREEN AOA region serves as an orientation of stall margin, and includes an "approach target AOA" indication (green circle) that indicates the optimal AOA for approach (approximately $1.3 \times V_{SO}$). The YELLOW AOA region begins at AOA higher than approach target AOA. The first yellow chevron appears approximately at $1.08 \times V_{SO}$ at 1 g condition, followed by a second yellow chevron, indicating that the RED AOA region, and the stall, are imminent.



Aural stall warning

The system is calibrated to produce an aural warning as the angle of attack increases approaching the critical range.

Haptic Stall Warning System

Additionally to the visual and aural stall warning, the aircraft can be optionally equipped with a haptic stall warning system that activates a control stick intermittent vibration when the critical AOA is approached (approximately indicated by the first yellow chevron, or by the activation of the aural stall warning). The control stick vibration acts as a secondary notification additional to the aural and visual warnings. The vibration produced by the haptic system is strong enough to be perceived by the pilot also aurally as a very distinctive intermittent buzzing.

7.13 FLIGHT DECK ARRANGEMENT

Instrument Panel

There are different instrument panel arrangements available. It may consists of a set of analogue/digital gauges for airspeed, altitude, vertical speed and rpm, of Garmin GPS, transponder, radio and slip indicator. Some instruments feature a LCD display - Digital artificial horizon (Kanardia Horis), Primary Flight Display (PFD) or Multi Function Display (MFD), showing values indicated by the instrument pointers. Depending on instrument panel configuration, en-

gine parameters are presented either on a dedicated Engine Management System (EMS) display (Kandardia Digi) or as part of Garmin/Dynon PFD/MFD data presentation instead.

NOTE: Please refer to OEM documentation for additional information about individual instruments.

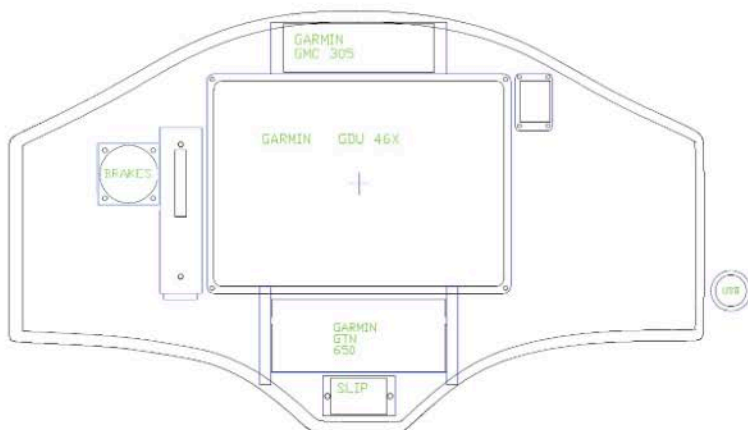
Switch Panel

A switch panel located in the "dash board" bolster below the flight instruments contains master/ignition/magnetos switches, green switches and circuit breakers.

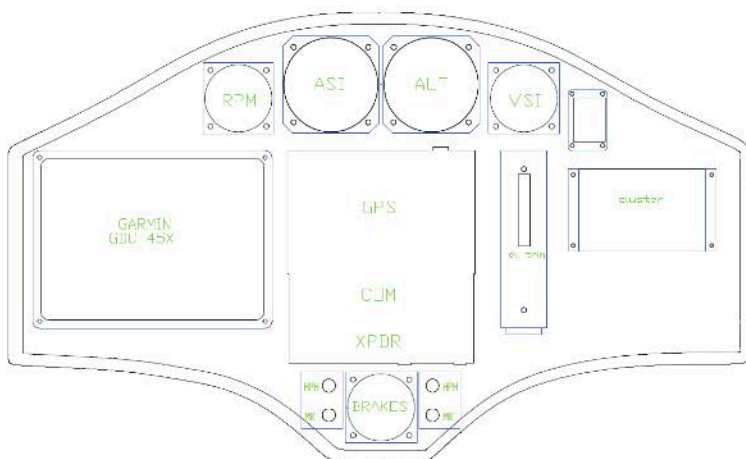
Center Console

The center console contains (front-to-back) throttle and choke lever, elevator trim switch, brake lever and the flap lever.

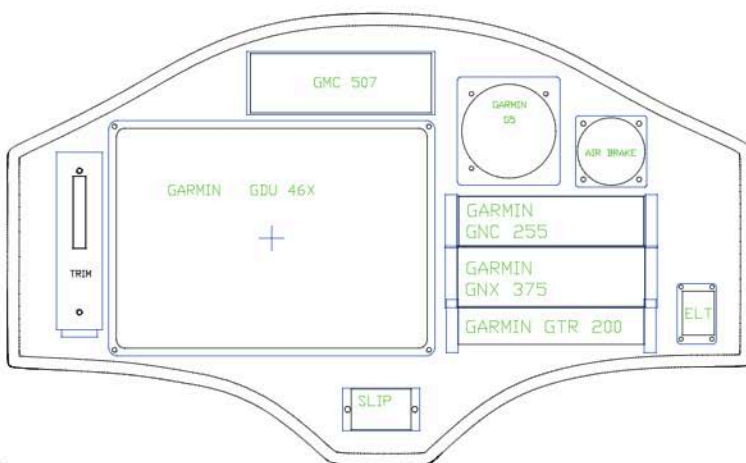
Examples of Instrument and Switch panels installed on ALPHA Trainer PRO.



