PIPISTREL

PILOT'S OPERATING HANDBOOK

VELIS Club

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Pilot's Operating Handbook

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This handbook includes all of the material required to be provided to the pilot by CS-LSA regulations. Additional information, deemed necessary by the TC holder, is also included.

Those pages marked as “APPROVED” are approved by the European Aviation Safety Agency.

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

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USING THIS HANDBOOK

Special statements in the Pilot's Operating Handbook concerning the safety or operation of the airplane are highlighted by being prefixed by one of the following terms:

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.

Revision tracking, filing and identifying

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.

The revision number on the log of effective pages shall also coincide with the revision number of the page in question. As an alternative to removing and/or replacing individual pages, the owner can also print out a whole new manual in its current form.

Revised material is marked with a vertical bar that will extend the full length of deleted, new or revised text added to new or previously existing pages. This marker will be located adjacent to the applicable text in the marking on the outer side of the page. The same system applies when the header, figure or any other element inside this POH is revised. A list of revisions is located at the beginning of the log of effective pages. Pipistrel is not responsible for technical changes/updates to OEM manuals supplied with the aircraft (eg. radio, transponder, GPS, etc.).

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A00	Initial	/	ALL	EASA 10.12.2020

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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 VELIS Club 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 has a tricycle landing gear. It is equipped with a 73,5 kW Rotax 912 S3.

The seats are side-by side with full dual flight controls and joint levers for throttle, choke, propeller, flaps and airbrake control. Access to cockpit is via two large gull-wing doors. Baggage area is behind the seats and accessible via a dedicated baggage door on the left-hand side of the fuselage. The VELIS Club can be optionally 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.

The airplane is approved for intentional spins and glider-towing (tow-hook is optional, see Supplement 9-S4).

1.3. CERTIFICATION BASIS

Type certification is based on EASA CS-LSA Light Sport Aircraft Certification Specifications. Operation of the basic version is restricted to VFR-day operations and a maximum takeoff weight of 600 kg.

1.4. THREE VIEW DRAWING

VELIS Club
3-view drawing

1.5. DIMENSIONS AND WEIGHTS

Basic Dimensions	**Metric**	**Imperial**
Length	6.45 m	21.15 ft
Span	10.70 m	35.13 ft
Height	2.06 m	6.75 ft

Wing		
Area	9.51 m^2	102.4 ft^2
Span	10.70 m	35.13 ft
Mean aerodynamic chord	0.898 m	2.95 ft
Horizontal Tail	**Metric**	**Imperial**
Area	1.02 m^2	10.9 ft^2
Span	2.18 m	7.15 ft
Vertical Tail		
Area	1.24 m^2	13.3 ft^2
Height	1.19 m	3.90 ft
Weights		
Maximum takeoff weight	600 kg	1323 lb
Design empty weight (min.)	340 kg	750 lb
Design useful load	260 kg	573 lb
Maximum baggage weight *	25 kg	55 lb
Max. wing loading	63.07 kg/m^2	12.92 lb/ft^2

* Baggage is permitted only when the baggage compartment is installed

1.6. SYSTEMS

1.6.1. POWERPLANT

The engine installed is Rotax 912 S3 providing 73.5 kW takeoff power. All limits as defined by the engine manufacturer apply. The engine can be operated with AVGAS 100LL or MOGAS (min. RON 95 antiknock properties and max. 10% ethanol content) as by Rotax specification. The propeller is driven by a gearbox. The gearbox is equipped with the Rotax slipper clutch.

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 is equipped with a MTV-33-1-A/170-200 made by MT-propeller. It is a 2-blade hydraulically operated constant-speed propeller with 1.70 m diameter. Construction is fiber reinforced wooden laminated core.

1.6.3. FUEL SYSTEM

The airplane uses two integral tanks located in the left and right wing, with header tanks present downstream from the main tanks before the fuel selector with three different positions: LEFT, RIGHT, OFF. Maximum usable fuel quantity is 2 x 49.5 L (2 x 50 L max tank capacity). The fuel system is designed as a pump system and provided with a mechanical pump. A gascolator that removes water from the fuel system is present and equipped with a 60 micron filter. An auxiliary fuel pump is not present.

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 via toe-pedals. A parking brake lever is also present. Optional wheel fairings can be installed.

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.

KIAS 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.

V_G Best Glide Speed is the speed at which the greatest flight distance is attained per unit of altitude lost with power idle.

V_A Operating Maneuvering Speed is the maximum speed at which application of full control movement will not over stress the airplane.

V_{FE} Maximum Flap Extended Speed is the highest speed permissible with wing flaps in a prescribed extended position.

V_{NO} Maximum Structural Cruising Speed is the speed that should not be exceeded except in smooth air, and then only with caution.

V_{NE} Never Exceed Speed is the speed that may not be exceeded at any time.

V_{AE} Maximum Airbrakes Extended Speed is the maximum speed at which the airbrakes may be extended.

V_{SO} 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.

AOA Angle of Attack is the angle between the line of the chord of an aerofoil and the relative airflow.

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 minimal 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 in flight temperature indications or from ground meteorological sources. It is expressed in either degrees Celsius or degrees Fahrenheit.

PA Pressure Altitude (ft) 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.

EMS Engine Management System

EGT Exhaust Gas Temperature

EIS Engine Information System

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.
-	**Basic Empty Weight** is the actual weight of the airplane including all operating fix installed equipment of the airplane. The basic empty weight includes the weight of unusable fuel and full oil.
MAC	**Mean Aerodynamic Chord** is the chord drawn through the centroid of the wing plan area.
R or LEMAC	**Leading Edge of Mean Aerodynamic Chord** is the forward edge of MAC aft of the reference datum.
-	**Maximum Gross Weight** is the maximum permissible weight of the airplane and its contents as listed in the aircraft specifications.
-	**Moment** is the product of the items weight multiplied by its arm.
-	**Useful Load** is the basic 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 mm2	0.0016 in2	1 in2	625 mm2
1 cm2	0.1550 in2	1 in2	6.4510 cm2
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	16.393 mm
1 cm3	0.06102 in3	1 in3	16.393 cm3
1 hPa	0.0145 psi	1 psi	68.965 hPa

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SECTION

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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 are KIAS.

Speed	KTAS	KIAS	Remarks
V_{NE}	**163**	See table below	**Never Exceed Speed** is the speed limit that may not be exceeded at any time.

DA (ft)	0	2000	4000	6000	8000	10000	12000	14000	16000	18000
V_{NE} (KIAS)	**163**	**158**	**154**	**149**	**145**	**140**	**136**	**132**	**128**	**123**

Speed	KIAS	Remarks
V_{NO} below FL100	120	**Maximum Structural Cruising Speed** is the speed that should not be exceeded except in smooth air.
V_{NO} above FL100	Reduced by 0.5 kts for every 1000 ft	
V_A	100	**Operating Maneuvering Speed** is the maximum speed at which full control travel may be used.
V_{FE}	81	**Maximum Flap Extended Speed** is the highest speed permissible with wing flaps extended at (+1) stage, 65 KIAS for (+2) stage, 135 for (0) stage.
V_{AE}	100	**Maximum Airbrakes Extended Speed** is the highest speed permissible with the airbrakes extended.
V_{S0}	47	**Stall speed in landing configuration** wing flaps extended at (+2) stage
V_S	53	**Stall speed in clean configuration** wing flaps retracted (0) stage

2.3. AIRSPEED INDICATOR MARKINGS

Speeds are KIAS.

MARKING	VALUE	REMARKS
White Arc	47 - 81	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 1st stage.
White triangle	65, 81, 135	Flap speed limitations for (+2) stage, (+1) stage and (0) respectively.
Green Arc	53 - 120	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. **NOTE:** Clean configuration is regarded as Flaps in position (0). Expect stalling at 56 KIAS with Flaps in position (-).
Yellow Arc	120 - 163	Caution Range. Operations must be conducted with caution and only in smooth air.
Red Line	163	Never exceed speed. Maximum speed for all operations.

2.4. ENGINE LIMITATIONS

Engine (Rotax 912 S3) - please refer to *Rotax 912 Series Operators Manual* for additional information.

Maximum Power rating	73.5 kW / 5800 RPM Max 5 min
Maximum Continuous Power	69 kW / 5500 RPM
Normal RPM	1400 - 5500 RPM
Maximum RPM	5800 RPM
Minimum Oil Pressure	0.8 bar
Normal Oil Pressure	2.0 – 5.0 bar
Maximum Oil Pressure	7.0* bar *permissible for a short period after cold start

Minimum Oil Temperature	50 °C
Normal Oil Temperature	90 °C - 110 °C
Maximum Oil Temperature	130 °C

Minimum Coolant Temperature	not limited
Maximum Coolant Temperature	120 °C
Maximum Exhaust Gas Temperature	880 °C

2.5. ENGINE INSTRUMENT MARKINGS

Kanardia RPM indicator:

Tachometer [RPM]	YELLOW RANGE	GREEN RANGE	YELLOW RANGE	RED LINE
	0 - 1400	1400 - 5500	5500 - 5800	5800

Kanardia DIGI display:

Oil Pressure [bar]	RED RANGE	YELLOW RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE
	0.0 - 0.8	0.8 - 2.0	2.0 - 5.0	5.0 - 7.0	> 7.0

MAP [in Hg] (manifold pressure)	GREEN RANGE	YELLOW RANGE
	0.0 - 29.4	> 29.4

Fuel Pressure [in Hg]	RED RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE
	0.0 - 0.15	0.15 - 0.40	0.40 - 0.50	> 0.50

Oil Temperature [°C]	RED RANGE	YELLOW RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE
	< 4	4 - 80	80 - 110	110 - 130	> 130

COOL TEMP [°C] (coolant temperature)	GREEN RANGE	YELLOW RANGE	RED RANGE
	20 - 110	110 - 120	> 120

EGT [°C] (exhaust gas temperature)	GREEN RANGE	YELLOW RANGE	RED RANGE
	400 - 885	885 - 900	> 900

Voltmeter [V]	/
	10.0 - 16.0

Ammeter [A]	/
	(- 40) - 40

2.6. WEIGHT AND CENTER OF GRAVITY LIMITS

Maximum takeoff weight	600 kg / 1323 lbs
Maximum landing weight	600 kg / 1323 lbs
Maximum zero fuel weight	555 kg / 1221 lbs
Design empty weight (minimum)	340 kg / 750 lbs
Design useful load	260 kg / 573 lbs
Most forward CG	25 % MAC / 267 mm
Most rearward CG	35 % MAC / 356 mm

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

CAUTION: Carrying baggage behind the seats is allowed only when the baggage compartment is installed and CG limitations are respected.

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	54 kg / 119 lbs

CAUTION: It is the pilots responsibility to ensure that the airplane is loaded properly and within prescribed weight and balance limitations.

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 95 (min. AKI 91)

Total fuel capacity	100 liters / 72 kg
Total fuel each tank	50 liters / 36 kg
Total usable fuel (all flight conditions)	99 liters / 71.3 kg
Maximum allowable fuel imbalance	Unlimited

* See latest edition of Rotax Service Instruction *SI-912-016R10 Selection of suitable operating fluids for Rotax Engine*.

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

NOTE: Unusable fuel is 0.5 liters per tank.

2.9. OIL/COOLANT

Approved oil: AeroShell Oil Sport PLUS 4 (as per Rotax specification*).

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

* as per Rotax specification: see latest edition of Rotax Service Instruction *SI-912-016R10 Selection of suitable operating fluids for Rotax Engine*.

2.10. FLIGHT LOAD FACTOR LIMITS

Up to V_A	+ 4.0 g / - 2.0 g
Up to V_{NE}	+ 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 certified in the CS-LSA category 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 approved with Flaps (0) and airbrakes retracted, power-off (IDLE).

2.12. ALTITUDE LIMITS

Maximum takeoff altitude	10,000 ft MSL
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

The structure has been tested to + 55 °C. Refer to AMM chapter 4 for approved colors and markings.

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.

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 local regulations or the nature of the operation.

SYSTEM, INSTRUMENT, EQUIPMENT	MLE - Required for Kind of Operation	
	VFR Day	Remarks
VHF COM	-	*The number of items required depends on the type of operation and applicable regulations.*
Intercom incl. headsets and microphones	-	*The number of items required depends on the type of operation and applicable regulations.*
Ammeter/Indicator	1*	
Battery	1	
Battery voltage indication	1*	
Generator fail light	1	
Safety belts and harnesses	2	*One may be inoperative if the flight is conducted in single pilot operations, and if the affected seat is not occupied.*
BPRS	-	*Needs to be operative when installed.*
ELT	1	
Pitch trim system and indicator	1	
Stall warning system	1	
Fuel selector valve	1	
Fuel quantity indicator	2	
Clock	-	*Also a wristwatch indicating hours, minutes, seconds is acceptable*
Hour meter	-	*May be inoperative provided a procedure is established to record flight time.*
Airspeed indicator	1	
Altimeter	1	
Magnetic compass	1	
Transponder	-	*The number of items required depends on the type of operation and applicable regulations.*
MAP indicator	1*	
Tachometer (RPM indicator)	1*	
Coolant temperature indicator	2*	
Oil pressure indicator	1*	
Oil temperature indicator	1*	

* The indication is integrated into the Kanardia DIGI system/display

2.16. OPERATIONAL RESTRICTIONS

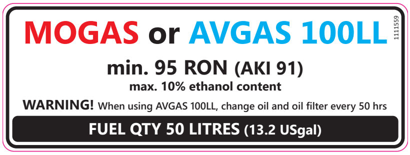
Flight into known icing conditions is prohibited.
No flights in heavy rainfall or blizzard conditions.
Areas with risk of thunderstorms should be avoided.
Flight under Instrument Flight Rules (IFR) is not permitted.
Smoking is prohibited.
Engine: -25 °C (oil temp) to 50 °C (ambient temp) as per Rotax OM.
Do not fly when temperature of the aircraft’s surface is at risk of exceeding 55 °C.
Do not takeoff with airbrakes extended.
Do not takeoff and land with flaps negative (-).
Avoid applying more than 75% rudder deflection during cruise/climb/landing as this may cause a pitch-down moment.
No intentional spins with configurations other than flaps 0 airbrakes retracted and power IDLE.
Dual socket USB outlets are not approved to supply power to flight-critical communication or navigation devices.
GPS navigation source is for information only and should not be used for primary navigation as well as attitude and heading references.
Carrying baggage behind the seats is allowed only when the baggage compartment is installed and CG limitations are respected.

2.17. PLACARDS

NOTE: The latest revision of the VELIS Club POH is the authoritative source of information regarding required placards. See the latest revision of the Virus SW 121 IPC for information about where the placards are to be located on the aircraft and how to order them if necessary.

2.17.1. PLACARDS (EXTERNAL)

Next to each wing fuel tank filler neck (2 pcs):



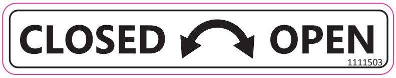
Next to nose wheel:

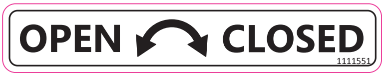
Next to main wheels (2 pcs):

Next to each static port (2 pcs):

Next to each fuel system water trap (2 pcs):

Next to door opening latches:



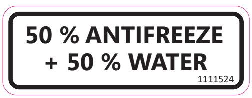


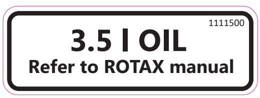
Next to fuel drain (engine cowling):

Around the drainage holes in fuselage, wings, control surfaces
(20 pcs, +1 pcs on forced ventilation cold air inlet, optional):

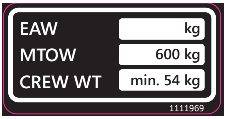
2.17.2. PLACARDS (ENGINE COMPARTMENT)

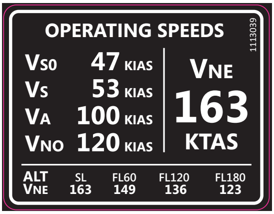
On coolant bottle, oil bottle:

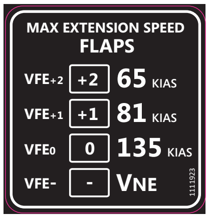




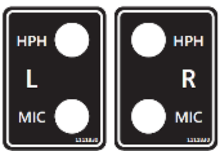
2.17.3. PLACARDS (INSTRUMENT PANEL)







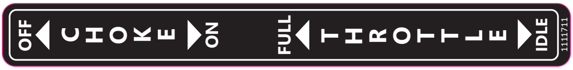
Next to microphone/headphone jacks:



2.17.4. PLACARDS (CENTER CONSOLE)

Next to propeller lever:

Next to choke and throttle levers:

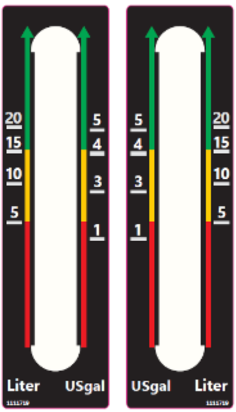


On flap lever (2 pcs):

Next to parking brake lever:

2.17.5. PLACARDS (CABIN)

Next to fuel level indicators:



Fuel selector:

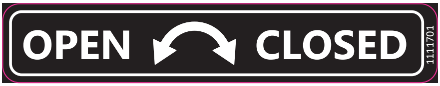
Next to the compass:

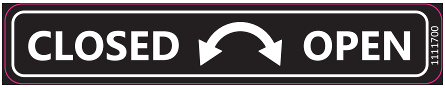
DATE: Calibrated with radio ON OFF

For	N	30	60	E	120	150
Steer						
For	S	210	240	W	300	330
Steer						

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

Below each door to depict door handle operation:



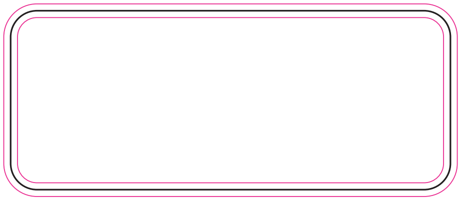


On inside of baggage compartment door:

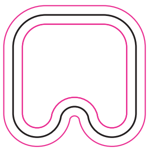
On inside and outside baggage compartment lock (2 pcs):

2.17.6. PLACARDS (FUEL PROTECTION)

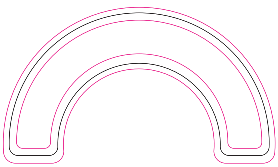
Protects the placards near the wing filler necks (2 pcs):

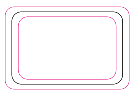


Protects water trap placards (2 pcs):



Protects fuel/water drain placards near the gascolator/drain:





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, these 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.

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 the discretion of the pilot. It is not recommended to continue the flight beyond the nearest suitable landing area.

NOTE: The procedures described in this section include also optional equipment. Skip steps that do not apply to the specific aircraft if the equipment is not installed. See Section 7 for additional information.

3.2. AIRSPEEDS FOR EMERGENCY OPERATIONS

Maneuvering Speed:	100 KIAS
Best Glide - flaps (0):	70 KIAS

Emergency Landing (Engine-out):

Flaps (0)	63 KIAS
Flaps (+1)	60 KIAS
Flaps (+2)	58 KIAS

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	Starter	Keep cranking
2	Fuel Selector	OFF
3	Throttle Lever	Full forward

If flames are extinguished:

4	Ignition Switch	OFF
5	GEN Master	OFF
6	BAT Master	OFF

If flames persist, perform *EMERGENCY ENGINE SHUTDOWN ON GROUND* and *EMERGENCY GROUND EGRESS PROCEDURES*.

3.3.2. EMERGENCY ENGINE SHUTDOWN ON GROUND

1	Throttle Lever	Idle
2	Ignition Switch	OFF
3	Fuel Selector	OFF
4	GEN Master	OFF
5	BAT Master	OFF

3.3.3. EMERGENCY GROUND EGRESS

1	Engine	Shutdown
2	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.

3.4. IN-FLIGHT EMERGENCIES

3.4.1. ENGINE FAILURE AT TAKEOFF (LOW ALTITUDE)

If the engine fails immediately after becoming airborne, abort with landing on the runway if possible. If altitude attained precludes a runway stop but is not sufficient 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	Airspeed	**Maintain above stall speed!**
2	Fuel Selector	**OFF**
3	Ignition Switch	**OFF**
4	Flaps	**As required**

If time permits:

1	Throttle Lever	**Idle**
2	BAT Master	**OFF**
3	Seat Belts	**Check fastened and tightened**

3.4.2. ENGINE FAILURE IN FLIGHT

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

WARNING: If engine failure is accompanied by fuel fumes in the cockpit or internal engine damage is suspected, set fuel selector to OFF and do not attempt a restart. Continue with *EMERGENCY LANDING* checklist.

1	Best Glide Speed	70 KIAS

Only when time and conditions permit, follow:

2	*ENGINE RE-START IN FLIGHT AFTER FAILURE* procedure

When in flight engine re-start is not possible or/and engine does not re-start or respond to actions, continue with:

3	*EMERGENCY LANDING* procedure

WARNING: If airplane is equipped with the BPRS and altitude or terrain does not permit a safe landing or prevent you from gliding to the airport, BPRS deployment may be required.

Best Glide Speed and Glide Ratio conditions:

Propeller	Stopped
Flaps	(0)

Weight:	600 kg
Best Glide Speed:	70 KIAS
Max. Glide Ratio:	15 : 1

3.4.3. ENGINE RE-START IN FLIGHT AFTER FAILURE

The following procedure addresses the most common causes for engine loss. Switching tanks and cranking will enhance starting if fuel contamination was the cause of the failure.

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

1	BAT Master	Check ON
2	GEN Master	Check ON
3	Propeller Lever	Full forward
4	Throttle Lever	10 mm OPEN
5	Starter (if propeller not windmilling)	Engage
6	Throttle Lever	Gradually increase

WARNING: If Engine re-start in flight is not successful or time / conditions prevents you to perform safe troubleshooting, always be prepared to continue with EMERGENCY LANDING checklist. If airplane is equipped with the BPRS, deployment may be required.

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 an emergency landing pattern over a suitable landing field. Always be prepared for a complete engine failure and if airplane is equipped with the BPRS, consider deploying it, 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	Fuel Selector	Switch tanks

Selecting the opposite fuel tank may resolve the problem if fuel starvation or contamination in one tank was the problem.

2	Throttle Lever	Sweep

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

3	Ignition Switch	BOTH, L, then R

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

4	Land	AS SOON AS POSSIBLE

If engine stops and time/conditions permit, proceed with ENGINE FAILURE IN FLIGHT check-list.

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 emergency landing field.

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 the cause.

3.4.6. PROPELLER GOVERNOR FAILURE

If the RPM does not respond to propeller lever movement or overspeeds, the most likely cause is a faulty governor or an oil system malfunction.

Propeller RPM will not increase:

1	Land	AS SOON AS PRACTICAL

Propeller overspeeds or rpm will not decrease:

1	Throttle Lever	Adjust (to keep RPM in limits)
2	Airspeed	Reduce to MAX 90 KIAS
3	Oil Pressure	CHECK
4	Land	AS SOON AS PRACTICAL

3.5. FIRE IN FLIGHT

3.5.1. SMOKE IN THE COCKPIT

IIf 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. Perform an Emergency Landing and shut down the fuel supply to the engine once a safe landing is assured.

1	Green Electrical Switches (switch panel)	OFF
2	Door Vents	Open
3	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.

3.5.2. ENGINE FIRE IN FLIGHT

If an engine fire occurs during flight:

1	Fuel Selector	OFF
2	Door Vents	As required

3	Throttle Lever	Full forward

After the engine stops:

4	Ignition Switch	OFF
5	Land	IMMEDIATELY

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

3.5.3. WING FIRE IN FLIGHT

1	NAV/AC Lights	OFF
2	Side slip to keep flames away from fuel tank and cabin	Perform - If possible
3	Land	IMMEDIATELY

NOTE: As an alternative, putting the airplane into a dive may put the fire out. Do not exceed V_{NE} during the dive.

3.5.4. 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 the 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 the cabin of smoke or fumes.

1	GEN Master	OFF
2	BAT Master	OFF
3	*Fire Extinguisher* ***(if applicable)***	Activate
4	Door Vents	As required

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

5	Land	AS SOON AS POSSIBLE

WARNING: If turning off the MASTER SWITCHES eliminates the cause of the fire, leave the switches OFF. Do not attempt to isolate the source of the fire by checking each individual electrical component.

CAUTION: When the BAT Master and GEN Master Switch are turned OFF, the engine will continue to run, but BAT Master switch has to be turned ON again if engine re-start would be necessary. The electric power to the avionics will be cut off and all electric instruments not equipped with a backup battery will be inoperative. 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).

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.

3.6. SPINS

The airplane is approved for intentional spins, according to F2245-12d, paragraph 4.5.9., which includes investigation of behavior of developed 3-turn spins and subsequent recovery within a maximum additional 1.5 turns (see Section 4, normal procedures).

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 started spinning.

In any case, spin recovery technique is classic:

1	Throttle Lever	**Idle**
2	Rudder	**Full deflection - OPPOSITE to the spin**

3	Control Stick	Push forward - lower the nose to increase speed, Roll neutral

As rotation stops:

4	Rudder	Neutralize
5	Horizontal Flight	Resume - do not exceed g-load and airspeed limits

3.7. EMERGENCY LANDING

If all attempts to restart the engine and an emergency landing is imminent, select a suitable field and prepare for the landing. If airplane is equipped with the BPRS and 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.

3.7.1. EMERGENCY LANDING WITHOUT ENGINE POWER

1	Best Glide Speed	Establish - 70 KIAS
2	Throttle Lever	Idle
3	Fuel Selector	OFF
4	Ignition Switch	OFF
5	Seat Belt(s)	Check fastened and tightened

Select a suitable field and prepare for the emergency landing:

6	Flaps (when landing is assured)	(+2)
7	Report your location and intentions	Transmit (121.5 MHz) MAYDAY
8	Transponder	SQUAWK 7700
9	ELT	Activate
10	BAT Master	OFF

3.7.2. DITCHING

1	Report your location and intentions	Transmit (121.5 MHz) MAYDAY
2	Transponder	SQUAWK 7700
3	Flotation Devices	Put On
4	Seat Belt(s)	Check fastened and tightened
5	Flaps	(+2)
6	Airspeed	50 KIAS or minimum possible
7	Approach*	300 ft/min Rate of descent or minimum possible
8	Doors	UNLATCH before impact with water
9	Touchdown *	Wings level - Lowest possible speed
10	Airplane	Evacuate
11	Flotation Devices	Inflate when clear of the airplane

* **CAUTION:** A correct landing flare may be problematic to perform due to loss of depth perception, especially over a wide expanse of smooth water. On contact with the water surface the aircraft will decelerate abruptly, overturning is also possible. Evacuate quickly. In heavy swells and light wind, ditch parallel to the swells. In heavy wind, ditch into the wind.

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.

3.7.3. 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 takeoff or landing and is hardly noticeable during fast taxiing. It is only during the lower taxiing speeds that a tendency to swerve occurs.

3.7.4. LANDING WITH DEFECTIVE BRAKES

Brake system deficiency is usually detected only after touch down, during ground roll deceleration phase. If brakes are inefficient:

1	Ignition	OFF
2	Fuel Selector	OFF
3	Seat Belt(s)	Check fastened and tightened

In case of single brake failure, release immediately brake pressure to avoid swerve due to asymmetric braking. Only if necessary apply very light pressure on the brakes, using nose wheel steering to compensate asymmetric braking.

Steer the aircraft gently during deceleration. Once the aircraft has stopped, restart the power and vacate the runway at low speed and using low power settings.

3.8. GPS DISPLAY MALFUNCTION

In the unlikely event of a Garmin Aera 660 display failure, GPS-derived analog flight instrumentation, position, navigation, and hazard avoidance information to the pilot is lost. If this malfunction occurs, the GPS circuit breaker may be disengaged and the airplane flown using the mechanical flight instruments to control airspeed, altitude and attitude. Use compass information for navigation purposes.

See *Garmin Aera 660 Pilot's Guide* for more information.

3.9. GENERATOR FAILURE

Steady illumination of the “GENERATOR FAIL” caution light 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. In this condition on board battery should provide power for at least 30 minutes.

NOTE: Electrical power malfunctions are accompanied by an excessive rate of charge, battery voltage reduction or discharge shown on the ammeter.

1	RPM	**Increase**

If the "GENERATOR FAIL” caution light persists:

2	Unnecessary Equipment	**OFF (to reduce loads)**
3	Voltage / Current	**Monitor**

NOTE: In case normal positive rate of charge is observed on Ammeter, engine integrated AC generator could still be operational. Suspect also faulty GENERATOR FAIL indication. Electrical system shall be inspected on ground.

4	Land	**AS SOON AS PRACTICAL**

NOTE: If it is necessary to reduce electrical loads due to a 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.

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 turned off during flight.

3.10. ENGINE INDICATING SYSTEM FAILURE

In the event of a Data Acquisition Unit failure, the engine indications displayed on the Kanardia DIGI will be disabled. In the event of Data Acquisition Unit failure, pull and reset the EIS circuit breaker. If the engine indicating system fails to reset, land as soon as practical.

1	EIS Circuit Breaker	Cycle
2	Land	AS SOON AS PRACTICAL

3.11. COMMUNICATION FAILURE

1	Switches, Controls, Volume	CHECK
2	Frequency	Change
3	Circuit Breakers	CHECK
4	Headset	Change
5	Transmission	Attempt

If unsuccesful:

6	Transponder	SQUAWK 7600

3.12. PITOT STATIC MALFUNCTION

3.12.1. 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.

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.

3.12.2. 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

3.13. ELECTRIC TRIM FAILURE

Any failure or malfunction of the electric trim can be overridden by use of the control stick. If runaway trim is the problem, cut the circuit by disengaging the TRIM circuit breaker and land as soon as practical.

1	Airplane Control	Grasp stick, Maintain manually
2	TRIM Circuit Breaker	Disengage
3	Throttle Lever	As required
4	Control Stick	Manually hold pressure
5	Land	AS SOON AS PRACTICAL

3.14. BATTERY MALFUNCTION / OVER-VOLTAGE

The EarthX integrated BMS continuously monitors each cell's voltage as part of the cell balancing and over/under-voltage protection. The EarthX battery disconnects itself in case of under-voltage.

NOTE: A lithium battery voltage remains relatively constant while discharging. But when the lithium battery runs out of power it does so more abruptly when compared to lead-acid batteries.

Battery system malfunctions are additionally indicated by the orange BATTERY 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 *ETX Lithium Battery User's Manual* for additional information about how to troubleshoot any battery errors/malfunctions.

The faults that have most relevance during flight are indicated by a slow flashing of the BATTERY CAUTION Light (5s on / 5s off). If the battery voltage is outside the normal range of operation, 12.8 V to 14.6 V, the battery is over-discharged or over-charged, most likely the result of an issue with the electrical/charging system.

- UNDERVOLTAGE (over-discharging) condition is indicated by the slow flashing of the BATTERY CAUTION Light (5s on / 5s off) **and** voltage lower than 12.8 V. The most common cause for over-discharge is a charging system (generator) failure. See Section 3.9 for more information and applicable procedure.

- OVERVOLTAGE (over-charging) condition is indicated by the slow flashing of the BATTERY CAUTION Light (5s on / 5s off) **and** voltage greater than 15.2 V.

CAUTION: If in flight, shutoff charging system (generator) immediately. Most likely, the cause is a voltage regulator failure.

Slow flashing (5s on / 5s off) **and** Battery Voltage greater than 15.2 V:

1	GEN Master	OFF
2	Land	AS SOON AS PRACTICAL

3.15. EXCEEDING V_{NE}

Should the V_{NE} be exceeded, set throttle to idle and 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.

3.16. 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 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.

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 airplane is equipped with the BPRS and 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	
Starter	Keep cranking
Fuel Selector	OFF
Throttle Lever	Full forward
If flames are extinguished:	
Ignition Switch	OFF
GEN Master	OFF
BAT Master	OFF
If flames persist, perform EMERGENCY ENGINE SHUTDOWN ON GROUND and EMERGENCY EGRESS CHECKLIST.	

EMERGENCY ENGINE SHUTDOWN	
Throttle Lever	Idle
Ignition Switch	OFF
Fuel Selector	OFF
GEN Master	OFF
BAT Master	OFF

EMERGENCY GROUND EGRESS	
Engine	SHUTDOWN
Parking Brake	Engaged
Seat Belts	Released
Airplane	Exit

IN FLIGHT EMERGENCIES

ENGINE FAILURE AT TAKE OFF (LOW ALT)	
Airspeed	Maintain above stall speed!
Fuel Selector	OFF
Ignition Switch	OFF
Flaps	As required
If time permits:	
Throttle Lever	Idle
BAT Master	OFF
Seat Belts	CHECK fastened and tightened

ENGINE FAILURE IN FLIGHT	
Best Glide Speed	70 KIAS
Only when time and conditions permit, proceed with:	
ENGINE RE-START IN FLIGHT AFTER FAILURE procedure	
If restart not possible or unsuccessful, proceed with:	
EMERGENCY LANDING procedure	

ENGINE RE-START IN FLIGHT AFTER FAILURE	
BAT Master	Check ON
GEN Master	Check ON
Propeller Lever	Full forward
Throttle Lever	10 mm OPEN
Starter (Propeller not windmilling)	Engage
Throttle Lever	Gradually increase

ENGINE PARTIAL POWER LOSS

Fuel Selector	Switch tanks
Throttle Lever	Sweep
Ignition Switch	BOTH, L, then R
Land	AS SOON AS POSSIBLE
If engine stops and time/conditions permit, proceed with ENGINE FAILURE IN FLIGHT check-list	

LOW OIL PRESSURE

Throttle Lever	Minimum required
Land	AS SOON AS POSSIBLE

PROPELLER GOVERNOR FAILURE

Propeller RPM will not increase:	
Land	AS SOON AS PRACTICAL
Propeller overspeeds or RPM will not decrease:	
Throttle Lever	Adjust (to keep RPM in limits)
Airspeed	Reduce to MAX 90 KIAS
Oil Pressure	CHECK
Land	AS SOON AS PRACTICAL

FIRE IN FLIGHT

SMOKE IN THE COCKPIT	
Green Electrical Switches (switch panel)	OFF
Door Vents	Open
Land	AS SOON AS POSSIBLE

ENGINE FIRE FLIGHT	
Fuel Selector	OFF
Door Vents	As required
Throttle Lever	Full forward

After the engine stops:

Ignition Switch	OFF
Land	IMMEDIATELY

WING FIRE IN FLIGHT	
NAV/AC Lights	OFF
Side slip to keep flames away from fuel tank and cabin	Perform - if possible
Land	IMMEDIATELY

FIRE IN FLIGHT (continue)

COCKPIT FIRE IN FLIGHT	
GEN Master	OFF
BAT Master	OFF
Fire Extinguisher *(if applicable)*	Activate
Door Vents	OPEN as required

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

Land	AS SOON AS POSSIBLE

SPIN RECOVERY	
Throttle Lever	Idle
Rudder	FULL deflection, OPPOSITE to the spin
Control Stick	Forward, roll neutral

As rotation stops:

Rudder	Neutralize
Horizontal Flight	Resume do not exceed airspeed and g-load limits

DITCHING	
Report your Location and Intentions	Transmit (121.5 MHz) MAYDAY
Transponder	SQUAWK 7700
Flotation Devices	Put On
Seat Belt(s)	CHECK fastened and tightened
Flaps	(+2)
Airspeed	50 KIAS or minimum possible
Approach	300 ft/min Rate of descent or minimum possible
Doors	Unlatch before impact with water
Touchdown	Wings level - lowest possible speed
Airplane	Evacuate
Flotation Devices	Inflate when clear of the airplane

EMERGENCY LANDING

EMERGENCY LANDING WITHOUT ENGINE POWER	
Best Glide Speed	ESTABLISH - 70 KIAS
Throttle Lever	Idle
Fuel Selector	OFF
Ignition Switch	OFF
Seat Belt(s)	CHECK fastened and tightened
Select a suitable field and prepare for the emergency landing:	
Flaps (When landing is assured)	(+2)
Report your Location and Intentions	Transmit (121.5 MHz) MAYDAY
Transponder	SQUAWK 7700
ELT	Activate
BAT Master	OFF

LANDING WITH DEFECTIVE BRAKES

Ignition Switch	OFF
Fuel Selector	OFF
Seat Belt(s)	CHECK fastened and tightened

GENERATOR FAILURE

RPM	Increase

If the "GENERATOR FAIL" caution light still persists:

Unnecessary Equipment	Switch OFF (to reduce loads)
Voltage / Current	Monitor
Land	AS SOON AS PRACTICAL

ENGINE INDICATING SYSTEM FAILURE

EIS Circuit Breaker	Cycle
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

ELECTRIC TRIM FAILURE

Airplane Control	Grasp stick - maintain manually
TRIM Circuit Breaker	Disengage
If problem persists:	
Throttle Lever	As required
Control Stick	Manually hold pressure
Land	AS SOON AS PRACTICAL

BATTERY MALFUNCTION / OVERVOLTAGE

Slow flashing (5s on / 5s off) **and** Battery Voltage greater than 15.2V:	
GEN Master	OFF
Land	AS SOON AS PRACTICAL

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SECTION

4

SECTION 4 - NORMAL PROCEDURES

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4.1. INTRODUCTION

This section provides amplified procedures for normal operation.