Garmin G3X Touch 10" - Example of instrument panel - 1



Garmin G3X Touch 7" + Kanardia Digi EMS - example of instrument panel -2



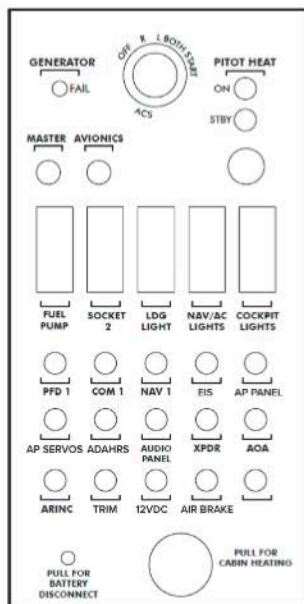
Garmin G3X 10" touchscreen with Garmin NAV/COM, XPDR and Audio panel
- example of instrument panel -3

SECTION 7

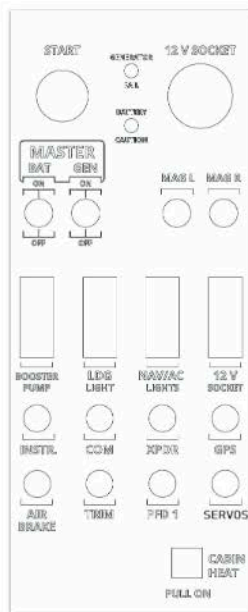
AIRPLANE DESCRIPTION

ALPHA Trainer PRO

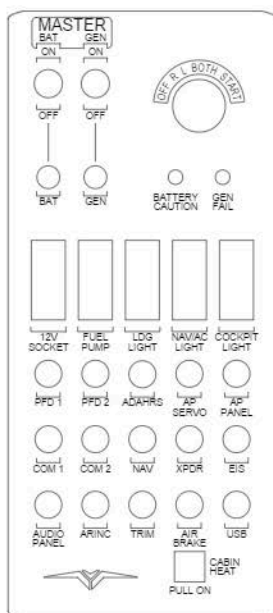
Pilot's Operating Handbook



Example of switch panel configuration with MASTER, AVIONICS and rotary ignition switch



Example of switch panel configuration with two magneto switches (MAG L/MAG R), MASTER BAT & GEN and push start button



Example of switch panel configuration with rotary ignition switch and MASTER BAT & GEN switches

7.14 FLIGHT INSTRUMENTS

The following paragraphs list most common avionics configuration offered for the aircraft. The avionics, navigation and communication equipment are mounted in the instrument panel and are easily accessible from either pilot seat. Avionics equipment depends on aircraft configuration, thus the actual configuration might vary from the one listed below.

NOTE: Please refer to OEM documentation for additional information about individual equipment, or for optional equipment not mentioned in the configurations described below.

Tables below outline examples of possible configurations:

Example of configuration 1:

1	Garmin GDU 460 - Garmin G3X Touch 10" Landscape display - PFD
2	Garmin GTN 650 GPS/COM/NAV/MFD
3	Garmin G3X AP GMC 305 - Autopilot Panel
4	Slip indicator
5	Mechanical Compass
6	ELT Artex 345
7	Electric Trim
8	Airbrakes control panel

Example of configuration 2:

1	Airspeed Indicator Kanardia
2	Altimeter Kanardia
3	Variometer Kanardia
4	Tachometer with integrated hour meter Kanardia
5	Engine Management System Kanardia (Engine Data Acquisition unit Daqu and display DiGi)
6	Radio COM Garmin GTR 200
7	Transponder Garmin GTX 335
8	GPS Garmin Aera 660
9	Garmin G3X Touch 7" Landscape display with integrated autopilot functions
10	Slip indicator - integrated into Garmin G3X Touch display

11	Airbrakes control panel
12	Mechanical Compass
13	ELT Artex 345
14	Electric Trim

Example of configuration 3:

1	Garmin GDU 460 - Garmin G3X Touch 10" Landscape display - PFD
2	Garmin G5 backup + battery pack
3	Garmin G3X AP GMC 507 - Autopilot Panel
4	Garmin GNX 375 2" Touchscreen Nav/XPDR ADS-B in / Out
5	Garmin GNC 255A NAV/COM Radio - secondary COM
6	Garmin GTR 200 COM Radio - primary COM
7	Slip indicator
8	Mechanical Compass
9	ELT Artex 345
10	Electric Trim
11	Airbrakes control panel

PFD

When installed, the Primary Flight Display (PFD) provides the functions of the attitude indicator, magnetic heading indicator, airspeed indicator, ground speed indicator, AOA tape, altimeter, vertical speed indicator, directional gyro, HSI (horizontal situation indicator), wind data, EMS (engine management system) and avionics-related annunciator. In addition, the PFD communicates with GPS. It also triggers aural and acoustic warnings.

An integral air data/attitude and heading reference system (ADAHRS) uses a 3-axis solid state gyro and accelerometer system and a remote magnetometer. ADAHRS also provides roll, pitch, heading data and outside air temperature (OAT) data and continually updates the winds aloft and true airspeed (TAS) indications on the PFD.

For more details please refer to OEM's documentation.

NAV EQUIPMENT

The aircraft can be optionally equipped with NAV devices (e.g. Garmin GNC 255A). In this configuration, the NAV antenna is installed on the leading edge of the vertical tail. Please refer to OEM documentation for more details.

7.15 AUTOPILOT (optional)

The aircraft can be optionally equipped with a 2-axis Dynon or Garmin autopilot system, controlling pitch and roll via separate servo motors. It can be either fully integrated with the PFD/MFD, or can have a dedicated remote autopilot panel (Garmin GMC 305 or GMC 507) installed on the central part of the instrument panel for easier mode selection/recognition/activation/arming. When in an active autopilot mode, full guidance is provided, including smooth transitions to altitude and heading captures. If not in an active autopilot mode (i.e., "hand-flying"), there is no guidance other than the position of the appropriate bugs and/or the flight director, as set by the pilot.

The reference bugs' status, autopilot annunciations, and flight director steering command bars (if installed) will indicate when PFD is coupled with the autopilot.

Beside primary autopilot's interface buttons (remote or integrated into PFD/MFD), there is also a red push-button installed on the control stick. Its main function is to disengage autopilot by a quick press-release (quick subsequent press-release, within 1 second after first press, will mute the disengage aural warning OR will disconnect the flight director, depending on system/settings). There are also other functions available, such as Control Wheel Steering (CWS), which temporary disconnects AP servos, for the time when the red button is being pressed (pilot can temporary override autopilot and adjust aircraft's target attitude). Longer hold of the red button, when autopilot is not active yet, will activate autopilot, if such setting is selected.

For details that depend on the model of autopilot installed, such as autopilot modes specifications (e.g., hdg, alt, V/S, etc.), bugs' status annunciations (e.g., active, armed, etc.), autopilot interface (e.g., AP handling, FD handling, modes activation, etc.) and power consumption characteristics, please consult applicable OEM.

CAUTION: The proper flap configuration, with respect to flap speed limitations and stall speeds, has to be manually set by the pilot also when flying with autopilot active, according to the actual airspeed.

CAUTION: When flying with autopilot active, vertical speeds that are within aircraft's performance capabilities for the specific configuration should be selected or else, the autopilot may not be able to maintain selected values.

7.16 EMERGENCY LOCATOR TRANSMITTER

The airplane is optionally equipped with a self-contained emergency locator transmitter (ELT). The device is composed by the ELT transmitter, installed behind the right seat, a remote switch mounted on the instrument panel, connecting wires and antenna. In the event of an aircraft accident, these devices are designed to transmit a distress signal on different frequencies (121.5 and 406 MHz). The ELT is activated either automatically, once a certain force threshold is reached (e.g. in case of incident) or manually, by setting the remote switch, installed on the instrument panel, to ON.

For correct operation of the system, following switches position must be ensured:

	Artex 345	
	ELT (box)	Remote switch
Flight position (normal):	ARM/OFF	ARM/OFF
Manual activation during emergency landing:	use remote switch	ON
Manual activation (after emergency landing):	ON	ON
End transmission:	ON > ARM/OFF	ON > ARM/OFF

NOTE: Please refer to OEM documentation for additional information about ELT periodical pre-flight testing procedures.

NOTE: If the ELT is inadvertently activated in its distress mode, the operator should deactivate it AND contact the nearest COSPAS-SARSAT Mission Control Centre or local RCC as soon as possible to request cancellation of the distress alert (Deactivating the ALT alone does NOT cancel the distress alert that already has been transmitted by the beacon and received by COSPAS-SARSAT).

7.17 BALLISTIC PARACHUTE RESCUE SYSTEM (BPRS)

The aircraft is optionally equipped with the Ballistic Parachute Rescue System (BPRS) designed to bring the aircraft and its occupants to the ground in the event of a life-threatening emergency. The system is intended to save the lives of the occupants but will most likely destroy the aircraft and may, in adverse circumstances, cause serious injury or death to the occupants. Because of this it is important carefully to consider when and how you would use the system.

WARNING: The parachute system does not require electrical power for activation and can be activated at any time. The solid propellant rocket flight path is upward from the parachute cover. Stay clear of parachute canister area when aircraft is occupied. Do not allow children in the aircraft unattended.

7.17.1 SYSTEM DESCRIPTION

The BPRS consists of a parachute, a solid-propellant rocket to deploy the parachute, a rocket activation handle, a composite container and a harness connecting the canopy to the wingbox structure.

A composite box containing the parachute and solid-propellant rocket is mounted to the airplane structure behind the right seat and is divided from the baggage compartment. There is an exhaust tube leading the activation gasses from the rocket to the outside (bottom) of the fuselage, the exhaust is placarded.

The type of BPRS is Galaxy Rescue System GRS 6/473. The parachute system attaches with 2 belts to the aft fuselage/wings pins and belonging bulkhead. When deployed, the aircraft is suspended under the parachute with approx. 20° nose down attitude. The parachute system is activated by an activation handle, located between the occupant seats on the tubular structure overhead. The handle is pulled forward and/or downward for activation. A rocket is ignited that leaves the fuselage through a special egress panel directly behind the main bulkhead. The rocket pulls the complete parachute package out of its container at once. Maximum demonstrated parachute activation speed is 170 KTAS.

7.17.2 ACTIVATION

The BPRS is activated by an activation handle, located between the occupant seats on the tubular structure overhead. Pulling the activation T-handle will activate the rocket and initiate the BPRS deployment sequence.

To activate the rocket, two separate events must occur:

1

Pull the activation T-handle from its receptacle. Pulling the T-handle removes it from the o-ring seal that holds it in place and takes out the slack in the cable (approximately 5 cm of cable will be exposed). Once the slack is removed, the T-handle motion will stop and greater force will be required to activate the rocket.

2

Clasp both hands around activation T-handle and pull straight forward/downward with a strong, steady, and continuous force until the rocket activates. A chin-up type pull works best. Up to 200 N force, or greater, may be required to activate the rocket. The greater force required occurs as the cable arms and then releases the rocket igniter firing pin, which ignites the rocket fuel.

NOTE: Rapidly pulling on the activation T-handle greatly increases the pull forces required to activate the rocket.

A safety pin is provided to ensure that the activation handle is not pulled during inadvertently; for example, the presence of unattended children in the airplane, the presence of people who are not familiar with the BPRS activation system in the airplane, or during display of the airplane. A "Remove Before Flight" streamer is attached to the pin.

WARNING: Always remove the safety pin of the BPRS before engine start-up and re-insert before leaving the aircraft.

WARNING: After maintenance has been performed or any other time the system has been safe tied, operators must verify that the pin has been removed before further flight.

7.17.3 DEPLOYMENT CHARACTERISTICS

When the rocket launches, the parachute assembly is extracted outward due to rocket thrust and rearward due to relative airflow. In approximately two seconds the parachute will begin to inflate.

When air begins to fill the canopy, forward motion of the airplane will dramatically be slowed. This deceleration increases with airspeed but in all cases within the parachute envelope should be less than 4 g's. During this de-

celeration a slight nose-up may be experienced, particularly at high speed. Following any nose-up pitching, the nose will gradually drop until the aircraft is hanging nose-low beneath the canopy. Descent rate is expected to be less than 1500 feet per minute with a lateral speed equal to the velocity of the surface wind. In addition, surface winds may continue to drag the aircraft after ground impact.

CAUTION: Ground impact is expected to be equivalent to touchdown from a height of approximately 3 meters. Occupants must prepare for it in accordance with the BPRS Deployment procedure in Section 3 - Emergency Procedures.

NOTE: The BPRS is designed to work in a variety of aircraft attitudes, including spins. However, deployment in an attitude other than level flight may yield deployment characteristics other than those described above.



BPRS installation: hatch and belt positioning



BPRS installation: belts attachment points to fuselage structure



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SECTION

8

SECTION 8 – HANDLING AND SERVICING

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8.1 INTRODUCTION

The airplane owner should establish contact with the dealer or certified service station for service and information. All correspondence regarding the airplane must include its serial number (see tail-mounted type dataplate). A maintenance manual with revision service may be procured by the manufacturer.

8.2 AIRPLANE INSPECTION PERIODS

All applicable periodical inspections can be found in the latest revision of the aircraft's maintenance manual. The airworthiness authority may require other inspections by issuing airworthiness directives applicable to the aircraft, engine, propeller and/or specific components. The owner is responsible for compliance with all applicable airworthiness directives and periodical inspections.