NOTE: The procedures described in this section include also optional equipment. Skip steps that do not apply to the specific aircraft if the equipment is not installed. See Section 7 for additional information.

4.2. AIRSPEEDS FOR NORMAL OPERATION

Unless otherwise noted, the following speeds are based on a maximum mass of 600 kg 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 KIAS**
Obstacle clearance	**Flaps (0)**	**60 KIAS**
ENROUTE CLIMB		
Normal	**Flaps (0) or (-)**	**90 - 110 KIAS**
Best rate of climb (SL)	**Flaps (0)**	**78 KIAS (V_Y)**
Best angle of climb (SL)	**Flaps (0)**	**60 KIAS (V_X)**
LANDING APPROACH		
Normal approach	**Flaps (0)**	**65 - 75 KIAS**
Normal approach	**Flaps (+1)**	**63 - 70 KIAS**
Normal approach	**Flaps (+2)**	**60 - 65 KIAS**
GO AROUND		
Full power	**Flaps as practical**	**65 KIAS**

Maximum demonstrated crosswind velocity

Takeoff or landing	**9 m/s - 18 Knots**

4.3. PREFLIGHT INSPECTION

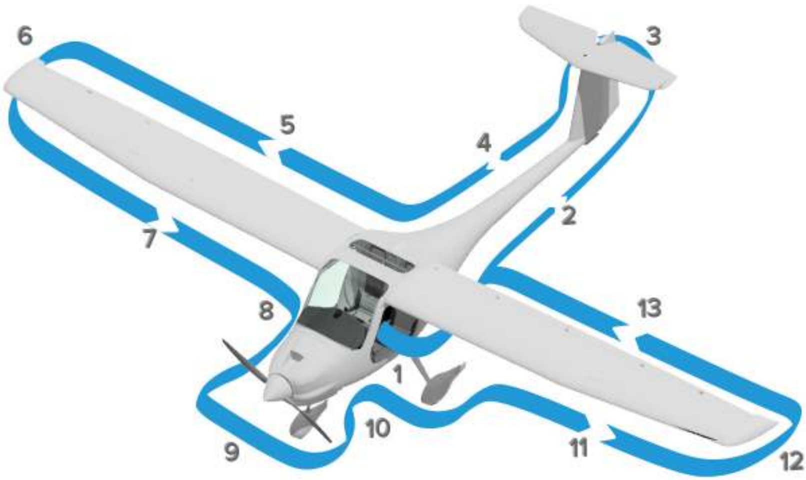
Before carrying out preflight inspections, ensure that all required maintenance has been performed. Review your flight plan and compute weight and balance.

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 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 breaks 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	Required Documents	On board
2	BPRS Handle	Check safety PIN inserted
3	Ignition Switch	Check OFF
4	Green Electrical Switches	All OFF
5	Circuit Breakers	Check ENGAGED
6	Battery Disconnect Switch	Check CONNECTED
7	Flight Controls	Free, unobstructed motion
8	Flaps, Airbrakes	Symmetrical, smooth operation

Check smooth operation of flap and airbrake lever and that flap lever push button lock is functional for all flap positions.

9	BAT Master	ON

When BAT Master is turned ON, the stall warning system is tested. See Section 7 for more information.

10	GEN Master	ON
11	ELT (transmitter and remote switch)	ARMED

Check that ELT transmitter and Remote switch are BOTH in the ARM (armed) position. Antenna and cable harness shall be properly connected to ELT transmitter!

NOTE: Periodical testing of ELT operation is required (advised once a month, but not more than once per week). Please see OEM for details about testing procedure.

12	Voltmeter	12 - 14 Volts
13	Lights	Check operation
14	Fuel Quantity	Check
15	Fuel Selector	Select fullest tank
16	GEN Master	OFF
17	BAT Master	OFF
18	Circuit Breakers	Check ENGAGED

2) LEFT FUSELAGE		
1	COM / ELT Antenna (top)	Condition and attachment
2	Wing / Fuselage Seal	Taped firmly, no wrinkles
3	XPDR Antenna (underside)	Condition and attachment
4	Baggage	Secured
5	Baggage Door	Closed and locked
6	Static Pressure Port	Unblocked
7	Fuel System Water Srain	Perform

3) EMPENNAGE		
1	Tiedown Rope	Remove
2	Horizontal and Vertical Stabilizer	Check condition
3	Elevator and Elevator U-piece	Condition and movement
4	Rudder	Freedom of movement
5	Rudder Trim Tab	Condition and attachment
6	Attachment Hinges, Bolts, Springs and Pins	Secured, tightened, in place

4) RIGHT FUSELAGE		
1	Static Pressure Port	Unblocked
2	Fuel System Water Drain	Perform
3	Wing / Fuselage Seal	Taped firmly, no wrinkles
4	Door Lock	Unlock
5	BPRS Cover, Strap Covers	Condition and attachment

5) - 6) - 7) RIGHT WING		
1	Flaperon	Condition, attachment and movement
2	Flaperon Gap Seal	Taped firmly, no wrinkles
3	Airbrakes	Condition, security and movement
4	Hinges, Bolts and Safety Nuts	Secured, tightened, in place
5	NAV/AC Lights	Condition and attachment

6	Leading Edge and Tip	Check condition
7	Fuel Cap	Check fuel quantity sufficient and fuel cap fully closed

Check there is enough fuel quantity for intended operation and that fuel cap is fully closed afterwards with fuel vent tube pointing in the aft direction.

8	Water Drain Holes	Clean
9	Pitot Tube	Cover removed, tube unblocked

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	Check attachment
5	Chocks and Tiedown Rings/Ropes	Remove

9) PROPELLER AND COWLINGS AREA		
1	Cowlings	Attachment secured
2	Propeller	Clean, undamaged
3	Spinner	Condition, attachment and oil leaks
4	Air Inlets, Outlets	Unobstructed

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, attachment and clearance
3	Gascolator	Drain 1 cup, sample
4	Landing Light	Attachment and condition

5	Strut	Check condition
6	Nose Landing Gear	General condition
7	Wheel and Tire	Condition, inflation and wear
8	Wheel Fairing	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	Check attachment
5	Chocks and Tiedown Rings/ Ropes	Remove

11) - 12) - 13) LEFT WING		
1	Fuel Cap	Check sufficient fuel quantity and fuel cap fully closed
Check there is enough fuel quantity for intended operation and that fuel cap is fully closed afterwards with fuel vent tube pointing in the aft direction.		
2	Leading Edge and Tip	Condition
3	NAV/AC Lights	Condition and attachment
4	Flaperon	Condition, attachment, movement
5	Flaperon Gap Seal	Taped firmly, no wrinkles
6	Airbrake	Condition, security and movement
7	Hinges, Bolts and Safety Nuts	Secured, tightened, in place
8	Water Drain Holes	Clean

4.4. STARTING ENGINE

4.4.1. BEFORE STARTING ENGINE

1	Preflight Inspection	Completed
2	Fuel Quantity	Sufficient
3	Emergency Equipment	On board
4	Passenger	Briefed
5	Seats, Seat Belts and Pedals	Fasten and adjust

CAUTION: Pedals must be locked in position before flight. Ensure seat belt harnesses are not twisted.

6	Doors	Closed and latched
7	BPRS Safety Pin	Remove
8	BAT Master	ON

When BAT Master is turned ON, the stall warning system is tested. See Section 7 for more information.

9	Parking Brake	Engage

4.4.2. STARTING ENGINE

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

1	Fuel Selector	Verify fullest tank selected
2	NAV/AC Lights	ON
3	Choke	As required

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.

4	Propeller Lever	Full forward - 'Fine pitch'
5	Throttle Lever	Idle
6	Oil Pressure Indication	Available
7	Brakes	Hold
8	Propeller Area	Clear
9	Ignition Switch	Start (Release after engine starts)

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

10	Throttle Lever	2000 RPM (for first two minutes, then ~2500 RPM for warm up)
11	Oil Pressure	CHECK

CAUTION: After starting, if the oil gauge does not begin to show pressure within 10 seconds, shut down the engine and investigate cause. Lack of oil pressure indicates loss of lubrication, which can cause severe engine damage. Also consider the time the avionics suite needs to start displaying engine information.

NOTE: At an engine start with low oil temperature, continue to observe the oil pressure as it could drop again due to the increased flow resistance in the suction line. The number of revolutions may be only so far increased that the oil pressure remains steady.

12	Choke	Gradually close
13	GEN Master	ON
14	Voltage Indication	CHECK
15	Ammeter Indication	Check positive amps
16	Engine Parameters	Monitor

4.4.3. BEFORE TAXIING

1	Flaps	(-) or (0)
2	COM / Avionics / XPDR	As required
3	Cabin Heat / Defrost	As required
4	Fuel Selector	SWITCH TANK (to check flow from both tanks)
5	ELT Switch	Check ARMED

4.4.4. TAXIING

When taxiing, directional control is accomplished with rudder deflection and with the use of toe activated brakes when necessary. 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. If the taxi is performed at high power settings 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.

1	Parking Brake	Disengage
2	Brakes	CHECK

4.4.5. BEFORE TAKEOFF

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. 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	Brakes	Hold
2	Doors	Latched
3	Choke	Verify closed
4	Propeller Lever	Verify full forward - 'Fine pitch'
5	Throttle Lever	Set 4000 RPM
6	Generator	Check warning light out
7	Voltage	CHECK
8	Ignition Switch	RIGHT, note RPM, then BOTH

9	Ignition Switch	LEFT, note RPM, then BOTH

WARNING: RPM drop must not exceed 300 RPM for either ''magneto'' and the difference in drop should not exceed 115 RPM.

10	Propeller Lever	Cycle lever 3 times, observe RPM drop
11	Propeller Lever	Full forward - 'Fine pitch'
12	Throttle Lever	Set to just above idle

Check the two ignition circuits at 4000 RPM. Speed drop with only one ignition circuit must not exceed 300 RPM and the difference in drop should not exceed 115 RPM max. by use of either circuit, L or R.

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 and Shoulder Harness	Fastened
2	BPRS Activation Handle	Verify pin removed
3	Airbrakes	Closed and locked
4	Flaps	Set (+1)
5	Trim	Set neutral
6	Fuel Selector	Select fullest tank
7	Fuel Quantity	CHECK
8	NAV / AC / Landing Lights	As required
9	Circuit Breakers	CHECK
10	COM, GPS, XPDR	Set
11	Altimeter	SET
12	Engine Parameters	CHECK
13	Flight Controls	Free and correct

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 5700 RPM. All engine parameters should stay in the green. If power is not developed, abort takeoff.

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 and short field takeoffs are accomplished with flaps set at (+1). Takeoffs using flaps (0) are permissible, however, no performance data is available for takeoffs in the flaps up configuration. Takeoffs with negative (-) flaps are not approved.

Soft or rough field takeoffs are performed with (+1) 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.

4.5.3. NORMAL TAKEOFF

NORMAL TAKEOFF		
1	Brakes	Release (Steer with rudder only)
2	Propeller Lever	Full forward - 'Fine pitch'
3	Throttle Lever	Full forward
4	Engine Parameters	CHECK
5	Airspeed Indication	CHECK

6	Elevator Control	Rotate smoothly at 45-48 KIAS
7	Best Climb Speed	V_Y = 78 KIAS
8	At a safe altitude, Flaps	(0)

4.5.4. SHORT FIELD TAKEOFF

SHORT FIELD TAKEOFF		
1	Brakes	Hold
2	Propeller Lever	Full forward - 'Fine pitch'
3	Throttle Lever	Full forward
4	Engine Parameters	CHECK
5	Brakes	Release (Steer with rudder only)
6	Airspeed Indication	CHECK
7	Elevator Control	Rotate smoothly at 45 KIAS
8	Airspeed at Obstacle	60 KIAS
9	At a safe altitude, Flaps	(0)
19	Airspeed	V_Y = 78 KIAS

4.6. CLIMBING

Normal climbs are performed flaps UP (0) and full power at speeds 5 to 10 kts higher than best rate-of-climb speeds. These higher speeds give the best combination of performance, visibility and engine cooling.

CAUTION: RPM above 5500 is limited to 5 minutes!

For maximum rate of climb, use the best rate-of-climb speeds shown in the rate-of-climb chart 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= 60 KIAS , flaps (0), V_Y= 78 KIAS , flaps (0)

1	Climb Power/RPM	Set
2	Best Climb Speed	V_Y = 78 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

Normal cruising is performed between 55% and 75% power. The engine power setting and corresponding fuel consumption for various altitudes and temperatures can be determined by using the cruise data in Section 5.

1	Flaps	(-)
2	Cruise Power	Set
3	Engine Parameters	CHECK
4	Fuel Selector	Switch to other tank latest every 30 min

The fuel tanks must be changed latest every 30 min to keep the fuel quantity in balance between left and right wing tank. Otherwise the airplane may roll into the direction of the fuller fuel tank.

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.

NOTE: It is recommended to use Flaps (-) above 100 KIAS and Flaps (0) below 100 KIAS.

4.8. DESCENT/APPROACH

1	Altimeter	Set
2	Cabin Heat/Defrost	As required
3	Landing Light	ON
4	Fuel Selector	Fullest tank
5	Parking Brake	Verify disengaged

6	Brake Pressure	CHECK (pump pedals)
7	Seat Belts and Shoulder Harness	CHECK fastened

4.9. BEFORE LANDING

1	Approach Speed	Establish (60 - 65 KIAS)
2	Propeller Lever	Full forward - 'Fine pitch'
3	Flaps	As required
4	Airbrakes (on final)	As required
5	Trim	As required

4.10. LANDING

CAUTION: Landings should be made with full flaps and airbrakes fixed in ½ extended position. Approach angle 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.

Normal Landing

Normal landings are made with full flaps and airbrakes fixed in ½ extended position with power on or idle. Surface winds and air turbulence are usually the primary factors in determining the most comfortable approach speeds (60 - 65 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 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. 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 and brakes as required. The maximum allowable crosswind velocity is dependent upon pilot capability as well as aircraft limitations. Operation in direct crosswinds of 18 knots has been demonstrated.

Max Crosswind Component:	**18 kts**

4.11. BALKED LANDING

In a balked landing (go around), apply full power and pitch up (climb), then close airbrakes, 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	Close and lock
3	Flaps	(+1)
4	Airspeed	57 - 60 KIAS

After clear of obstacles:

5	Flaps	(0)
6	Airspeed	V_y = 78 KIAS

4.12. AFTER LANDING

1	Throttle Lever	Idle
2	Flaps	(-) or (0)
3	Transponder	STBY
4	Lights	As required
5	Airbrakes	Close at taxi speed
6	ELT	CHECK not transmitting

NOTE: After a hard landing, the ELT may activate (flashing red light on ELT remote switch). To reset it, set the remote switch to ON first and then back to ARM/OFF position. Please check OEM documentation for additional information.

4.13. SHUT DOWN

1	Green Electrical Switches (switch panel)	All OFF
2	Throttle Lever	Idle
3	Ignition Switch	OFF
4	Engine Time and Flight Time	Log
5	GEN Master	OFF
6	BAT Master	OFF
7	BPRS Safety Pin	Insert

4.14. PARKING

1	BPRS Safety Pin	Inserted, secured
2	Parking Brake	Engaged only if necessary
3	Fuel Selector	OFF
4	Chocks, Tie-downs, Pitot Covers	As required

NOTE: Park on level terrain, excessive bank (one wing lower than the other) will result in fuel spilling from fuel vents.

4.15. SOFT FIELD OPERATIONS

As described in 4.5.2. and 4.10.