8.3 PILOT CONDUCTED MAINTENANCE

Please refer to applicable Aircraft Maintenance Manual (AMM) and the regulations of the country of registration for information what maintenance may be performed by the pilot.

8.4 CHANGES AND REPAIRS

Information regarding changes and repairs can be found in the applicable maintenance manual (AMM).

8.5 SERVICING

8.5.1 TIRE SERVICING

The main landing gear wheel assemblies use 4.00 x 6 tires. The nose wheel assembly uses a 4.00 x 4 tire. For maximum service from the tires, keep them inflated to the proper pressure

Nose wheel tire (recommended):	26 psi (1.8 bar)
Main wheel tires (recommended):	40 psi (2.8 bar)

When checking tire pressure, examine the tires for wear, cuts, nicks, bruises and excessive wear.

8.5.2 BRAKE SERVICING

Brake Hydraulic Fluid Replenishing

The brake system is filled with DOT-4 hydraulic brake fluid. The fluid level should be checked at every oil change and at the annual / 100 h inspections, replenishing the system when necessary.

To replenish brake fluid:

- 1 Chock tires and release parking brake.
- 2 Clean area around the brake handle before opening reservoir cap itself.
- 3 Remove cap and add DOT-4 hydraulic fluid.
- 4 Install cap, check brakes, inspect area for leaks.

8.5.3 PROPELLER

The spinner and backing plate should be cleaned and inspected for cracks frequently. Before each flight the propeller should be inspected for dents, scratches, as well as corrosion on visible metal parts. If found, they should be repaired as soon as possible by a rated mechanic, since a nick or scratch causes an area of increased stress which can lead to serious cracks or the loss of a propeller tip. The back face of the blades should be repainted when necessary with flat black paint to retard glare. Refer to the latest revision of the applicable propeller manual for detailed information (i.e. *POM-160-00-60-001 FP02-80 Propeller operator's manual* for FP02-80 or *Manual for propeller type H50F* for Helix propeller).

8.5.4 OIL SERVICING

Oil must be changed every 100 hours and sooner under unfavorable (AVGAS) operating conditions.

An oil filler cap and dipstick are located at the right side of the engine, accessible through an access door on the top right side of the engine cowl-
ing. To check and add oil:

- 1 Open access door on upper cowl. Open cap of the oil bottle.
- 2 Verify Master switches OFF, Ignition (Magneto switches) OFF.
- 3 Rotate the propeller in normal direction until a blurring noise is heard. This is an evidence the oil has pumped through the system properly.
- 4 Pull dipstick, clean dipstick, and verify oil level.
- 5 Add oil through filler as required to maintain level between indicated min and max ticks. The capacity of oil system is 3.5 liters.
- 6 Reinstall dipstick and secure cap.
- 7 Close and secure access door.

8.5.5 FUEL SYSTEM SERVICING

Fuel Filter Screening

Refer to procedures in Maintenance manual

Filling Fuel Tanks

Fuel filler is located on top of the fuselage, behind the cabin. The tank holds a maximum of 50 L.

WARNING:

- Have a fire extinguisher available.
- Do not fill tank within 30 m of any electrical equipment capable of producing a spark.
- Permit no smoking or open flame within 30 m of airplane or refuel vehicle.
- Do not operate radios or electrical equipment during refuel operations.
- Do not operate any electrical switches.

To refuel airplane:

- 1** Place fire extinguisher near fuel tank being filled.
- 2** Connect ground wire from refuel nozzle to airplane exhaust, from airplane exhaust to fuel truck or cart, and from fuel truck or cart to a suitable earth ground.
- 3** Place rubber protective cover over the fuselage around fuel filler.
- 4** Remove fuel filler cap and fuel airplane to desired level.

NOTE: Keep fuel tank at least half full at all times to minimize condensation and moisture accumulation in the tank. In extremely humid areas, the fuel supply should be checked frequently and drained of condensation to prevent possible distribution problems.

- 5** Remove nozzle, install filler cap, and remove protective cover.
- 6** Remove ground wires.
- 7** Remove fire extinguisher.



Ground wire connected to exhaust.

Fuel Draining and Sampling

Typically, fuel contamination results from foreign material such as water, dirt, rust, and fungal or bacterial growth. Additionally, chemicals and additives that are incompatible with fuel or fuel system components are also a source of fuel contamination. To assure that the proper grade of fuel is used and that contamination is not present, the fuel must be sampled prior to each flight.

Fuel drains is provided for the fuel gascolator. Fuel must be sampled by draining a cupful of fuel into a clear sample cup.

The gascolator drain is accessible through the lower engine cowling (left side) just forward of the firewall.

If sampling reveals contamination, the gascolator must be sampled again repeatedly until all contamination is removed. If after repeated samplings, evidence of significant contamination remains, do not fly the airplane until a mechanic is consulted, the fuel system is drained and purged, and the source of contamination is determined and corrected.

The gascolator sampling outlet is open by rotating the knob and closed by rotating in the opposite direction.

CAUTION: Make sure the gascolator sampling outlet has been closed and is not leaking fuel before flight.



Fuel/water drain outlet

8.5.6 COOLING SYSTEM SERVICING

NOTE: Please refer to latest edition of Rotax Service Instruction SI-912-016, for the selection of the correct coolant.

Coolant quantity in the cooling system can be verified by checking coolant level contained in the expansion tank (water cooler), and coolant level in the overflow bottle.

- 1 Remove upper engine cowling and locate the water cooler cap
- 2 Open water cooler cap
- 3 Check coolant level. It must be flush to the bottom of the filler neck
- 4 Refill if necessary
- 5 Close water cooler cap
- 6 Check coolant level contained in the overflow bottle (between min and max level markings on the bottle)
- 7 Install upper engine cowling

NOTE: Please refer to *Rotax 912 series Operators Manual* for additional information about coolant level check procedure.

8.6 GROUND HANDLING

8.6.1 APPLICATION OF EXTERNAL POWER

No dedicated ground service receptacle is available, however it is possible to connect a battery-booster or external power to battery plus terminal and the exhaust.

If external power will be used to start engine, keep yourself, others, and power unit cables well clear of the propeller rotation plane.

CAUTION: Do not use external power to start the airplane with a 'dead' battery or to charge a dead or weak battery in the airplane. The battery must be removed from the airplane and battery maintenance performed with appropriate procedures.

To apply external power to the airplane:

- 1 Ensure that external power source is regulated to 14 VDC.
- 2 MASTER switch - OFF.
- 3 Connect (+) lead of external power source to (+) terminal of the battery. Connect (-) lead of external power source to the exhaust.
- 4 MASTER switch - ON. 14 VDC from the external power unit will energize the main distribution and essential distribution buses. The airplane may now be started or electrical equipment operated.

CAUTION: If maintenance on avionics systems is to be performed, it is recommended that external power be used.

To remove external power from airplane:

- 1 Carefully remove cables from battery terminal and exhaust.

8.6.2 TAXIING / GROUND MOVEMENTS

Before attempting to taxi the airplane, ground personnel should be instructed and authorized by the owner to taxi the airplane. Instruction should include engine starting and shutdown procedures in addition to taxi and steering techniques. All Normal procedures apply.

CAUTION: Verify that taxi and propeller blast areas are clear before beginning taxi.

Do not operate the engine at high RPM when running up or taxiing over ground containing loose stones or any loose material that may cause damage to the propeller blades. Taxi with minimum power needed for forward movement. Excessive braking may result in overheated or damaged brakes and/or fire. Observe wing clearance when taxiing near buildings or other stationary objects. If possible, station an observer outside the airplane. Avoid holes when taxiing over uneven ground.

- 1 Remove chocks.
- 2 Start engine in accordance with Starting Engine procedure.
- 3 Release parking brake.
- 4 Advance throttle to initiate taxi. Immediately after initiating taxi, apply the brakes to determine their effectiveness.
- 5 Taxi airplane to desired location.
- 6 Shut down airplane and install chocks and tie-downs.

8.6.3 PARKING

For parking:

- | | |
|---|--|
| 1 | Head airplane into the wind if possible. |
| 2 | Choose even terrain so that fuel does not spill because of sloped wings. |
| 3 | Retract flaps to 0, retract airbrakes (if installed) |
| 4 | Set parking brake by first applying brake pressure pulling the handle and then set the pin on the handle. |
| 5 | Chock both main gear wheels. |
| 6 | Tie down airplane. |
| 7 | Install a pitot head cover. |
| 8 | Fold the bottom part of the seat up (vertically) to prevent any moisture from accumulating below the seat. |
| 9 | Cabin doors should be locked. Lock doors at own discretion. |

CAUTION: Care should be taken when setting overheated brakes or during cold weather when accumulated moisture may freeze a brake.

8.6.4. TIE-DOWN

- | | |
|---|---|
| 1 | Head the airplane into the wind if possible |
| 2 | Retract flaps to (0), retract airbrakes (if installed) |
| 3 | Chock the wheels |
| 4 | Attach tie-down rings |
| 5 | Secure tie-down ropes to the wing tie-down rings and to the tail ring at approximately 45° angles to the ground |

CAUTION: Anchor points for wing tie-downs should not be more than 5 m apart to prevent tie-down rings damage in heavy winds.

8.7 CLEANING

8.7.1. CLEANING EXTERIOR SURFACES

The airplane should be washed with a mild soap and water. Harsh abrasives or alkaline soaps or detergents could make scratches on painted or plastic surfaces. Cover static ports and other areas where cleaning solution could cause damage. Be sure to remove the static port covers before flight.

NOTE: Prior to cleaning, place the airplane in a shaded area to allow the surfaces to cool.

To wash the airplane, use the following procedure:

- | | |
|---|--|
| 1 | Flush away loose dirt with water |
| 2 | Apply cleaning solution with a soft cloth, a sponge or a soft bristle |
| 3 | To remove exhaust stains, allow the solution to remain on the surface |
| 4 | To remove stubborn grease, use a cloth dampened with degreaser or naphtha. |
| 5 | Rinse all surfaces thoroughly. |

Any good silicone free automotive wax may be used to preserve painted surfaces. Soft cleaning cloths or a chamois should be used to prevent scratches when cleaning or polishing. A heavier coating of wax on the leading surfaces will reduce the abrasion problems in these areas. Pledge spray is recommended to be applied once the surface is clean and can be used instead of waxing.

Windscreen and Windows

Before cleaning lexan surfaces, rinse away all dirt particles before applying cloth or chamois. Never rub dry lexan. Do not attempt to polish lexan.

CAUTION: Clean windshield and windows only with a solvent free, none abrasive, antistatic cleaner. Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or glass window cleaning sprays. Use only a non-abrasive cotton cloth or genuine chamois to clean acrylic windows. Pledge spray is, however, recommended to be applied once the windshield is clean.

NOTE: Wiping with a circular motion can cause glare rings. Use an up and down wiping motion to prevent this. To prevent scratching from dirt that has accumulated on the cloth, fold cloth to expose a clean area after each pass.

- 1** Remove grease or oil using a soft cloth saturated mild detergent, then rinse with clean, fresh water.
- 2** Using a moist cloth or chamois, gently wipe the windows clean of all contaminants.
- 3** Dry the windows using a dry nonabrasive cotton cloth or chamois.

Engine Compartment

NOTE: Only to be cleaned by licensed service personnel.

- 1** Place a large pan under the engine to catch waste.
- 2** Remove induction air filter and seal off induction system inlet.
- 3** With the engine cowling removed, spray or brush the engine with solvent or a mixture of solvent and degreaser. In order to remove especially heavy dirt and grease deposits, it may be necessary to brush areas that were sprayed.

CAUTION: Do not spray solvent into the generator, starter, or induction air intakes.

8.7.2. CLEANING INTERIOR SURFACES

Windshield and Windows

Never rub dry lexan. Do not attempt to polish lexan.

CAUTION: Clean lexan windows with a solvent free, none abrasive, antistatic acrylic cleaner. Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or glass window cleaning sprays. Use only a non-abrasive cotton cloth or genuine chamois to clean acrylic windows. Paper towel or newspaper are highly abrasive and will cause hairline scratches.

NOTE: Wiping with a circular motion can cause glare rings. Use an up and down wiping motion to prevent this. To prevent scratching from dirt that has accumulated on the cloth, fold cloth to expose a clean area after each pass.