4.16. SPINNING (INTENTIONAL SPINS)

Hereby are listed the approved configurations for intentional spinning:

Flaps	Airbrakes	Power	Approved
(0)	IN	IDLE	**YES**
(0)	OUT	IDLE	NO
(+1)	IN	IDLE	NO
(+1)	OUT	IDLE	NO
(+2)	IN	IDLE	NO
(+2)	OUT	IDLE	NO
(-)	IN	IDLE	NO
(-)	OUT	IDLE	NO

CAUTION: Spin testing was performed according to F2245-12d, paragraph 4.5.9 , which includes investigation of behavior of developed 2-turns and 3-turns spins and subsequent recovery within a maximum additional 1.5-turns. Exceeding intentional 3-turns in actual spinning maneuver is at own responsibility and pilot caution is advised.

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

Aircraft preparation

Spinning with more than 50% fuel in each tank may result in fuel escaping from fuel vents.

Cockpit preparation

Make sure that all objects located in the cabin are safely secured.

Adjust pedal position so that it is possible for the pilot to easily control the rudder with full-deflections.

Fasten seat-belts properly. Excessive elevator push-over during spin recovery may result in negative G accelerations.

Entry altitude and altitude drop

Flight testing showed that typical altitude drops *from spin entry to full recovery in level flight* are in the following ranges:

1-turn spin*:	**440-840 ft**
2-turn spin*:	**800-1250 ft**
3-turn spin*:	**1000-1660 ft**

* depending on aircraft loading and control inputs

Minimum recommended altitude to enter an intentional 3-turn spin is 5500 ft AGL.

SPIN ENTRY PROCEDURE	
1	Flaps 0, trim for 67 KIAS, fix power setting.
2	Pull the control stick back until stall occurs.
3	Hold the stick in full aft position (stop) and apply full rudder in the desired spin direction.
4	Reduce throttle to IDLE, hold controls steady while spinning.
5	As desired, apply roll input (up to full deflection) in the same or in opposite direction of the rudder input.

SPIN RECOVERY PROCEDURE	
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	Neutralize roll input (stick to center-forward position).
5	As rotation stops, neutralize rudder.
6	Establish horizontal flight without exceeding g-load or airspeed.

After-landing aircraft inspection

Check oil-quantity after each flight involving spinning.

4.17. STALL

The stall recovery procedure is standard and can be performed by normal use of controls:

1	Control Stick	Forward, to reduce angle of attack
2	Throttle Lever	Add power
3	Horizontal Flight	Resume

Stall recovery is performed with average pilot skills, with less than 20° of yaw or roll. The recovery maneuver generally requires less than 250 ft of altitude drop.

The aircraft is equipped with a stall warning system warning that is activated as aerodynamic stall condition is imminent.

Two stall types can be encountered when stalling the aircraft.

A-type stall: uncontrollable downward pitching motion (fully developed stall, usually accompanied by wing drop).

C-type stall: the control stick reaches the rear stop position.

Depending on a combination of several factors like aircraft mass, flaps setting, CG position, G-load, power setting and tempo of AoA increase/speed reduction, the stall can be A-type or C-type.

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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	
Required Documents	On board
BPRS Handle	Check Safety PIN inserted
Ignition Switch	Check OFF
Green Electrical Switches	ALL OFF
Circuit Breakers	Check ENGAGED
Battery Disconnect Switch	Check CONNECTED
Flight Controls	Free, unobstructed motion
Flaps, Airbrakes	Symmetrical, smooth operation
BAT Master	ON
Stall Warning Self Test	Check aural and haptic warning
GEN Master	ON
ELT	ARMED
Voltmeter	12 - 14 V
Lights	Check operation
Fuel Quantity	Check
Fuel Selector	Select Fullest Tank
GEN Master	OFF
BAT Master	OFF
Circuit Breakers	Check ENGAGED

LEFT FUSELAGE	
COM/ELT Antenna (top)	Condition and attachment
Wing / Fuselage Seal	Taped firmly, no wrinkles
XPDR Antenna (underside)	Condition and attachment
Baggage Compartment	Baggage secured
Baggage Door	Closed and locked
Static Pressure Port	Unblocked
Fuel System Water Drain	Perform
EMPENNAGE	
Tiedown Rope	Remove
Horizontal and Vertical Stabilizers	Check condition
Elevator and Elevator U-Piece	Condition and movement
Rudder	Freedom of movement
Rudder Trim Tab	Condition and attachment
Hinges, Bolts, Springs and Pins	Secured, tightened, in place
RIGHT FUSELAGE	
Static Pressure Port	Unblocked
Fuel System Water Drain	Perform
Wing / Fuselage Seal	Taped firmly, no wrinkles
Door Lock	Unlock
BPRS Cover, Strap Covers	Condition and attachment

RIGHT WING	
Flaperon	Condition, attachment and movement
Flaperon Gap Seal	Taped firmly, no wrinkles
Airbrakes	Condition, security and movement
Hinges, Bolts, Safety Nuts	Secured, tightened, in place
NAV/AC Lights	Condition and attachment
Leading Edge and Tip	Check condition
Fuel Cap	Check fuel quantity sufficient and fuel cap fully closed
Water Drain Holes	Clean
Pitot Tube	Cover removed, tube unblocked
RIGHT MAIN LANDING GEAR	
Landing Gear	General condition
Tire	Condition, inflation and wear
Wheel and Brake	Fluid leaks, evidence of overheating, general condition and wear
Wheel Fairing	Check attachment
Checks and Tiedown Rings / Ropes	Remove

PROPELLER AND COWLINGS AREA	
Engine Cowlings	Attachment secured
Propeller	Clean, undamaged
Spinner	Condition, attachment, oil leaks
Air Inlets and Outlets	Unobstructed

ENGINE AND NOSE LANDING GEAR AREA	
Engine Oil	Check quantity, leaks, cap and door secured
Exhaust Pipe	Condition, attachment, clearance
Gascolator	Drain 1 cup, sample
Landing Light	Attachment and condition
Nose Landing Gear and Strut	General condition
Wheel and Tire	Condition, inflation and wear
Wheel Fairing	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	Check attachment
Checks and Tiedown Rings / Ropes	Remove

LEFT WING	
Fuel Cap	Check fuel quantity sufficient and fuel cap fully closed
Leading Edge and Tip	Check condition
NAV/AC Light	Check condition and attachment
Flaperon	Condition, attachment and movement
Flaperon Gap Seal	Taped firmly, no wrinkles
Airbrake	Condition, security and movement
Hinges, Bolts, Safety Nuts	Secured, tightened, in place
Water Drain Holes	Clean

STARTING ENGINE

BEFORE STARTING ENGINE	
Preflight Inspection	Completed
Fuel Quantity	Sufficient
Emergency Equipment	On board
Passenger	Briefed
Seats, Seat Belts, Pedals	Fasten, Adjust
Doors	Closed and Latched
BPRS Safety Pin	Remove
BAT Master	ON
Stall Warning Self Test	Check aural and haptic warning
Parking Brake	Engage

STARTING ENGINE	
Fuel Selector	Verify fullest tank selected
NAV/AC Lights	ON
Choke	As required
Propeller Lever	Full forward
Throttle Lever	Idle
Oil Pressure Indication	Available
Brakes	Hold
Propeller Area	Clear
Ignition Switch	START (release after engine starts)

STARTING ENGINE (continue)	
Throttle Lever	2000 RPM (for 2', then warm up at ~2500 RPM)
Oil Pressure	CHECK
Choke	Gradually close
GEN Master	ON
Voltage Indication	CHECK
Ammeter Indication	CHECK positive amps
Engine Parameters	Monitor

BEFORE TAXIING	
Flaps	(-) or (0)
COM / Avionics	As required
Cabin Heat / Defrost	As required
Fuel Selector	SWITCH TANKS (to check flow from both)
ELT switch	Check ARMED

TAXIING	
Parking Brake	Disengage
Brakes	CHECK

BEFORE TAKEOFF

ENGINE TEST	
Brakes	Hold
Doors	Latched
Choke	Verify closed
Propeller Lever	Verify full forward
Throttle Lever	4000 RPM
Generator	CHECK warning light out
Voltage	CHECK
Ignition Switch	RIGHT, note RPM, then BOTH
Ignition Switch	LEFT, note RPM, then BOTH
Propeller Lever	Cycle 3 times, observe RPM drop
Propeller Lever	Full forward
Throttle Lever	Set to just above IDLE
BEFORE TAKEOFF	
Seat Belts	Fastened
BPRS Activation Handle	Verify pin removed
Airbrakes	Closed and locked
Flaps	(+1)
Trim	Set neutral
Fuel Selector	Select fullest tank
Fuel Quantity	CHECK

BEFORE TAKEOFF (continue)	
NAV / AC / Landing Lights	As required
Circuit Breakers	CHECK
COM, GPS, XPDR	Set
Altimeter	Set
Engine Parameters	CHECK
Flight Controls	Free and correct

TAKEOFF

NORMAL TAKEOFF	
Brakes	Release (steer with rudder only)
Propeller Lever	Full forward
Throttle Lever	Full forward
Engine Parameters	CHECK
Airspeed Indication	CHECK
Elevator Control	Rotate smoothly at 45 - 48 KIAS
Best Climb Speed	V_Y = 78 KIAS
At a Safe Altitude > FLAPS	(0)

SHORT FIELD TAKEOFF	
Brakes	HOLD
Propeller Lever	Full forward
Throttle Lever	Full forward
Engine Parameters	CHECK
Brakes	Release (Steer with rudder only)
Airspeed Indication	CHECK
Elevator Control	Rotate smoothly at 45 KIAS
Airspeed at Obstacle	60 KIAS
At a Safe Altitude > FLAPS	(0)
Airspeed	V_Y = 78 KIAS

CLIMB	
Climb Power / RPM	Set
Best Climb Speed	V_Y = 78 KIAS
Engine Parameters	CHECK

CRUISE	
Flaps	(-)
Cruise Power	Set
Engine Parameters	CHECK
Fuel Selector	Switch to the other tank latest every 30 min

DESCENT / APPROACH	
Altimeter	SET
Cabin Heat / Defrost	As required
Landing Light	ON
Fuel Selector	Fullest tank
Parking Brake	Verify disengaged
Brake Pressure	CHECK (pump pedals)
Seat Belts and Shoulder Harness	CHECK fastened

BEFORE LANDING	
Approach Speed	Establish (60 - 65 KIAS)
Propeller Lever	Full forward
Flaps	As required
Airbrakes (on final)	As required
Trim	As required

BALKED LANDING	
Throttle Lever	Full forward
Airbrakes	Close and lock
Flaps	(+1)
Airspeed	57 - 60 KIAS
After Clear of Obstacles:	
Flaps	(0)
Airspeed	V_y = 78 KIAS

AFTER LANDING	
Throttle Lever	IDLE
Flaps	(-) or (0)
Transponder	STBY
Lights	As required
Airbrakes	Close at taxi speed
ELT	CHECK not transmitting

SHUT DOWN	
Green Electrical Switches (Switch Panel)	All OFF
Throttle Lever	Idle
Ignition Switch	OFF
Engine Time and Flight Time	Log

SHUT DOWN (continue)	
GEN Master	OFF
BAT Master	OFF
BPRS Safety Pin	Insert

PARKING	
BPRS Safety Pin	CHECK Inserted / Secured
Parking Brake	Engage Only if necessary
Fuel Selector	OFF
Chocks, Tie-downs, Pitot Covers	As required

SPIN RECOVERY (see POH for approved configurations)	
Throttle Lever	IDLE
Rudder	Full - opposite direction
Control Stick	Forward, Roll neutral
Rudder (as rotation stops)	Neutralize
Horizontal Flight	Resume (do not exceed g-load/speed limitations)

STALL RECOVERY	
Control Stick	Forward, to reduce AoA
Throttle Lever	Add power
Horizontal flight	Resume

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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.

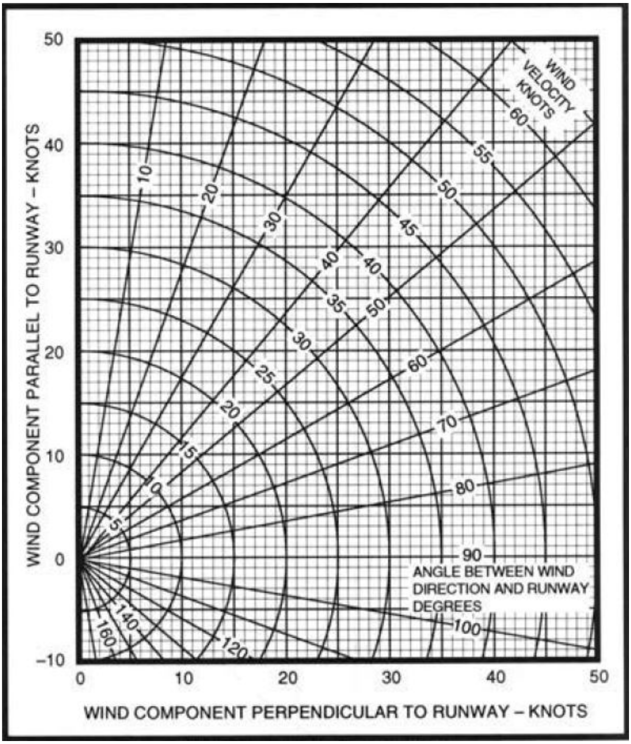
The performance tables do not take into account the expertise of the pilot or the maintenance condition of the airplane. The performance illustrated in the tables can be achieved if the indicated procedures are followed and the airplane is in good maintenance condition.

The fuel consumption during cruise is based on propeller RPM and manifold pressure settings. Some undefined variables such as the operating condition of the engine, contamination of the aircrafts 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.

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

Conditions

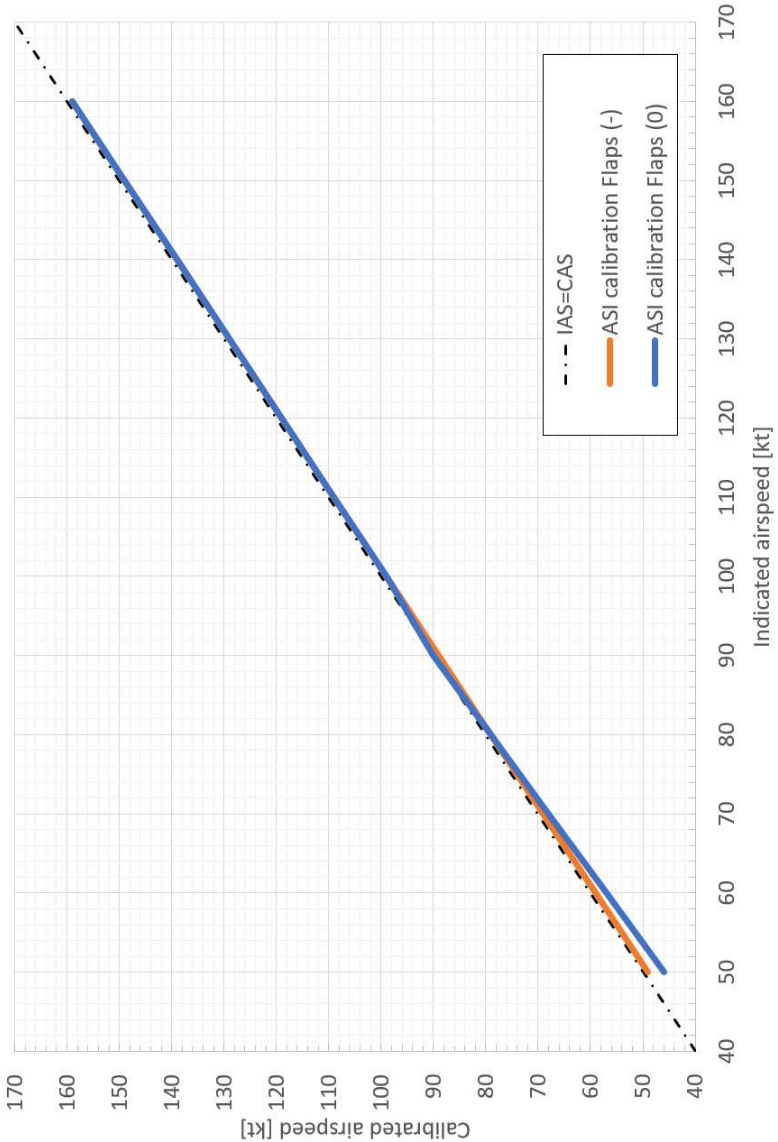
Power: power level for level flight, or max. continuous power whichever is less

NOTE: Indicated airspeed values assume zero instrument error.

KIAS	KCAS			
	Flaps (-)	Flaps (0)	Flaps (+1)	Flaps (+2)
40	---	---	37	37
50	49	46	47	48
60	59	57	59	59
70	69	68	69	---
80	79	79	80	---
90	89	90	---	---
100	99	99	---	---
110	109	109	---	---
120	119	119	---	---
130	129	129	---	---
140	139	139	---	---
150	149	149	---	---
160	159	159	---	---
163	162	162	---	---

NOTE: Airbrake extension does not influence airspeed calibration values.

KIAS/KCAS Diagram



5.5. STALL SPEED

Conditions
Power: idle
Propeller: full forward (fine pitch)

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 airbrakes	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.

WEIGHT	BANK ANGLE	STALL SPEED									
		Flaps (-)		Flaps (+0)		Flaps (+1)		Flaps (+2)		Flaps (+2) & full abks	
kg	Degrees	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
600 Most FWD C.G.	**0**	56	55	53	50	51	48	47	45	50	48
600 Most AFT C.G.	**0**	54	52	51	49	49	46	45	43	48	46
	45	65	64	63	60	59	58	55	54	58	57

5.6. TAKEOFF

Conditions

Power:	throttle full open
Propeller:	full forward (fine pitch)
Flaps:	(+1)
Runway:	dry, paved and level
Wind:	calm

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.