- 1 Wipe the windows clean with a moist cloth or chamois.
- 2 Dry the windows using a dry nonabrasive cotton cloth or chamois.

Instrument Panel and Electronic Display Screens

The instrument panel, control knobs, and plastic trim need only to be wiped clean with a soft damp cloth. The multifunction display, primary flight display, and other electronic display screens should be cleaned with LCD Screen Cleaning Solution.

CAUTION: To avoid solution dripping onto display and possibly migrating into component, apply the cleaning solution to cloth first, not directly to the display screen. Use only a lens cloth or non-abrasive cotton cloth to clean display screens. Paper towels, tissue, or camera lens paper may scratch the display screen. Clean display screen with power idle.

- 1 Gently wipe the display with a clean, dry, cotton cloth.
- 2 Moisten clean, cotton cloth with cleaning solution.
- 3 Wipe the soft cotton cloth across the display in one direction, moving from the top of the display to the bottom. Do not rub harshly.
- 4 Gently wipe the display with a clean, dry, cotton cloth.

The airplane interior can be cleaned with a mild detergent or soap and water. Harsh abrasives or alkaline soaps or detergents should be avoided. Solvents and alcohols may damage or discolour vinyl or urethane parts. Cover areas where cleaning solution could cause damage. Use the following procedure:

CAUTION: Solvent cleaners and alcohol should not be used on interior parts. If cleaning solvents are used on cloth, cover areas where cleaning solvents could cause damage.

- 1 Clean headliner, and side panels, with a stiff bristle brush, and vacuum where necessary.
- 2 Soiled upholstery, may be cleaned with a good upholstery cleaner suitable for the material. Carefully follow the manufacturer's instructions. Avoid soaking or harsh rubbing.

Leather Upholstery and Seats

Wipe leather upholstery with a soft, damp cloth. For deeper cleaning, use a mix of mild detergent and water. Do not use soaps as they contain alkaline which will cause the leather to age prematurely. Cover areas where cleaning solution could cause damage. Solvent cleaners and alcohol should not be used on leather upholstery.

- 1 Clean leather upholstery with a soft bristle brush and vacuum it.
- 2 Wipe leather upholstery with a soft, damp cloth.
- 3 Soiled upholstery, may be cleaned with approved products. Avoid soaking or harsh rubbing.

Carpets

To clean carpets, first remove loose dirt with a whisk-broom or vacuum. For soiled spots and stubborn stains use a non-flammable, dry cleaning fluid. Floor carpets may be cleaned like any household carpet.

SECTION

9

SECTION 9 – SUPPLEMENTS

LIST OF SUPPLEMENTS

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SUPPLEMENT

9-S1

SECTION 9 – SUPPLEMENT 9-S1

TRAINING SUPPLEMENT

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9.1 INTRODUCTION

This chapter has been written to assist owners/pilots/instructors of ALPHA Trainer on their quest to learn how to safely and efficiently fly this aircraft in addition to the information already assembled in the rest of this POH. This section will cover most operations the aircraft offers in an order established in section Normal procedures and recommended speeds. Please consider what follows as an add-on to that chapter.

9.2 ENGINE START-UP

First and foremost make sure you have sufficient fuel quantity on board for the desired length of flight. If you are not completely confident there is enough, step out of the aircraft and add more fuel into the tanks. There is an old aviators' saying: "The only time you have too much fuel is when you are on fire."

When engaging engine starter, wheel brakes **MUST** be engaged. To keep your propeller in perfect shape, avoid starting up on areas where there are small stones on the ground. Those little stones can easily be picked up by the propeller causing damage to the blades.

Warming up must be conducted below 2500 RPM. When reaching safe operational engine temperatures, verify maximum engine ground RPM. Hold the stick back completely and slowly(!) add throttle to full power, then verify RPM.

9.3 TAXI

Taxiing with the ALPHA Trainer is rather simple considering the steerable nose wheel. It is recommended you taxi slowly, up to 10 km/s (5 kts), while holding the stick back fully to ease the pressure of the nose wheel.

During taxiing monitor engine temperatures. Due to low airflow around the radiators the CHT and Oil temperature will rise during long taxi periods. If you are holding position, do not leave throttle at idle. It is better you have

some 2500 RPM as this will provide some airflow from the propeller to the radiators and the temperatures will not rise so quickly. Should you see engine temperatures exceed safe operational values, shut off the engine, point the aircraft's nose into the wind and wait for the temperatures to reduce.

9.4 TAKE OFF AND INITIAL CLIMB

Having checked and set all engine and aircraft parameters, you should be ready for take off by now. Reverify fuel valve is open. Trim lever should be in the middle.

Start the take-off roll gradually. Keep adding throttle smoothly and slowly to full power. There are two reasons for this. First, you change flight stage from zero movement to acceleration slowly; this provides you with time to react to conditions. Second, especially if taking-off from a gravel runway, this method of adding full throttle will prevent the little stones on the runway to damage the propeller. Extremely short runways are an exception. There you should line up the aircraft, set flaps to 2nd stage, step on the brakes, apply full power and release the brakes. As you start to move, pull the stick 1/3 of elevator's deflection backwards to ease the pressure on the nose wheel and lift it off the runway slightly. Do not use full back deflection as this will cause the aircraft's tail to touch the ground.

When the nose wheel has lifted off the ground, there is nothing else but to hold the same pitch attitude and the aircraft will become airborne. Cross-wind take-offs, depending on wind strength, require a little bit of aileron deflection into the wind. Remember, wings must stay level throughout ground-roll, rotation and initial climb!

Having lifted off the ground, gently push the stick forward just a bit to accelerate. At some 110 km/h (60 kts) set flaps to 1st stage, at 130 km/h (70 kts) set them to neutral.

9.5 CLIMB

A comfortable setting for climb is flaps in zero/neutral position, speed of 76 kts (140 km/h) at or slightly below 5500 RPM. In summer time or when outside temperature exceeds 85° F (30°C) you should consider climbing at some 85 kts (160 km/h) to provide more airflow to the engine radiators. Trim the aircraft for comfortable stick forces.

9.6 CRUISE

Make sure flaps are retracted. A comfortable cruise setting is 5300 engine RPM.

Cruising fast, do not kick-in rudder for turns! Above 85 kts (160 km/h) the rudder becomes almost insignificant in comparison to aileron deflections when it comes to making a turn. Cruising fast, it is important to fly coordinated (ball in the middle) as this increases efficiency and decreases side-pressure onto vertical tail surfaces. Also, pay attention to turbulence. If you hit turbulence at speeds greater than VNO, reduce power immediately and pull up the nose to reduce speed.

If flying a traffic pattern, set engine power so that airspeed does not exceed 150 km/h (80 kts).

9.7 DESCENT

Descending with the Alpha Trainer is the stage of flight where the most care should be taken. The aircraft is aerodynamically clean and builds up speed very fast.

Start the descent by reducing throttle and keep your speed below VNO. During initial descent it is recommended you trim for a 10 kts lower speed than the one you decided to descend at. Do this for safety. In case you hit turbulence simply release forward pressure on the stick and the aircraft will slow down.

Also, keep in mind you need to begin your descent quite some time before destination. A comfortable rate of descent is 500 fpm (2.5 m/s). So it takes you 2 minutes for a 1000 ft (300 m) drop. At 105 kts (200 km/h) this means 3.6 NM for each 1000 ft drop.

Entering the traffic pattern the aircraft must slow down. In order to do this, hold your altitude and reduce throttle to idle. Gradually slow down to below 80 kts (150 km/h), then set proper engine RPM to maintain speed of 70 kts (130 km/h). Trim the aircraft for comfortable stick forces.

Before turning to base-leg, reduce power to idle and set flaps to 1st stage at 70 kts (130 km/h). Once out of the turn, reduce speed towards 60 kts (110 km/h). Power remains idle from the point of turning base all the way to touch-down. If you plan your approach this way, you will always be on the safe side - even if your engine fails, you will still be able to safely reach the runway!

Turn to final at 55 kts (100 km/h). When in runway heading, set flaps to 2nd stage. Use the throttle to obtain the desired descent path (if applicable).

9.8 ROUNDOUT (FLARE) AND TOUCHDOWN

Your speed should be a constant 55 kts (100 km/h) throughout the final with the descent path constant as well. At a height of 10 meters (25 feet) start a gentle flare and approach the aircraft must touch down with the main (back) wheels first, so that you will not bounce on the runway. After touchdown, operate the rudder pedals if necessary to maintain runway heading and try to have the nose wheel off the ground for as long as possible. When the nose wheel is to touch the ground, rudder pedals **MUST** be exactly in the middle not to cause damage to the steering mechanism. While braking, hold the stick back fully! Once you have come to a standstill, retract flaps all the way to normal 0° position (handle full down).

Should you bounce off the runway after touch-down, do not, under any circumstances, push stick forward. Bouncing tends to reduce by itself anyhow.

Crosswind landings, depending on the wind speed, require some sort of drift correction. Most efficient is the low-wing method, where you are to lower the wing into the wind slightly and maintain course by applying appropriate rudder deflection. You can also try the crab method.

SUPPLEMENT

9-S2

SECTION 9 – SUPPLEMENT 9-S2

HELIX PROPELLER H502F R-SSI-18-2 PERFORMANCE

When the Helix propeller H50F R-SSI-18-2 is installed on the aircraft, the performance data presented in this supplement apply and replace only the corresponding sub-sections of the POH.

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SECTION 5: PERFORMANCE	REPLACE
SECTION 6: WEIGHT AND BALANCE	NO CHANGE
SECTION 7: SYSTEM DESCRIPTION	NO CHANGE
SECTION 8: HANDLING AND SERVICING	NO CHANGE

5.6 TAKE-OFF

Conditions	Weight:	MTOM (1212 lbs / 550 kg)
	Power:	throttle full open
	Flaps:	(+1)
	Runway:	dry, paved and level
	Wind:	calm

DISTANCE [m] / [ft]		912 UL 80 hp
SL 15 °C/ISA	Ground roll (MTOM)	238 / 781
	15 m/ 50 ft obstacle	453 / 1486

NOTE: In order to meet the data for takeoff runway length over 50 ft / 15m obstacle maintain V_x (58 KIAS) after takeoff.

Takeoff performance may vary depending on the wind, temperature, elevation and wing/propeller surface condition.

Correction Factors

Headwind: Subtract 10% for each 12 knots headwind.

Tailwind: Add 10% for each 2 knots tailwind up to 10 knots.

Runway Surface

Dry Grass: Add 10% to Ground Roll.

Wet Grass: Add 30% to Ground Roll.

Runway Slope:

Increase table distances by 22% of the ground roll distance at Sea Level for each 1% of upslope.

Decrease table distances by 7% of the ground roll distance at Sea Level, for each 1% of slope.

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	15 °C / ISA
Sea level	Ground roll	204 / 670	226 / 742	250 / 820	275 / 903	303 / 994	238 / 781
	50 ft / 15 m obstacle	389 / 1277	431 / 1414	476 / 1562	523 / 1716	574 / 1883	453 / 1486

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	11 °C / ISA
2000	Ground roll	242 / 794	269 / 883	297 / 975	328 / 1076	360 / 1181	272 / 893
	50 ft / 15 m obstacle	460 / 1510	509 / 1670	562 / 1844	619 / 2031	679 / 2228	515 / 1690

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	7 °C / ISA
4000	Ground roll	289 / 948	321 / 1053	355 / 1165	391 / 1283	430 / 1411	312 / 1024
	50 ft / 15 m obstacle	545 / 1788	604 / 1982	667 / 2188	734 / 2408	805 / 2641	586 / 1923

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	3 °C / ISA
6000	Ground roll	346 / 1135	384 / 1260	425 / 1394	468 / 1536	515 / 1690	358 / 1175
	50 ft / 15 m obstacle	648 / 2126	718 / 2356	793 / 2602	872 / 2861	957 / 3140	669 / 2195

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	-1 °C / ISA
8000	Ground roll	415 / 1362	461 / 1513	510 / 1673	562 / 1844	618 / 2028	412 / 1352
	50 ft / 15 m obstacle	772 / 2533	855 / 2805	944 / 3097	1039 / 3409	1140 / 3740	765 / 2510

5.7. CLIMB

RATE OF CLIMB (V_Y)

Conditions	Power:	throttle full open
	Flaps:	(0)
	Airspeed:	best rate of climb - at V_Y (76 KIAS)

WEIGHT	Pressure Altitude	Climb Speed	RATE OF CLIMB [ft/min]				
	ft	KIAS	0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	ISA
550 kg / 1212 lbs	0	76	1078	991	907	828	948
	2000	76	898	830	766	705	823
	4000	76	743	680	620	563	698
	6000	76	639	580	524	471	620
	8000	76	537	483	431	382	542
	10000	76	439	388	341	295	464

CLIMB GRADIENT (V_X)

NOTE: Angle of climb data shown is for information only, appropriate pilot procedures should be followed for non-ISA conditions.