Weight: **600 kg**

Altitude [ft]	DISTANCE [m]	TEMPERATURE					
		0 °C	10 °C	20 °C	30 °C	40 °C	15 °C/ISA
SL	Ground roll	148	157	167	176	186	160
	50 ft	302	316	329	343	356	320

PRESSURE Altitude [ft]	DISTANCE [m]	TEMPERATURE					
		0 °C	10 °C	20 °C	30 °C	40 °C	11 °C/ISA
2000	Ground roll	178	189	201	213	225	192
	50 ft	357	373	389	405	421	379

PRESSURE Altitude [ft]	DISTANCE [m]	TEMPERATURE					
		0 °C	10 °C	20 °C	30 °C	40 °C	7 °C/ISA
4000	Ground roll	220	234	248	262	277	229
	50 ft	391	408	426	443	460	402

PRESSURE Altitude [ft]	DISTANCE [m]	TEMPERATURE					
		0 °C	10 °C	20 °C	30 °C	40 °C	3 °C/ISA
6000	**Ground roll**	264	280	297	315	333	268
	50 ft	428	447	466	485	504	435

Speed at Liftoff: 47 KIAS

Speed over 50 ft: 60 KIAS (V_X)

5.7. RATE OF CLIMB (V_Y)

Conditions

Power: throttle full open

Propeller: full forward (fine pitch)

Flaps: (0)

Airspeed: best rate of climb - 78 KIAS (V_Y)

WEIGHT	Pressure Altitude	Climb Speed	RATE OF CLIMB [ft/min]				
	ft	KIAS	0 °C	10 °C	20 °C	30 °C	ISA
600 kg	**0**	78	1108	1069	1032	998	1050
	2000	78	1037	1001	967	935	997
	4000	78	969	935	903	873	944
	6000	78	902	870	840	812	892
	8000	78	836	807	779	753	839
	10000	78	772	745	719	696	786
	12000	78	709	684	661	639	733

5.8. 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
600 kg	**0**	60	10.93 °
	2000	60	9.42 °
	4000	60	8.36 °
	6000	60	7.08 °
	8000	60	5.79 °

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

5.9. CRUISING - POWER SETTING, FUEL CONSUMPTION

<u>**Conditions**</u>

Weight: 600 kg
Temperature: ISA
Wind: zero
Total Fuel: 99 Liter (usable)

Usable fuel for cruise is equal to 99 liters usable:

- less fuel used prior to takeoff
- less climb fuel
- less 6 L for 30 min VFR reserve fuel at 47% power (ISA @ 10,000 ft PA)
- less descent fuel

CAUTION: Actual flight endurance must be calculated from the following tables.

NOTE: Maximum continuous power is defined by 5500 RPM, not by MAP. MCP is 69 kW. See latest revision of Rotax service letter SL-912-016R1 for additional information about engine operational parameters and limitations.

PRESSURE Altitude	Parameters		ISA		
	RPM	MAP	PWR (%MCP)	KTAS	FF (liter/h)
2000 ft	**5500**	**27.7**	100%	129	28.8
	5500	**26.7**	85%	126	22.4
	5300	**25.7**	75%	119	18.4
	4900	**24.7**	65%	105	16.0
	4600	**24.0**	55%	102	14.4

PRESSURE Altitude	Parameters		ISA		
	RPM	MAP	PWR (%MCP)	KTAS	FF (liter/h)
4000 ft	*Not achievable*		MCP	*Not achievable*	
	5500	**25.3**	85%	130	25.2
	5500	**24.3**	75%	126	19.6
	5100	**23.3**	65%	116	16.8
	4600	**23.3**	55%	113	15.6

PRESSURE Altitude	Parameters		ISA		
	RPM	MAP	PWR (%MCP)	KTAS	FF (liter/h)
6000 ft	*Not achievable*		MCP	*Not achievable*	
			85%		
	5500	**23.3**	75%	132	23.2
	5300	**22.7**	65%	125	19.6
	4900	**22.0**	55%	115	16.8

PRESSURE Altitude	Parameters		ISA		
	RPM	MAP	PWR (%MCP)	KTAS	FF (liter/h)
8000 ft	*Not achievable*		MCP	*Not achievable*	
			85%		
	5500	**22.0**	75%	132	23.6
	5300	**21.7**	65%	125	21.2
	5100	**21.0**	55%	118	18.0

PRESSURE Altitude	Parameters		ISA		
	RPM	MAP	PWR (%MCP)	KTAS	FF (liter/h)
10,000 ft	*Not achievable*		MCP	*Not achievable*	
			85%		
			75%		
	5500	**20.3**	65%	133	22.4
	5300	**19.7**	55%	125	19.2

PRESSURE Altitude	Parameters		ISA		
	RPM	MAP	PWR (%MCP)	KTAS	FF (liter/h)
12,000 ft	*Not achievable*		MCP	*Not achievable*	
			85%		
			75%		
			65%		
	5500	**18**	55%	120	20.4

5.10. LANDING

Conditions	Wind:	calm
	Runway:	dry, level and paved
	Flaps:	(+2)
	Airbrakes:	1/2 extension
	Power:	3° power approach to 50 ft height, then reduce power smoothly continue to reach idle just at touch down.
	Airspeed:	60 KIAS at 50 ft height

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.

Weight: **600 kg**

PRESSURE Altitude [ft]	DISTANCE [m]	TEMPERATURE					
		0 °C	10 °C	20 °C	30 °C	40 °C	ISA
SL	Ground roll	248	257	266	275	284	260
	Total over 50 ft	433	442	451	460	469	445

PRESSURE Altitude [ft]	DISTANCE [m]	TEMPERATURE					
		0 °C	10 °C	20 °C	30 °C	40 °C	11 °C
2000	Ground roll	267	276	286	296	306	279
	Total over 50 ft	452	461	471	481	491	463

PRESSURE Altitude [ft]	DISTANCE [m]	TEMPERATURE					
		0 °C	10 °C	20 °C	30 °C	40 °C	7 °C
4000	Ground roll	287	298	309	319	287	294
	Total over 50 ft	472	483	494	504	472	280

PRESSURE Altitude [ft]	DISTANCE [m]	TEMPERATURE					
		0 °C	10 °C	20 °C	30 °C	40 °C	3 °C
6000	Ground roll	310	321	333	344	310	314
	Total over 50 ft	495	506	518	529	495	500

5.11. NOISE CHARACTERISTICS

Noise level according to ICAO Annex 16, Chapter 10:
Measured: 70 dB(A) Max. allow. noise level: 70.8 dB(A)

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SECTION

6

SECTION 6 - WEIGHT AND BALANCE

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6.1. INTRODUCTION

This section provides information about how to calculate the takeoff 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 the aircraft's takeoff weight and C.G. are within the envelope presented in the weight and balance chart (see section 6.3).

NOTE: The aircraft's empty weight and empty weight C.G. are the starting point for all takeoff calculations. Please refer to the aircraft's weight and balance report (WBR-121-08-10_XXX*) for the current empty weight data.

* Where XXX represents the aircraft's serial number.

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 6.4, 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 [kg]	ARM [mm]	MOMENT [kgmm]
Aircraft empty weight	340*	270*	91800
Pilot	60	*370*	22200
Co-pilot	90	*370*	33300
Fuel (Left wing tank)	36	*215*	7740
Fuel (Right wing tank)	36	*215*	7740
Baggage compartment **	25	*1160*	29000
Total weight/ moment	587	-	191780
C.G.	-	327	-

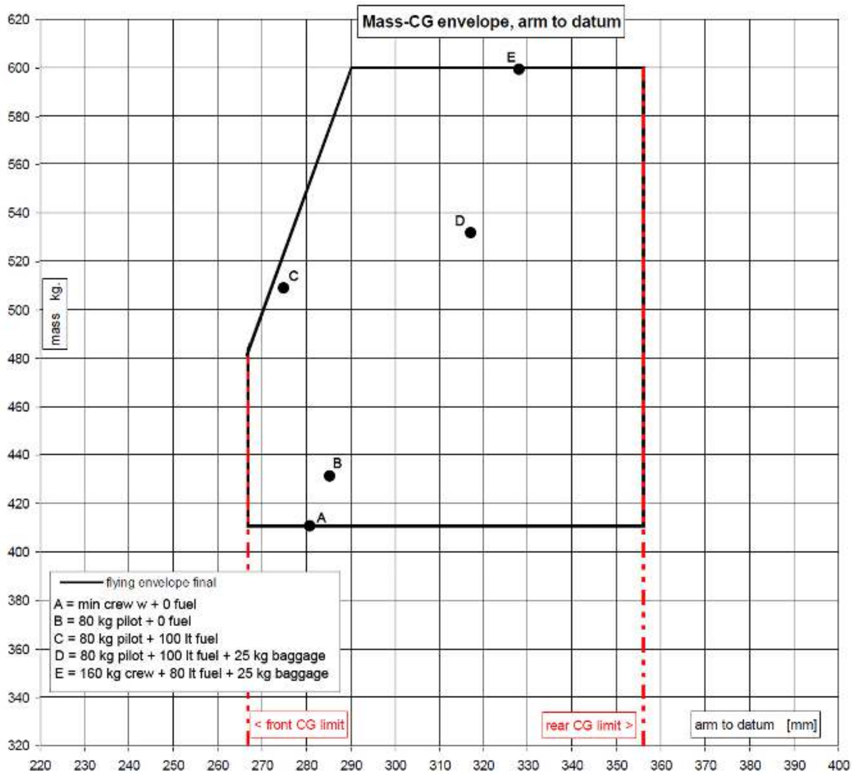
* These values are to be obtained from the applicable aircraft's weight and balance report (WBR-121-08-10_XXX), where XXX represents the aircraft's serial number.

** Only when the baggage compartment is installed and CG limitations are respected.

To perform and log weight and balance please use the applicable aircraft's weight and balance report (WBR-121-08-10_XXX), where XXX represents the aircraft's serial number.

6.3. WEIGHT AND BALANCE CHART

The chart below shows the Aircraft'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.

NOTE: Some optional equipment, primarily avionics, may not be described in this section. For description and operation of optional equipment not described in this section, refer to Section 9, Supplements.

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 baggage. The baggage compartment floor (optional) 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 wings are connected by two bolts through the spar ends. The wing structure is made mostly from carbon fiber. The main spar shear web and the root ribs are made from glass fiber. This allows better visual inspection and easier damage detection. 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 dual-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. Each wing half has glider type airbrakes.

Fuel tanks: Each wing includes one (1) 50 litres semi-integrated fuel tank made of GFRP. The fuel tank is coated with an alcohol resistant sealant.

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 has an aluminum bracket with two pins that slide into two bushings found at the top of the vertical stabilizer. It's fastened in place using one bolt, thus making removal easy. The shell of the horizontal tail is designed as CFRP sandwich.

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 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 spherical plain bearings. Balancing weights are mounted at the front end of the rudder.

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 central console.

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. FLAPERON CONTROL SYSTEM

Roll control is achieved by torsional activation of flaperon control surfaces via an all-pushrod mechanisms. 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.

7.3.3. 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 cable junction 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 nose wheel hinge element, where a anti-shimmy damper is also connected to.

7.3.4. 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 4 positions, corresponding to flap deflections of -5°, 0°, +9°, +20°. 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.

7.3.5. AIRBRAKES CONTROL SYSTEM

Schempp-Hirth Style airbrakes are activated by a ceiling mounted pull-lever requiring the thumb-trigger to be released for opening. The lever is connected to the wing-side of the push-rod mechanism via self-fitting coupling. A bell-crank fitted into the wing just aft of the main spar near the root-rib converts rotary motion introduced by the cockpit lever into translational motion required to open and close the airbrakes.

7.3.6. ELEVATOR TRIM SYSTEM

Spring type elevator trim is activated by a linear servo motor assembly located behind the baggage 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 adjacent to the trim switch, and on engine indicating system display.

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 fiber. The strut is composed by two parallel elements producing a semi-redundant structure and allowing for predictable locations of stress points. The tube-less type wheel tire is 4.00 x 6. Wheel track is 1.60 m, wheel base 1.58 m. Inflate to 2.8 bar

7.4.2. NOSE GEAR

The nose gear is integrated into the engine mount. It is steerable, connected to the rudder pedal control system and incorporates an oil-spring damper element. The maximum turning arc is 45 degrees either side of center. The strut's cylinder, as well as the wheel fork, are made from aluminum, while the strut's inner tube is made chrome-plated steel. The nosewheel tire is 4.00 x 4. Inflate to 1.8 bar.

7.4.3. WHEEL BRAKE SYSTEM

The main wheels are equipped with hydraulic disc brakes. Right and left brake are independent and activated by tip brakes on each set of rudder pedals. A parking brake in form of a center console lever is installed and accessible to both pilots.

The main wheel brakes are set for parking by using the PARK BRAKE knob on the left side of the console near the pilot's right ankle. Brake lines from the toe brakes to the main wheel brake calipers are plumbed through a parking brake valve. For normal operation, the knob is pushed forward. With the knob pushed forward, poppets in the valve are mechanically held open allowing normal brake operation. When the handle is pulled back, the parking brake valve holds applied brake pressure, locking the brakes. To apply the parking brake, set the brakes with the rudder-pedal toe brakes, and then pull the PARK BRAKE knob back.

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 pedals, 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, let up on the toe brakes and then reapply the brakes with heavy pressure. If the brakes are spongy or pedal travel increases, pumping the pedals may build braking pressure.

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

The brake system consists of a master cylinder for each rudder pedal, two hydraulic fluid reservoirs, a parking brake valve, a single disc brake assembly on each main landing gear wheel, and associated hydraulic plumbing. Braking pressure is initiated by depressing the lever on top of a rudder pedal (toe brake). The brakes are plumbed so that depressing either the pilot's or copilot's left or right toe brake will apply the respective (left or right) main wheel brake. The reservoir is serviced with DOT-4 hydraulic fluid.

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 and one independent baggage compartment door on the left side.

Doors are locked in the closed position via 3 locking pins operated simultaneously by rotating a common central handle. Baggage compartment door is locked with a key secured closure.

7.5.2. 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. The back panel features a manual pneumatic pump to adjust the size of the lumbar bladder and thus lumbar support.

7.5.3. 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 S3 engine providing 73.5 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 95 (min. AKI 91) as by Rotax specification. The propeller is driven by a gearbox. The gearbox is equipped with the Rotax slipper clutch. 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, gearbox and propeller governor.

7.6.2. ENGINE COMPONENTS

Oil System

The dry-sump lubrication system consists of a 3.5 liter-tank, two coolers, a mechanically-driven pump and 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 deliminators is recommended.

Engine Cooling

The engine is ram-air and liquid cooled. Cooling air enters the engine bay through an inlet on the starboard side of the spinner and is then distributed over the engine's cylinders by carbon composite plenum. The liquid 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 movable cowl flaps are used.

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 upper 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 dual tailpipes. All of it’s components are made of titanium, making it very light weight. The two tailpipes are 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, a propeller control lever and the choke lever.

Engine controls

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.

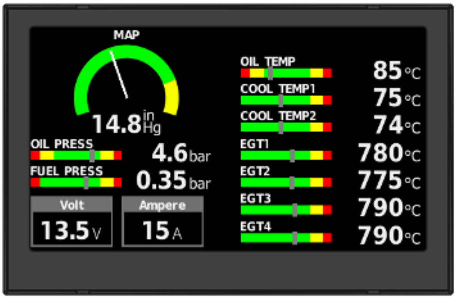
The constant-speed propeller is controlled by a wire controlling a hydraulic governor. The control is operated by a lever positioned in the throttle quadrant.

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. With the BAT Master switch ON, rotating the key to the spring loaded START position energizes the starter and activates both magnetos. The key automatically returns to the BOTH position when released.

7.6.4. ENGINE MONITORING INSTRUMENTS

The aircraft is equipped with Kanardia aircraft electronic engine indicating system. The Kanardia DIGI engine information displays data gathered by the Data Acquisition Unit.



Example of Kanadia DIGI graphics

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

A Data Acquisition Unit (Kanardia DAQU), mounted inside the instrument panel, converts analog signals from the coolant temperature, EGT, MAP, oil pressure, oil temperature, fuel pressure, voltage, amperage and tachometer sensors to digital format, which are then transmitted to the engine information system for display.

12 VDC for Data Acquisition Unit operation is supplied through the EIS circuit breaker.

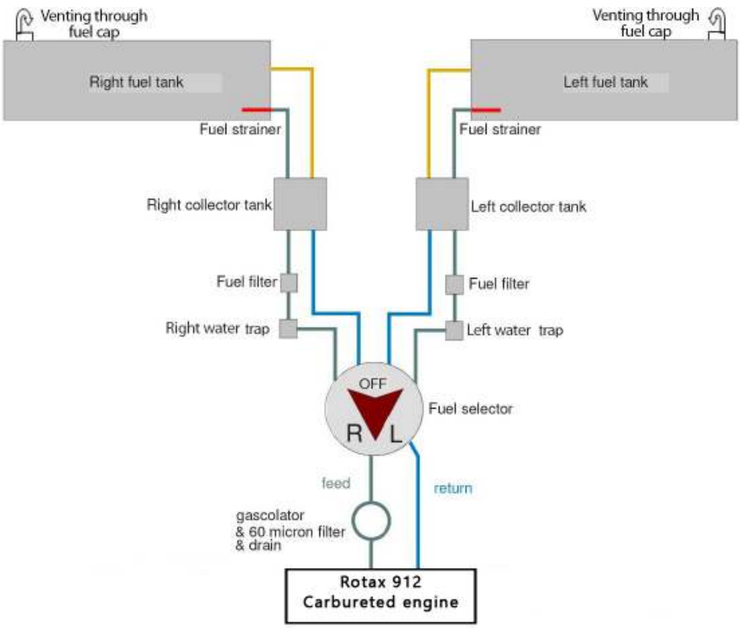
7.6.5. PROPELLER

The airplane is equipped with a constant-speed, two-blade composite propeller (MT Propeller type MTV-33, diameter 1700 mm) and governor. The propeller governor automatically adjusts propeller pitch to regulate propeller and engine RPM. The propeller governor senses engine speed by means of flyweights and the desired RPM setting through a cable connected to the propeller control lever (blue lever) in the cockpit. The propeller governor boosts oil pressure in order to regulate propeller pitch position. During stabilized flight, the governor automatically adjusts propeller pitch in order to maintain the RPM setting. Any change in airspeed or load on the propeller results in a change in propeller pitch. Typically takeoff, climb and landing is performed with max rpm setting (lever full forward). See Section 5 - Performance - Cruise, for cruise settings.