WEIGHT	Pressure Altitude	Climb Speed	CLIMB ANGLE / GRADIENT
	ft	KIAS	ISA
550 kg / 1212 lbs	4000	58	7.2 ° / 12.7 %

CAUTION: Expect the climb performance to degrade with increased outside air temperature.

5.8. CRUISE

Conditions

Weight: 550 kg / 1212 lbs
 Temperature: ISA
 Wind: zero
 Total Fuel: 48 liters / 12.7 US gal (usable)

Usable fuel for cruise is equal to 48 liters / 12.7 US gal usable:

- less fuel used prior to takeoff
- less climb fuel
- less reserve fuel
- less descent fuel

NOTE: Max horizontal speed V_h (SL) is 100 KIAS (104 KCAS) with the Helix propeller H50F R-SSI-18-2.

NOTE: Actual flight endurance can be calculated from the following tables. For detailed fuel consumption determination for various cruising regimes consult the Rotax 912 Operators manual.

Pressure Altitude [ft]	Parameters		ISA		
	RPM	MAP	PWR	KTAS	FF (L/h)
1000	5500	25.9	MCP	106	13.6
	5000	24.9	75%	96	11.4
	4800	23.9	65%	90	10.2

Pressure Altitude [ft]	Parameters		ISA		
	RPM	MAP	PWR	KTAS	FF (L/h)
4000	5500	23.2	MCP	106	13.6
	5000	22.2	75%	95	11.7
	4800	21.4	65%	89	9.5

Pressure Altitude [ft]	Parameters		ISA		
	RPM	MAP	PWR	KTAS	FF (L/h)
7000	5500	21.0	MCP	105	13.6
	5000	20.1	75%	95	11
	4800	19.5	65%	88	9.2

NOTE: For every 10°C of OAT increase versus ISA, the cruising speed at 5500 RPM decreases by 3 kts.

5.10. LANDING

LANDING PERFORMANCE

<u>Conditions</u>	Weight:	550 kg / 1212 lbs
	Wind:	zero
	Runway:	dry, level and paved
	Flaps:	(+2)
	Airbrakes:	extended
	Power:	idle
	Airspeed:	55 KIAS

Correction Factors

Headwind: Subtract 10% from table distances for each 13 knots headwind.

Tailwind: Add 10% to table distances for each 2 knots tailwind up to 10 knots.

Dry grass runway: Add 20% to ground roll distance.

Wet grass runway: Add 60% to ground roll distance.

Sloped Runway:

Increase table distances by 27% of the ground roll distance for each 1% of slope.

Decrease table distances by 9% of the ground roll distance for each 1% of upslope.

CAUTION: The corrections should be used with caution since published runway slope data is usually the net slope from one end of the runway

to the other. Many runways will have portions of their length at greater or lesser slopes than the published slope, changing the estimated landing ground roll.

For operation in outside air temperatures colder than this table provides, use coldest data shown.

For operation in outside air temperatures warmer than this table provides, use extreme caution.

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	15 °C / ISA
Sea level	Ground roll	198 / 650	206 / 676	213 / 699	220 / 722	227 / 745	209 / 686
	50 ft / 15 m obstacle	423 / 1388	433 / 1421	444 / 1457	454 / 1490	465 / 1526	439 / 1440

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	11 °C / ISA
2000	Ground roll	213 / 699	221 / 725	229 / 751	237 / 778	245 / 804	222 / 728
	50 ft / 15 m obstacle	444 / 1457	456 / 1496	467 / 1532	478 / 1568	489 / 1604	457 / 1499

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	7 °C / ISA
4000	Ground roll	230 / 755	238 / 781	246 / 807	255 / 837	263 / 863	236 / 774
	50 ft / 15 m obstacle	468 / 1535	480 / 1575	491 / 1611	503 / 1650	515 / 1690	476 / 1562

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	3 °C / ISA
6000	Ground roll	247 / 810	257 / 843	266 / 873	275 / 902	284 / 932	250 / 820
	50 ft / 15 m obstacle	493 / 1618	506 / 1660	518 / 1700	531 / 1742	543 / 1782	497 / 1631

Pressure Altitude [ft]	DISTANCE [m] / [ft] 80 (hp)	OUTSIDE AIR TEMPERATURE					
		0 °C / 32 °F	10 °C / 50 °F	20 °C / 68 °F	30 °C / 86 °F	40 °C / 104 °F	-1 °C / ISA
8000	Ground roll	267 / 876	277 / 909	287 / 942	296 / 971	306 / 1004	266 / 873
	50 ft / 15 m obstacle	520 / 1706	534 / 1752	547 / 1795	560 / 1837	573 / 1880	519 / 1703

CROSSWIND LANDINGS

The maximum allowed crosswind component speed on landing is 18 kts (9 m/s). Normal crosswind landings are made with flaps extended to +1.

Avoid prolonged slips. After touchdown, hold a straight course with rudder. Only in case of high crosswind component it is permitted to land with flaps retracted (0°).

CAUTION: The runway length required increases by 10 % for every 5 kts of crosswind component.



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Pipistrel d.o.o.
Goriška cesta 50a
SI-5270 Ajdovščina
Slovenija - EU

t +386 (0)5 3663 873
f +386 (0)5 3661 263
info@pipistrel-aircraft.com
www.pipistrel-aircraft.com

Pipistrel Italia
Via Fratelli Rusjan, 26
34070 Savogna d'Isonzo (GO)
Italia - EU

t +39 3703207623
info.italia@pipistrel-aircraft.com
www.pipistrel-aircraft.com

Pipistrel Vertical Solutions d.o.o.
Vipavska cesta 2
SI-5270 Ajdovščina
Slovenija - EU

t +386 5 366 38 73
f +386 5 366 12 63
info@pipistrel-aircraft.com
www.pipistrel-aircraft.com