7.7. FUEL SYSTEM

The airplane has two integral fuel tanks, one in each wing. The maximum usable fuel quantity is 71.3 kg or 99 L (AVGAS or MOGAS, see chapter Limitations for applicable fuel grades). Two (left and right) transparent vertical tubes, which are visible from the pilot position and connected to the highest and lowest points of each respective tank, serve as a visual indicator of the fuel quantity available. Each tank has a strainer at the fuel outlet that prevents any debris and/or foreign material from making its way towards the engine. Venting of the fuel tanks is through the fuel caps.

There is a 1.5 L stainless steel collector tank (left and right) located just downstream from each fuel tank. It serves as a reserve fuel supply and prevents engine starvation from occurring due to prolonged flight in side slip. After leaving the collector tank the fuel goes through a drain valve (one per tank), located on the bottom-side of the fuselage behind the baggage compartment. Thereafter fuel enters the centrally-located fuel selector switch, which has three different positions: LEFT, RIGHT, and OFF. When the LEFT position is selected the engine is fed fuel from the left fuel tank and excess fuel is returned to the LEFT collector tank. When the RIGHT fuel position is selected the engine is fed fuel from the right tank and the excess fuel is returned to the RIGHT collector tank. When the OFF position is selected the fuel selector switch shuts off both the feed and return line. Once the fuel leaves the fuel selector it is fed through a gascolator, which has a drain valve. The gascolator removes water that may be in the fuel and filters out any debris/foreign material larger than 60 microns.



Fuel system diagram

Because of aircraft's high wing configuration the fuel system is completely gravity-fed, always ensuring adequate fuel pressure. 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 tanks should be filled after each flight to prevent condensation.

Fuel Selector Valve

A fuel selector valve, located in the middle of the center console, provides the following functions:

LEFT	Allows fuel to flow/return from/to the left tank
RIGHT	Allows fuel to flow/return from/to the right tank
OFF	Cuts off fuel flow and return from/to both tanks

The valve is arranged so that to feed off a particular tank the valve should be pointed to the fuel indicator for that tank. To select RIGHT or LEFT, rotate the selector to the desired position. To select OFF, first lift the fuel selector knob release and then rotate the knob to OFF.

Fuel selector valve

Draining

Three drains are present. The primary sampling location is the gascolator in the engine compartment, accessible from the bottom engine cowl. In addition, a drain between each fuel collector tank and the fuel selector is provided. These two drains are used for draining water from the fuel system and are accessible from the outside, located on the bottom-side of the fuselage behind the baggage compartment area. Industry standard fuel sampling cups or sticks should be used to perform draining.

Fuel Quantity Indicator

A visual fuel quantity indicator is provided for each fuel tank. The tube is placarded for quantity in Liters and US Gal, as well as color coded. Do not attempt to takeoff in the area of fuel quantity designated with RED.

NOTE: When the fuel level is in the RED area, prolonged uncoordinated flight such as slips or skids can uncover the fuel tank outlets. Therefore, if operating with one fuel tank dry or if operating on LEFT or RIGHT tank when in RED areas, do not allow the airplane to remain in uncoordinated flight for periods in excess of 1 minute.

Refer to visual fuel quantity indicators for actual fuel quantity on board and tracking of fuel situation.

7.8. ELECTRICAL SYSTEM

7.8.1. ELECTRICAL SYSTEM

The airplane is equipped with a single-generator, single-battery, 12/14 V direct current (VDC) electrical system designed to reduce the risk of electrical system faults. The system provides uninterrupted power for flight instrumentation, lighting and other electrically operated and controlled systems during normal operation.

7.8.2. POWER GENERATION

The electrical system is a 12/14 V DC system. Power is supplied by integrated AC generator with approximately 250W output at 5800 RPM and rectified with electronic full-wave rectifier regulator (RU 912). The generator system is capable of delivering max. 18A at 14V which feeds the on-board battery (ETX680C 13,2V, 12.4Ah). 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 rows on the switch panel under the instrument panel.

The circuit breakers (CB) are located under the switch/fuses of the switch panel. An ammeter and a voltmeter are integrated in the engine indicating system and displayed on the Kanardia DIGI engine information display to monitor electrical system operating.

7.8.3. POWER DISTRIBUTION

The electrical system is divided into three main subsystems (engine harness, main electrical board and switch panel) which are than interconnected to all equipment and devices. Harnesses of the electrical system from the engine is leading through the firewall and is connected to the electrical board and to other provided systems.

The Master relay connects the main battery to the electrical system with the BAT Master switch set to ON. All avionic loads and electrically operated instruments are then powered since the electrical power is delivered to the switch panel and circuit breakers. Main battery is now also providing electrical power for engine start. Rotating the start/ignition key to the spring loaded START position energizes the engine starter and activates both magnetos.

The engine ignition unit is self-powering. It derives power from two independent charging coils located on the generator stator supply one ignition circuit each. The energy is stored in capacitors of the electronic modules.

The generator relay connects the engine generator to the electrical system and provides main power source to the electrical system once engine is started and GEN Master switch is set to ON.

USB socket is connected to the master relay.

For more detailed information see AMM - Chapter 91.

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

Equipment	Circuit Breaker
Garmin Aera 660 GPS	GPS
Stall warning	STALL WRN
Heating / Ventilation Panel (optional)	HEAT COOL
Air Traffic system AirAvionics AT-1 (optional)	TFC
Kanardia Horis HO-80 AH Kanardia Indu I-VARIO-SL 57 - VSI	FLT INS
Kanardia DIGI-K - display Kanardia I-RPM-SL 57 - RPM Kanardia DAQU - EIS	EIS
Funke ATR833 Radio	COM

Funke TRT800H	XPDR
Electrical trim	TRIM
Cabin light	CKPT LIGHT
Landing light (optional)	LDG LIGHT
Navigation / Anti-Collision lights (optional)	NAV/AC LIGHTS

7.8.4. SWITCHES

Battery Master Switch

A toggle switch, labeled BAT, activates the master relay to connect the battery to the aircraft electrical system. During normal operation the battery is always connected. It only disconnects when the BAT Master Switch is disengaged or BAT circuit breaker disconnects it from the electrical system.

Generator Master Switch

A toggle switch, labeled GEN, activates the generator relay and connects electrical power, produced by the engine generator, to the electrical system. The switch is located next to the BAT Master Switch. In case that BAT Master Switch is turned OFF and engine is operating, only the generator provides electrical power source (GEN Master Switch must be ON).

With the GEN Master Switch in the OFF position, no electrical power is applied to the electric equipment unless the BAT Master Switch is turned ON.

For normal operations, the GEN Master Switch should be placed in the OFF position prior to activating the BAT Master Switch or applying an external power source.

7.8.5. WARNING LIGHTS

Battery Caution Light

The orange BATTERY CAUTION light is installed on the upper-left side of the switch panel with the EarthX battery installed. Caution light is ON (steady or flashing) when the battery management system (BMS) integrated in the battery detects any malfunctions. See Chapter 3 - Emergency procedures for additional details and refer to *ETX Lithium Battery User's Manual* for additional information how to troubleshoot any battery errors/malfunctions.

Generator Fail Light

The red GENERATOR FAIL Light on the switch panel, located next to the BATTERY CAUTION light is connected to the voltage regulator. When ON, this means that the generator related malfunction occurred or indication of generator operation has failed. Normal state (generator operating) is when this LED light is OFF. See Section 3.9 for more information.

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.

7.8.6. CIRCUIT BREAKERS AND FUSES

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

7.8.7. MISCELLANEOUS COMPONENTS

Convenience Outlet

Dual 2.0 USB port is installed on the right side of instrument panel. USB port may be used for devices compatible with USB 2.0 port. The outlet may be used to power portable equipment non essential to flight. Amperage draw through the outlet must not exceed 2 A.

7.9. LIGHTING

7.9.1. INTERIOR LIGHTNING

Cabin Light

Cabin light is mounted on the back wall above the flap handle. Its position between pilot seats allows to aim light from both seats and provides illumination to instrument and switch panel. Cabin light is controlled through the CKPT light switch installed on the switch panel.

7.10. ENVIRONMENTAL SYSTEM

Cabin passive ventilation

The system's primary source of fresh air is a set of sliding windows and adjustable vents that direct fresh ram air into the cabin. There is a sliding window door on the starboard side, an adjustable circular vent in the door on the port side and another adjustable circular outlet in the sun roof.

Optionally airplane can be equipped with forced cockpit ventilation with controllable heating and position (see Supplement 9-S3).

7.11. PITOT SYSTEM

The pitot-static system consists of a single pitot tube mounted on the starboard wing, approximately 3 meters from fuselage and dual static ports mounted in the fuselage just below the baggage compartment.

The pitot tube provides the total pressure to pneumatic instruments. The pitot tube also has a AOA sensing port.

The lines from the static ports join together and then drive the static pressure to pneumatic instruments.

7.12. STALL WARNING SYSTEM

Primary aircraft stall warning information to the pilot is the wing buffeting and shall be considered as the main indicator of stall condition.

Stall warning awareness is greatly improved with the secondary aural and haptic stall warning system. It uses real AOA sensing via the AOA-measuring pitot tube GARMIN GAP26. The system is calibrated to produce an aural buzzer-warning of increased frequency and intensity as the stall margin is approached.

Additionally to the aural stall warning the aircraft is equipped with the haptic stall warning system that activates a control stick vibration when the critical AOA is approached. The control stick vibration acts as a secondary stall warning notification additional to the aural warnings.

Stall Warning System Self Test

The stall warning system is subjected to a self test when BAT Master switch is turned ON. During the self test, haptic stall warning in the control stick handles is activated for few seconds with intermittent pulses. Aural warning is emitted from the integrated beeper and in the headset.

7.13. FLIGHT DECK ARRANGEMENT

7.13.1. INSTRUMENT PANEL

The upper row includes three flight instruments with 80mm diameter displays. First on the left is the airspeed indicator (ASI), followed by the artificial horizon (AH) and altimeter (ALT) as next.

The airplane is equipped with Garmin Aera 660. Analog flight instrumentation, position, navigation and hazard avoidance information (GPS-derived) is displayed to the pilot using a 5” display with a capacitive touch screen. It is mounted on the upper right side of the instrument panel.

VELIS Club instrument panel

The middle row consists of three 57mm diameter instruments. First on the left is the Tachometer (engine RPM indicator) with numerical totalizer information. Right of the middle mounted slip indicator is the vertical speed indicator (VSI). Next to the VSI is the Kanarda - DIGI display showing all engine data.

The lowest row consist of two 57mm round instruments. The left one is VHF voice radio (COM) and transponder (XPDR) on the right side. On each side of those two instruments pair of jacks (HPH and MIC) for pilot and copilot are installed. Intercom switch, mounted left of pilot jacks, serves to enable or disable intercom communication.

When optional cabin heating system is installed a vertically oriented cabin heat panel is positioned on the very left edge of the instrument panel enabling the pilots to control the cabin airflow.

The ELT remote switch is installed on the right side of the instrument panel.

CENTER CONSOLE

A center console contains (front-to-back) the parking brake lever, throttle lever, choke lever, propeller lever, fuel selector, elevator trim knob/indicator and indicator and the flap lever. On the ceiling there is the airbrakes activation handle. On the back wall, above the flaps handle, there is the cabin light.

Typical center console arrangement
(view of: throttle quadrant, fuel selector, elevator trim, flap lever)

7.13.2. SWITCH PANEL

A switch panel is located in the “dash board” bolster below the flight instruments. It contains BATTERY CAUTION and GENERATOR FAIL light at the top left corner followed by the MASTER Battery and GEN switch each with applicable CB's, lighting switches and circuit breakers for other aircraft systems. Starter/Ignition key switch is mounted on the top right part of the switch panel.

Typical switch panel arrangement
(optional switches and circuit breakers included)

7.14. FLIGHT INSTRUMENTS

The following paragraphs and equipment descriptions describe all standard instruments installations offered for the aircraft. The navigation and communication equipment are mounted on the instrument panel and are easily accessible from either pilot seat.

NOTE: For detailed descriptions of specific equipment, operating procedures or data, refer to the applicable OEM.

The standard avionics and systems configuration consists of:

1	Mikrotechna LUN1116 Airspeed Indicator (TSO)
2	Kanardia Horis HO-80 AH (Artificial horizon - attitude indicator)
3	Mikrotechna LUN1128 Altimeter (TSO)
4	Garmin Aera 660 GPS
5	Kanardia I-RPM-SL 57 RPM indicator
6	Slipball Winter
7	Kanardia Indu I-VARIO-SL 57 - VSI
8	Kanardia DIGI-K (display)
9	Funke ATR833-II Radio COM
10	Funke TRT800H Transponder

Pitot static instruments for airspeed and altitude are mounted in the top segment of the instrument panel and do not require electrical power to function.

7.14.1. MECHANICAL AIRSPEED INDICATOR

Indicated airspeed is indicated on an precision airspeed indicator installed in the pilot’s instrument panel. The instrument senses difference in Static and Pitot pressures and displays the result in knots on an airspeed scale. The Airspeed Indicator LUN1116 is a pitot-static based TSO’d instrument from Mikrotechna PRAHA, its diameter is 80mm with anti-reflective glass coating.

Example of airspeed indicator

7.14.2. MECHANICAL ALTIMETER

Airplane altitude is depicted on a conventional, three-pointer, internally lit barometric altimeter. Mikrotechna LUN1128 Altimeter (TSO) senses the local barometric pressure adjusted for altimeter setting and displays the result on the instrument in feet. The altimeter is calibrated for operation between -1000 and 20,000 feet altitude. The scale is marked from 0 to 10 in increments of 2. The long pointer indicates hundreds of feet and sweeps the scale every 1000 feet (each increment equals 20 feet). The short, wide pointer indicates thousands of feet and sweeps the scale every 10,000 feet (each increment equals 200 feet). The short narrow pointer indicates tens of thousands feet and sweeps from 0 (zero) to 2 (20,000 feet with each increment equal to 2000 feet). Barometric windows on the instrument's face allow barometric calibrations in either inches of mercury (inHg) or millibars (mb). The barometric altimeter settings are input through the barometric adjustment knob at the lower left of the instrument.

Altimeter

7.14.3. ARTIFICIAL HORIZON

Kanardia Horis HO-80 AH is an electronic device. It consists of a set of sensors and an LCD. The majority of sensors are built into its compact housing: static pressure, dynamic pressure, 3 axis accelerometer, 3 axes angular rate, and GPS receiver. Only the GPS antenna and OAT sensor are externally mounted. Single push/rotate knob is used to operate the instrument and to adjust settings.

Artificial horizon

7.14.4. GARMIN AERA 660

The Garmin Aera 660 provides the functions of the attitude indicator, magnetic heading indicator, airspeed indicator, ground speed indicator, altimeter, vertical speed indicator, directional gyro, HSI (horizontal situation indicator), wind data, FLARM (optional), FMS and avionics-related annunciator. It also triggers aural and acoustic warnings.

Garmin Aera 660

NOTE: For a detailed description of the Garmin Aera 660, refer to Garmin Aera 660 Pilots Guide.

7.14.5. RPM INDICATOR

The Kanardia I-RPM-SL 57 Indu is an electromechanical device providing RPM indication and totalizer function (hour meter). The electronics read the electrical signal from the RPM sensor and drives the stepper motor turning a needle. RPM information is also shown on a color LCD. When connected to a CAN bus instrument outputs RPM and engine hours data which can be used by other Kanardia devices.

RPM indicator

7.14.6. SLIP INDICATOR

The Winter QM 3 slip/skid indicator is also know as an inclinometer. Like the magnetic compass, this instrument requires no electrical power or input from other aircraft systems. The slip indicator is influenced by centrifugal force and gravity. It consists of a metal ball in an oil–filled, curved glass tube.

RPM indicator

7.14.7. MAGNETIC COMPASS

A conventional liquid filled, magnetic compass is installed on the cabin support strut assemby. A compass correction card is installed with the compass.

7.14.8. COMMUNICATION (COM) TRANSCEIVERS

The Funke Radio ATR833-II-OLED unit is a compact VHF communication transceiver (designated as COM), installed to provide VHF communication.

VHF COM

The ATR833-II radio replaces the well known ATR833 radio with the channel separation of 8.33 kHz. Transmitter and receiver are a complete new development with state-of-the-art digital signal processing. The ATR833-II has as its predecessor ATR833 a built-in voice controlled intercom. New is the automatic recognition of the microphone type.

Another new feature is the recording of the latest radio message. With a button press, up to nine seconds of the last radio call are repeated. In addition to the standard functions, there are 2 memory functions available: Up to 20 frequencies can be stored together with an identifier. Moreover, the 10 last used frequencies can be recalled easily.

The COM antenna is located on top of fuselage behind the cabin. 12 VDC for COM transceiver operation is supplied through the COM circuit breaker on the switch panel.

NOTE: For a detailed description refer to *f.u.n.k.e. AVIONICS GMBH ATR833-II-OLED* installation & operation manual.

7.14.9. TRANSPONDER

The airplane is equipped with a single Funke TRT800H ATC Mode S (identification and altitude) transponder with squawk capability. It offers the classical A/C modes of operation plus full Mode-S support including the future-oriented extended squitter function. The transponder unit with integrated controls is mounted on the instrument panel. The transponder antenna is mounted on the underside of the fuselage just aft of the firewall. 12 VDC for receiver, transmitter and altitude encoder operation is supplied through the XPDR circuit breaker on the switch panel.

ATC XPDR

7.14.10. AUDIO SYSTEM

The airplane is equipped with a VOX intercom system as part of the COM unit. A separate designated intercom ON/OFF switch is provided below the Transponder on the central part of the instrument panel.

Headset/Microphone Installation

The airplane is equipped with provisions for two headsets with integrated microphones. The microphone-headsets use remote Push-To-Talk (PTT) switches located on the top of the associated control stick grip. The microphone (MIC) and headset jacks for the pilots are located on the upper part of the back cockpit wall. The volume is controlled via the COM unit and intercom function via the dedicated intercom switch.

7.14.11. HOUR METER

Hour meter function (totalizer) is integrated into the RPM indicator, Kanardia I-RPM-SL 57 Indu. Refer to chapter 7.14.5. RPM INDICATOR for more details.

7.15. EMERGENCY LOCATOR TRANSMITTER

The airplane is equipped with a self-contained emergency locator transmitter (ELT) Artex 345. The transmitter is installed on the fuselage's internal side behind the right pilot's seat and is accessible by folding the seat. A remote switch and indicator panel is installed on the instrument panel and provides manual activation, testing and monitoring functions for the ELT.

If rapid deceleration, such as an impact or crash landing, is detected, the transmitter will repeatedly transmit VHF band audio sweeps at 121.5 MHz and 406 MHz for 24 hours or until manual deactivation.

The main transmitter and the remote switches have three positions labeled ON, ARM/OFF, TEST. A red LED light on the transmitter and on the remote switch panel flashes when the ELT is transmitting, or to signal functional abnormalities.

The TEST button is used to periodically test the unit in accordance with OEM procedures.

	Remote switch position		**ELT transmitter switch position**
Normal operation (automatic activation):	ARM/OFF	and	ARM/OFF
Manual activation:	ON	or	ON
Periodical test:	TEST	or	TEST
End transmission:	ON >> ARM/OFF	or	ON >> ARM/OFF

- In the event of imminent emergency landing:

1	Start ELT transmission manually: remote switch "ON". Status LED on the remote switch will start flashing.

- In the event of an accident, crash landing or hard landing:

1	ELT transmission is automatically activated by the G-force detector. Status LED on the remote switch will start flashing.

NOTE: Consult *ARTEX ELT 345 manual* for additional information about ELT use.

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 ATC 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 system).

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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 data plate). The latest revision of the maintenance manual can be attained by contacting 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

Pilots operating the airplane should refer to the regulations of the country of certification for information about preventative maintenance that may be performed by pilots. This maintenance may be performed only on an aircraft that the pilot owns or operates and which is not used in air carrier service. All other maintenance required on the airplane is to be accomplished by appropriately licensed personnel. A licensed maintenance company should be contacted for further information. Preventative maintenance should be accomplished with the appropriate service manual.

8.4. CHANGES AND REPAIRS

Only licensed personnel is permitted to perform changes or repairs. Changes to the aircraft must be performed in coordination with the manufacturer and the authority, with the intention of protecting the aircraft's airworthiness state. More detailed information regarding repairs can be found in the maintenance manual.

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):	**1.8 bar**
Main wheel tires (recommended):	**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 on rudder pedals around cap 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. 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 cowling. To check and add oil:

1	Open access door on upper cowl. Open cap of the oil bottle.
2	Verify BAT Master / GEN switch OFF, Ignition OFF.
3	Rotate the propeller in normal direction until a blurbing noise is heard. This is evidence that 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 lubrication system is 3.5 liters.
6	Reinstall dipstick and secure cap.
7	Close and secure access door.

8.5.4. FUEL SYSTEM SERVICING

Fuel Filter Screening

Refer to procedures in Maintenance manual

Filling Fuel Tanks

Fuel fillers are located on top of the wing. Each wing holds a maximum of 50L. The fuel tank caps are equipped with vent tubes.

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	Remove fuel filler cap and fuel airplane to desired level.

NOTE: Do not open (turn) the fuel cap by means of handling the vent tube. Use the provided tool or a coin.

NOTE: Do not permit fuel nozzle to come in contact with bottom of fuel tanks. Keep fuel tanks at least half full at all times to minimize condensation and moisture accumulation in tanks. In extremely humid areas, the fuel supply should be checked frequently and drained of condensation to prevent possible distribution problems.

If fuel is going to be added to only one tank, the tank being serviced should be filled to the same level as the opposite tank. This will aid in keeping fuel loads balanced.

4	Remove nozzle, install filler cap and remove protective cover.
5	Repeat refuel procedure tor opposite wing.
6	Remove ground wires.
7	Remove fire extinguisher.

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.

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

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.

8.5.5. 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.

8.5.6. PROPELLER SERVICING

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 Propeller Maintenance Manual for detailed information.

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	BAT Master switch OFF, GEN Master switch OFF.
3	Connect (+) lead of external power source to (+) terminal of the battery. Connect (-) lead of external power source to (-) terminal of the battery.
4	BAT Master switch to ON. 14 VDC from the external power unit will energize the aircraft electric system. 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 is 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 (-), retract and lock airbrakes.
4	Set parking brake by first applying brake pressure using the toe-brakes and then pulling the PARKING BRAKE knob aft
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 and baggage 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 (-), retract and lock airbrakes
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.

8.6.5. TOWING / GROUND MOVEMENTS

Towing is only approved when optional ground tow pegs are installed on the nose wheel axle. If the pegs are not installed, the following procedure shall be followed for ground movements:

CAUTION: While pushing the aircraft backward, the nose-wheel must be off the ground to keep the nose wheel from turning abruptly. Do not use the tail vertical or horizontal control surfaces or stabilizers to move the airplane. Grab the tail cone in front of the vertical fin to push and maneuver. Wing roots can be used as push points. Do not push or pull on wing control surfaces or propeller to maneuver the airplane. Do not move the airplane when the main gear is obstructed with mud or snow.

1	Be especially cognizant of hangar door clearances.
2	Release parking brake and remove chocks.
3	Move airplane to desired location by grabbing on the tail cone.
4	When moving backward, lower the tail to keep nose wheel off the ground.
5	Install chocks when repositioning complete.

To obtain a minimum radius turn during ground handling, the airplane may be rotated around either main landing gear by pressing down on a fuselage just forward of the horizontal stabilizer to raise the nosewheel off the ground.

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, anti static cleaner. Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or glass window cleaning sprays. Use only a nonabrasive 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 contaminates.
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 alternator, 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, anti static acrylic cleaner. Do not use gasoline, alcohol, benzene, carbon tetrachloride, thinner, acetone, or glass window cleaning sprays. Use only a nonabrasive 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 nonabrasive 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 discolor 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 cleaner. 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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WHEEL FAIRINGS	9-S2-2
FORCED COCKPIT VENTILATION	9-S3-2
AEROTOWING OPERATIONS	9-S4-2
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SUPPLEMENT

9-S1

SECTION 9 - SUPPLEMENT 9-S1; BAGGAGE COMPARTMENT

When the solid baggage compartment is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the POH. This document must be carried in the airplane at all times. Information in this supplement adds or replaces information in the basic POH.

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SECTION 9
SUPPLEMENT 9-S1

BAGGAGE COMPARTMENT

Signature: ______________________________

Stamp: ______________________________

Date of Approval: ______________________________

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SECTION 2: LIMITATIONS

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	54 kg / 119 lbs
Maximum baggage weight *	25 kg / 55 lbs

***CAUTION:** carrying baggage is allowed only when the baggage compartment is installed. It is the pilots responsibility to ensure that the airplane is loaded properly and within prescribed weight and balance limitations.

2.17 PLACARDS

2.17.5 PLACARDS (CABIN)

On inside of baggage compartment door
(replaces the existing placard SN: 1113032)

SEE AIRCRAFT FLIGHT MANUAL FOR
BAGGAGE LIMITATIONS AND
WEIGHT AND BALANCE INFORMATION
DISTRIBUTED FLOOR LIMIT 25 KG / 55 LBS
1111539

SECTION 4: NORMAL PROCEDURES

4.3 PREFLIGHT INSPECTION

4.3.1. PREFLIGHT WALK-AROUND

LEFT FUSELAGE		
1	COM / ELT antenna (top)	Condition and attachment
2	Wing / fuselage seal	Taped firmly, no wrinkles
3	XPDR antenna (underside)	Condition and attachment
4	Baggage compartment	Baggage secure
5	Baggage door	Closed and locked
6	Static pressure port	Unblocked
7	Fuel system water drain	Perform

4.16 SPINNING (INTENTIONAL SPINS)

Aircraft preparation

Make sure that the baggage compartment is either empty or, that all objects located in the baggage compartment are safely secured so that they do not move from their position in flight.

SECTION 7: SYSTEM DESCRIPTION

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.

7.5.4 BAGGAGE COMPARTMENT

The baggage compartment door, located on the left side of the fuselage aft of the door, allows entry to the baggage compartment. The baggage door is hinged on the forward edge and latched on the rear edge. The door is locked from the outside with a key lock. The baggage compartment key will also open and close the cabin doors.

The baggage compartment extends from behind the seats to the aft cabin bulkhead and is L50 x W50 x H60 cm in size and limited to 25 kg of load. The seats can be folded forward to provide additional baggage area for long or bulky items.

All items in the baggage compartment must be secured in place by means of a cargo net. The net is attached to 4 rings located at the baggage compartment corners.

SUPPLEMENT

9-S2

SECTION 9 - SUPPLEMENT 9-S2; WHEEL FAIRINGS

When wheel fairings are installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the POH. This document must be carried in the airplane at all times. Information in this supplement adds or replaces information in the basic POH.

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SECTION 7: SYSTEM DESCRIPTION	**REPLACE**
SECTION 8: HANDLING, SERVICING AND MAINTENANCE	**NO CHANGE**

SECTION 9
SUPPLEMENT 9-S2

WHEEL FAIRINGS

Signature: ______________________________

Stamp: ______________________________

Date of Approval: ______________________________

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SECTION 2: LIMITATIONS

2.17 PLACARDS

2.17.1. PLACARDS (EXTERNAL)

On each main landing gear wheel fairing (2 pcs):

SECTION 7: SYSTEM DESCRIPTION

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 fiber. The strut is composed by two parallel elements producing a semi-redundant structure and allowing for predictable locations of stress points. Wheels are equipped with aerodynamic fairings made of CFRP. The tube-less type wheel tire is 4.00 x 6. Wheel track is 1.60 m, wheel base 1.58 m. Inflate to 2.8 bar.

Landing gear (with optional wheel fairings installed)

7.4.2. NOSE GEAR

The nose gear is integrated into the engine mount. It is steerable, connected to the rudder pedal control system and incorporates an oil-spring damper element. The maximum turning arc is 45 degrees either side of center. The strut's cylinder, as well as the wheel fork, are made from aluminum, while the strut's inner tube is made chrome-plated steel. The nose wheel is equipped with aerodynamic fairing made of CFRP. The nosewheel tire is 4.00 x 4. Inflate to 1.8 bar.

SUPPLEMENT

9-S3

SECTION 9 - SUPPLEMENT 9-S3; FORCED COCKPIT VENTILATION

When upgraded cockpit ventilation and heating system is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the POH. This document must be carried in the airplane at all times. Information in this supplement adds or replaces information in the basic POH.

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SECTION 9
SUPPLEMENT 9-S3

FORCED COCKPIT VENTILATION

Signature: ________________________________

Stamp: ________________________________

Date of Approval: ________________________________

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SECTION 2: LIMITATIONS

2.17 PLACARDS

2.17.4. PLACARDS (CENTER CONSOLE)

Next to cabin-air control knob:

SECTION 3: EMERGENCY PROCEDURES

3.5 FIRE IN FLIGHT

3.5.1 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. Perform an EMERGENCY LANDING and shut down the fuel supply to the engine once a safe landing is assured.

1	Cabin Air Selector	OFF (Push)
2	Door Vents	Open

If source of smoke and fumes is firewall forward (smoke decreases):

3	Fan Toggle Switch	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	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	GEN Master	OFF
6	BAT Master	OFF
7	Land	AS SOON AS POSSIBLE

WARNING: After the BAT Master switch is turned OFF an engine re-start will no longer be possible!

CAUTION: When the BAT Master and GEN Master Switch are turned OFF, the engine will continue to run. The electric power to the avionics will be cut off and all electric instruments not equipped with a backup battery will be inoperative. Refer to analogue/backup instruments for the continuation of flight.

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.

3.5.2 ENGINE FIRE IN FLIGHT

If an engine fire occurs during flight:

1	Fuel Selector	OFF
2	Cabin Air Selector	OFF (Push)
3	Fan Toggle Switch	OFF
4	Door Vents	As required
5	Throttle Lever	Full forward

After the engine stops:

6	Ignition Switch	OFF
7	Land	IMMEDIATELY

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

3.5.3 WING FIRE IN FLIGHT

1	NAV/AC Lights	OFF
2	Side Slip to Keep Flames away from Fuel Tank and Cabin	Perform - if possible
3	Land	IMMEDIATELY

NOTE: As an alternative, putting the airplane into a dive may put the fire out. Do not exceed V_{NE} during the dive.

3.5.4 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 the 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 the cabin of smoke or fumes.

1	Cabin Air Selector	OFF (Push)
2	Fan Toggle Switch	OFF
3	GEN Master	OFF
4	BAT Master	OFF
5	*Fire Extinguisher* ***(if applicable)***	Activate
6	Door Vents	As required

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

7	Land	AS SOON AS POSSIBLE

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

WARNING: After the BAT Master switch is turned OFF an engine restart will no longer be possible!

CAUTION: When the BAT Master and GEN Master Switch are turned OFF, the engine will continue to run. The electric power to the avionics will be cut off and all electric instruments not equipped with a backup battery will be inoperative. 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).

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.

CHECKLISTS

EMERGENCY PROCEDURES

REPLACEMENT PAGES

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

ENGINE PARTIAL POWER LOSS

Fuel Selector	Switch tanks
Throttle Lever	SWEEP
Ignition Switch	BOTH, L, then R
Land	AS SOON AS POSSIBLE
If engine stops and time/conditions permit, proceed with **ENGINE FAILURE IN FLIGHT** check-list	

LOW OIL PRESSURE

Throttle Lever	Minimum required
Land	AS SOON AS POSSIBLE

PROPELLER GOVERNOR FAILURE

Propeller RPM will not increase:	
Land	AS SOON AS PRACTICAL
Propeller overspeeds or RPM will not decrease:	
Throttle Lever	Adjust (to keep RPM in limits)
Airspeed	Reduce to MAX 90 KIAS
Oil Pressure	CHECK
Land	AS SOON AS PRACTICAL

FIRE IN FLIGHT

SMOKE IN THE COCKPIT	
Cabin Air Selector	OFF (Push)
Door Vents	Open

If source of fumes/smoke is firewall forward (smoke decreases):

Fan Toggle Switch	OFF
Land	AS SOON AS POSSIBLE

If source of fumes/smoke is in the cabin (smoke increases):

Cabin Air Selector	ON (Pull)
Fan Toggle Switch	ON

If time/situation permits:

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 disconnection, or if it is not successful (smoke does not decrease):

GEN Master	OFF
BAT Master	OFF
Land	AS SOON AS POSSIBLE

FIRE IN FLIGHT (continue)

ENGINE FIRE IN FLIGHT	
Fuel Selector	OFF
Cabin Air Selector	OFF (Push)
Fan Toggle Switch	OFF
Door Vents	As required
Throttle Lever	Full forward

After the engine stops:

Ignition Switch	OFF
Land	IMMEDIATELY

WING FIRE IN FLIGHT	
NAV/AC lights	OFF
Side slip to keep flames away from fuel tank and cabin	Perform - if possible
Land	IMMEDIATELY

COCKPIT FIRE IN FLIGHT	
Cabin Air Selector	OFF
Fan toggle switch	OFF
GEN Master	OFF
BAT Master	OFF
Fire Extinguisher *(if applicable)*	Activate
Door Vents	As required

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

Land	AS SOON AS POSSIBLE

SPIN RECOVERY

Throttle Lever	Idle
Rudder	FULL deflection, OPPOSITE to the spin
Control Stick	Forward, roll neutral

As rotation stops:

Rudder	Neutralize
Horizontal Flight	Resume do not exceed airspeed and g-load limits

DITCHING

Report your Location and Intentions	Transmit (121.5 MHz) MAYDAY
Transponder	SQUAWK 7700
Flotation Devices	PUT ON
Seat Belt(s)	Check fastened and tightened
Flaps	(+2)
Airspeed	50 KIAS or minimum possible
Approach	300 ft/min Rate of descent or minimum possible
Doors	UNLATCH BEFORE IMPACT WITH WATER
Touchdown	Wings level - lowest possible speed
Airplane	Evacuate
Flotation Devices	Inflate when clear of the airplane

SECTION 7: AIRPLANE DESCRIPTION

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 and the cabin heat system.

Cabin passive ventilation

The system's primary source of fresh air is a set of sliding windows and adjustable vents that direct fresh ram air into the cabin. There is a sliding window door on the starboard side, an adjustable circular vent in the door on the port side and another adjustable circular outlet in the sun roof.

Cabin Air Selector

This is the shut-off valve from the firewall forward compartment into the cabin. The stainless steel ON/OFF valve is controlled by a push-pull knob on the bottom of the switch panel with pull to open, twist to lock and push to shut positions. Make sure the Cabin Air Selector is open before using the optional Cabin Heat System.

Cabin Heat System

The cabin heat system 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 cowling. 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.

The Cabin Heat 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 Cabin Heat System control possibilities:

Airflow direction

The bottom 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 between these two, results in air flowing in both directions.

Heating

The upper 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.

Windshield defrost

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

Cabin heat panel

SUPPLEMENT

9-S4

SECTION 9 - SUPPLEMENT 9-S4; AEROTOWING OPERATIONS

When a tow hook is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the POH. This document must be carried in the airplane at all times. Information in this supplement adds to or replaces information in the basic POH.

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SECTION 5: PERFORMANCE	ADDED
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SECTION 7: SYSTEM DESCRIPTION	ADDED
SECTION 8: HANDLING, SERVICING AND MAINTENANCE	NO CHANGE

SECTION 9
SUPPLEMENT 9-S4

AEROTOWING OPERATIONS

Signature: ______________________________

Stamp: ______________________________

Date of Approval: ______________________________

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SECTION 2: LIMITATIONS

2.16 OPERATIONAL RESTRICTIONS

2.16.1 RESTRICTIONS FOR AEROTOWING OPERATIONS

Takeoff weight to be kept below 500 kg. Maximum weight of towed glider 600 kg. Maximum weak-link rating 300 kg. Aerotowing is only permitted within the speed range of 60-80 KIAS.

V_s at 500 kg is 48 KIAS, 1.3 V_s is 63 KIAS

2.17 PLACARDS

2.17.1 PLACARDS (EXTERNAL)

On the tow release (optional):

2.17.3 PLACARDS (INSTRUMENT PANEL)

Next to the tow hook release handle (optional):

SECTION 3: EMERGENCY PROCEDURES

3.17 AEROTOWING

All emergencies related to the engine and systems performance to be handled as per prior paragraphs, with pilot's consideration when to disconnect glider and/or drop the rope.

3.17.1 GUIDELINES FOR AEROTOWING EVENTUALITIES:

Glider out of sight (not visible in mirror)

When unsure of glider's position/behavior, notify glider pilot, if situation continues, disconnect rope. Land normally.

Engine failure

Notify glider pilot, disconnect rope. Land according to usual emergency procedure for engine failure.

Rope breaks

Verify operation of all systems, land normally.

Rope refuses to be dropped (mechanism lock)

Plan your landing long and approach high not to cause the hanging rope to become tangled into obstacles before the runway. After touchdown, brake gently. Respect all normal operating speeds and procedures.

Glider cannot disconnect

Continue flight to be over a landable terrain and disconnect the rope by pulling the yellow cockpit rope disconnect lever (inform glider pilot first). Glider will need to land with rope hanging from its nose. Conduct a normal landing procedure.

Rope refuses to disconnect with glider and towing airplane

Continue flight to be over a landable terrain and attempt to disconnect the rope again, both with glider and towing airplane. If unsuccessful, conduct a landing in aerotow. Respect normal landing airspeeds and conduct a shallow approach. Allow glider to touch down first, then touch down and brake gently.

SECTION 4: NORMAL PROCEDURES

4.18 AEROTOWING

This paragraph contains recommendations and establishes guidelines for operational consideration.

NOTE: Total takeoff distance is limited by certification basis to be less than 500 m. This is achieved by limiting the takeoff mass to 500 kg and mass of towed glider to 600 kg.

Attachment and removal of mirror

The mirror for glider-towing operations is attached to the bottom side of the left wing through the dedicated mounting. Remove the plastic cap which covers the tie-down point, insert the mirror mounting and screw it in until it is properly fixed. Clamp the mirror to the mounting. Adjust the mirror position in order to have a clear and unobstructed view of the towed glider. To remove the mirror, apply the above procedure in reverse.

Recommendations

BEFORE TAKEOFF:

1	Rope Disconnect	CHECK for successful disconnect
2	Mirror	Adjust before each tow to have clear view of the glider

TAKEOFF:

3	Takeoff Flap Setting	(+1) for grass and hard runway
4	Trim	Set ½ nose-up
5	Lift-off Speed	55 KIAS
6	Initial Climb Speed	60 KIAS (depends on glider type)

REACHING SAFE ALTITUDE (MIN 300 FT):

7	Engine Power	Propeller lever set to 5500 rpm WOT
8	Turn Crosswind	Maximum bank angle 20°
9	Flaps	(0)

10	Engine Temperatures	**Monitor**

CAUTION: In case of engine overheating consider reducing power, increasing speed or disconnecting glider.

BEFORE DESCENT:

11	Glider Disconnected	**CHECK mirror!**
12	Power	**Idle**
13	Flaps	**(-)**
14	Airbrakes	**As desired**
15	Rope	**Drop before landing**

CAUTION: Should the rope not be dropped before landing, use caution to maneuver aircraft so that the rope does not catch obstacles on approach path.

NOTE: In case the rope cannot be disconnected at both sides (tow-plane and glider), landing in formation was demonstrated to be the safest.

NOTE: All emergencies to be handled as per chapter Emergency Procedures with pilot's consideration when to disconnect glider.

CHECKLISTS

AEROTOWING

SUPPLEMENTARY PAGES

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

AEROTOWING (EMERGENCY PROCEDURES)

GLIDER OUT OF SIGHT	
If the glider is not visible in the mirror or the glider position is uncertain/unknown:	
Rope	Disconnect
Land (normal landing)	Perform
ENGINE FAILURE	
Notify Glider about Failure	Transmit
Rope	Disconnect
Emergency Landing	Perform
ROPE BREAKS	
All Systems Functionality	CHECK
Land (normal landing)	Perform
ROPE CAN'T BE DROPPED	
Perform high approach respecting normal operating speeds and procedures. Brake gently after touch down.	
GLIDER CAN'T DISCONNECT	
Continue the flight over a landable terrain and:	
Inform Glider about Rope Disconnection	Transmit
Rope	Disconnect
Land (normal landing)	Perform
GLIDER AND TOWPLANE CAN'T DISCONNECT (Landing in aerotow)	
Perform shallow approach respecting normal operating speeds and procedures. Allow glider to touch down first. Brake gently after touch down	

AEROTOWING (NORMAL PROCEDURES)

BEFORE TAKEOFF	
Rope Disconnect	CHECK for successful disconnect
Mirror	Adjust before each tow to have clear view of the glider
TAKEOFF	
Flaps	(+1)
Trim	½ Nose Up
Lift-Off Speed	55 KIAS
Initial Climb Speed	60 KIAS (depends on glider type)
REACHING SAFE ALTITUDE (MIN 300 FT)	
Engine Power	5500 RPM / WOT
Turn Crosswind	Maximum bank angle 20°
Flaps	(0)
Engine Temperatures	Monitor
BEFORE DESCENT	
Glider Disconnected	CHECK Mirror
Throttle Lever	Idle
Flaps	(-)
Airbrakes	As required
Rope	Drop before landing

SECTION 5: PERFORMANCE

5.12. AEROTOWING PERFORMANCE

5.12.1 TAKEOFF

Data is valid for a hard-surface runway.

TOWED GLIDER MASS	GROUND ROLL (ISA – Sea level)	TAKEOFF distance 15m obstacle (ISA – Sea level)
kg	**m**	**m**
300	180	350
400	200	370
500	250	410
600	280	500

5.12.2 CLIMB

TOWED GLIDER MASS	Climb rate stabilized (ISA Sea level)
kg	**m/s**
300	3.5
400	2.6
500	2.3
600	2

NOTE: Appropriate pilot procedures must be applied when towing outside of ISA sea-level conditions and/or from non-hard surface runways.

SECTION 7: AIRPLANE DESCRIPTION

7.16 TOWING EQUIPMENT

The aircraft is optionally equipped with towing equipment, consisting of the composite tail attachment, containing the hook/release assembly, the actuation cable from the tail into the cabin and the yellow cockpit rope-disconnect lever, positioned in front of the pilot on the middle console.

The mirror is mounted to the tie down point. Location for installation is marked on the bottom surface of the left-wing.

The towing equipment is limited to use with a weak link (max rating 300 kg) and for towing of gliders with a takeoff weight of less than 600 kg.

SUPPLEMENT

9-S5

SECTION 9 - SUPPLEMENT 9-S5; FLARM EQUIPMENT

When AT-1 FLARM equipment and accompanying harnesses, is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the POH. This document must be carried in the airplane at all times. Information in this supplement adds to or replaces information in the basic POH.

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SECTION 1: GENERAL	**NO CHANGE**
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SECTION 4: NORMAL PROCEDURES	**NO CHANGE**
SECTION 5: PERFORMANCE	**NO CHANGE**
SECTION 6: WEIGHT AND BALANCE	**NO CHANGE**
SECTION 7: SYSTEM DESCRIPTION	**ADD**
SECTION 8: HANDLING, SERVICING AND MAINTENANCE	**NO CHANGE**

SECTION 9
SUPPLEMENT 9-S5

FLARM EQUIPMENT

Signature: ______________________________

Stamp: ______________________________

Date of Approval: ______________________________

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SECTION 2: LIMITATIONS

2.17 PLACARDS

2.17.3. PLACARDS (INSTRUMENT PANEL)

SECTION 7: SYSTEM DESCRIPTION

This supplement provides specific information about the AT-1 FLARM system, which is optional equipment on the Virus SW 121C. For a detailed description of the AT-1 FLARM device, refer to Air Avionic's Air Traffic Pilot's Guide, document MAN0070A0002, latest revision.

NOTE: The word FLARM in this document is used generically and applies to a traffic collision avoidance system.

7.14.12 FLARM EQUIPMENT

If the optional AIR Traffic AT-1 by AIR Avionics unit is installed, the airplane is equipped with a FLARM system. The device is connected to the Garmin Aera and uses it to display traffic information and visual/audio alerts.

The FLARM equipment is composed of the AT-1 Flarm module, installed inside the instrument panel, three internal antennas installed on the instrument panel cover (ADS-B, Internal Flarm and GPS antennas) and an external Flarm antenna installed below the fuselage. An additional USB socket is positioned on the left side wall of the instrument panel, which is needed for FLARM device software updates. The system is powered through the circuit breaker designed "TFC", installed on the switch panel.

Please refer to Garmin Aera Pilot's Guide (document 190-02017-20) for additional information about traffic collision avoidance system.

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SUPPLEMENT

9-S6

SECTION 9 - SUPPLEMENT 9-S6; BALLISTIC PARACHUTE RESCUE SYSTEM

When BPRS is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the POH. This document must be carried in the airplane at all times. Information in this supplement adds or replaces information in the basic POH.

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SECTION 4: NORMAL PROCEDURES	**ADD**
SECTION 5: PERFORMANCE	**NO CHANGE**
SECTION 6: WEIGHT AND BALANCE	**NO CHANGE**
SECTION 7: SYSTEM DESCRIPTION	**ADD**
SECTION 8: HANDLING, SERVICING AND MAINTENANCE	**NO CHANGE**

SECTION 9
SUPPLEMENT 9-S6

BALLISTIC PARACHUTE RESCUE SYSTEM

Signature: ______________________________

Stamp: ______________________________

Date of Approval: ______________________________

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SECTION 1: GENERAL

1.6 SYSTEMS

1.6.5. BALLISTIC PARACHUTE RESCUE SYSTEM (BPRS)

The airplane is optionally equipped with a ballistic deployed parachute rescue system GRS 6/600 SD SPEEDY. The system is not accounted for in the sense of “alternative level of safety”. It is purely considered as a true “second chance” beyond what is required by the certification standard. The period for repacking of the parachute is 6 years. The date of exchange is indicated on the parachute canister.

SECTION 2: LIMITATIONS

2.17 PLACARDS

2.17.6 PLACARDS (BALLISTIC PARACHUTE RESCUE SYSTEM)

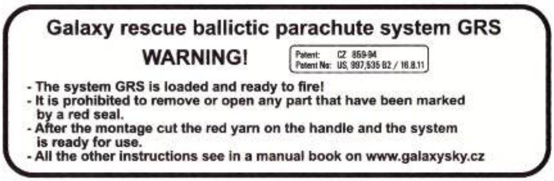
On/adjacent to parachute rescue system hatch and over rocket position:

Next to doors (2 pcs):

Next to rocket exhaust (bottom of fuselage):

Next to activation handle (cockpit):

On the parachute rescue system container:



SECTION 3: EMERGENCY PROCEDURES

3.1 INTRODUCTION

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.

3.7 EMERGENCY LANDING

3.7.2 DITCHING

1	Report your Location and Intentions	**Transmit (121.5 MHz) MAYDAY**
2	Transponder	**SQUAWK 7700**
3	Airspeed	**MINIMUM POSSIBLE**
4	Ignition Switch	**OFF**
5	Seat Belt(s)	**Check tightened and fastened**
6	BPRS Activation Handle	**PULL**
7	Doors	**Unlatch before impact with water**
8	Airplane	**Evacuate**
9	Flotation Devices	**Inflate when clear of the 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.

3.18 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 KTAS.

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

2	Ignition switch (If time and altitude permit)	OFF

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

3	BPRS 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 Selector	OFF

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

5	BAT Master	OFF
6	Ignition Switch	Check 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.

CHECKLISTS

EMERGENCY PROCEDURES

SUPPLEMENTARY PAGES

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

DITCHING (BPRS DEPLOYMENT)

Report your location and intentions	Transmit (121.5 MHz) MAYDAY
Transponder	SQUAWK 7700
Airspeed	MINIMUM POSSIBLE
Ignition Switch	OFF
Seat Belt(s)	Check tightened and fastened
BPRS Activation Handle	PULL
Doors	Unlatch before impact with water
Airplane	Evacuate
Flotation Devices	Inflate when clear of the airplane

BPRS DEPLOYMENT

Airspeed	MINIMUM POSSIBLE
Ignition switch (if time/altitude permits)	OFF
BPRS Activation Handle	PULL
After Deployment:	
Fuel Selector	OFF
BAT Master	OFF
Ignition Switch	OFF
ELT	Activate
Seat Belts and Harnesses	Tighten
Loose Items	Secure

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

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SECTION 7: AIRPLANE DESCRIPTION

7.17 BALLISTIC PARACHUTE RESCUE SYSTEM (BPRS)

The airplane can be 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 cabin support strut assembly.

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 gases from the rocket to the outside (bottom) of the fuselage, the exhaust is placarded.

The type of BPRS is Galaxy Rescue System GRS 6/600 SD SPEEDY. 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 it 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 deceleration 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.

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SUPPLEMENT

9-S7

SECTION 9 - SUPPLEMENT 9-S7;
EXTERIOR LIGHTING - NAV / AC LIGHTS

When exterior lights package is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the POH. This document must be carried in the airplane at all times. Information in this supplement adds or replaces information in the basic POH.

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SECTION 5: PERFORMANCE	**NO CHANGE**
SECTION 6: WEIGHT AND BALANCE	**NO CHANGE**
SECTION 7: SYSTEM DESCRIPTION	**ADD**
SECTION 8: HANDLING, SERVICING AND MAINTENANCE	**NO CHANGE**

SECTION 9
SUPPLEMENT 9-S7

EXTERIOR LIGHTING - NAV / AC LIGHTS

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Stamp: ______________________________

Date of Approval: ______________________________

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SECTION 7: AIRPLANE DESCRIPTION

7.9 LIGHTING

7.9.1 EXTERIOR LIGHTING

Navigation Lights

The airplane is equipped with LED standard wing tip 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/AC light switch, which includes a resettable circuit breaker element.

Strobe/Anti-collision Light

Anti-collision/strobe lights are installed integral with the standard navigation light and controlled by the same switch (NAV/AC light switch).

Landing Light

A High Intensity LED landing light is mounted in the lower engine cowl. The landing light is controlled through the LDG light switch on the switch panel. 12 VDC for landing 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.

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SUPPLEMENT

9-S8

SECTION 9 - SUPPLEMENT 9-S8; AIRCRAFT HOIST SYSTEM

When aircraft hoist system is installed on the aircraft, this POH Supplement is applicable and must be inserted in the Supplements Section of the POH. This document must be carried in the airplane at all times. Information in this supplement adds or replaces information in the basic POH.

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SECTION 7: SYSTEM DESCRIPTION	**NO CHANGE**
SECTION 8: HANDLING, SERVICING AND MAINTENANCE	**ADD**

SECTION 9
SUPPLEMENT 9-S8

AIRCRAFT HOIST SYSTEM

Signature: ______________________________

Stamp: ______________________________

Date of Approval: ______________________________

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SECTION 8: HANDLING AND SERVICING

8.6 GROUND HANDLING

8.6.5. HOISTING

Hoisting the aircraft is only necessary in a few instances, such as when the landing gear has failed or the aircraft's fuselage is badly damaged.

CAUTION: Before lifting/hoisting the airframe always clear the immediate area of people and equipment.

To lift the aircraft:

1	Position the hoisting/lifting system over the aircraft
2	Remove the wing-fuselage joint seal
3	Lift and rotate vertically the 4 hoisting brackets (2 each side) mounted at the wing root, in the wing-fuselage joint gap
4	Connect hoisting system to the four hoisting brackets and lift the aircraft carefully

NOTE: the lifting point should be positioned in correspondence to aircraft empty C.G. position. See Weight & Balance Report. Try to reposition the lifting point if the aircraft tilts while being lifted.

To lower the aircraft:

1	Lower the aircraft carefully to the ground
2	Disconnect and remove the hoisting system from the hoisting brackets
3	Fold the 4 hoisting brackets inside the wing-fuselage joint gap
4	Apply wing-fuselage joint seal

Hoisting system with hoisting brackets

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