



PILOT'S OPERATING HANDBOOK VIRUS SW 121

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Pilot Operating Handbook



Aircraft type: Virus SW 121
Model: Virus SW 121
Type certificate number: EASA.A.573

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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 Operating Handbook/Airplane Flight Manual 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 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.).

Index of document revisions

Doc. Rev.	Reason for revision	Affected pages	Authority
A00	/	ALL	EASA
A01	Pre-TC Updates	ALL	EASA
A02	Pre-TC Updates	ALL	EASA
A03	Intentional Spinning approved	1-2, 1-12, 2-8, 2-10, 2-18, 2-20, 3-15, 3-16, 3-28, 4-21, 4-22, 7-50, 9-S1-8	EASA
A04	Update due inconsistency with compliance documentation	2-15, 2-16	EASA
A05	Towing speed range added, ASI Markings amended, Check lists added, Supplement 3- Night VFR added	2-4, 2-11, 5-17, 5-18, 5-19, 5-20, 9-S3-1 to 9	EASA
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SECTION

1

SECTION 1 – GENERAL

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1.1. INTRODUCTION

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

1.2. DESCRIPTION

The Virus SW 121 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 VIRUS SW 121 is equipped with a ballistic parachute system.

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

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/VFR-night operations and a maximum takeoff weight of 600 kg.

1.4. THREE VIEW DRAWING



Virus SW 121
general arrangement

1.5. DIMENSIONS AND WEIGHTS

Basic Dimensions	Metric	Imperial
Length	6.40 m	20.99 ft
Span	10.70 m	35.10 ft
Height*	2.08 m	6.82 ft
Wing		
Area	9.51 m ²	102.4 ft ²
Span	10.70 m	35.10 ft
Mean aerodynamic chord	0.898 m	2.95 ft
Horizontal Tail		
Area	1.39 m ²	14.96 ft ²
Span	2.18 m	7.15 ft
Vertical Tail		
Area	1.24 m ²	13.34 ft ²
Height	1.11 m	3.64 ft
Weights		
Maximum takeoff weight	600 kg	1323 lb
Typical empty weight	349 kg	768 lb
Typical useful load	251 kg	552 lb
Maximum baggage weight	25 kg	55 lb
Max. wing loading	63.07 kg/m ²	12.92 lb/ft ²
Performance		
Max Speed Level Flight (Vh)	267 km/h IAS	144 KIAS
Cruise Speed (@75% power, 6000 ft PA)	244 km/h TAS	132 KTAS

* In-operation measurement, aircraft not leveled as per WBR.

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.

1.6.5. BALLISTIC PARACHUTE RESCUE SYSTEM (BPRS)

The airplane is 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 repackaging of the parachute is 6 years. The date of exchange is indicated on the parachute canister.

1.7. SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

1.7.1. GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

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

- DA** Density Altitude (ft) is pressure altitude corrected for non-standard temperature. As temperature and altitude increase, air density decreases.
- 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 inflight 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.
- VFR** Means the symbol used to designate the Visual Flight Rules.

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.
PFD	Primary Flight Display
MFD	Multi Function Display
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.

17.5. WEIGHT AND BALANCE TERMINOLOGY

C.G. or CG **Center of Gravity** is the point at which an airplane would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.

- **Arm** is the horizontal distance from the reference datum to the center of an item's gravity. The airplane's arm is obtained by adding the airplane's individual moments and dividing the sum by the total weight.
- **Aircraft Empty Weight** is the actual weight of the airplane including all optional equipment installed on the airplane in the current configuration and can be found in the applicable weight and balance document log. The aircraft empty weight includes the weight of unusable fuel, hydraulic fluid, coolant and oil.

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

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

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

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

1.8. CONVERSION TABLE

SI	US	US	SI
1 bar	14.5037 psi	1 psi	0.0689 bar
1 mm ²	0.0016 in ²	1 in ²	625 mm ²
1 cm ²	0.1550 in ²	1 in ²	6.4510 cm ²
1 daN	2.2481 lbf	1 lbf	0.4448 daN
1 g	0.0353 oz	1 oz	28.328 g
1 hPa	0.0295 inHg	1 inHg	33.898 hPa
1 kg	2.2046 lb	1 lb	0.4536 kg/min
1 kg/min	2.2046 lb/min	1 lb.min	0.4536 kg/min
1 l	0.2641 US gal	1 US gal	3.7864 l/min
1 l	1.057 US quart	1 US quart	0.9461 l
1 l/min	0.2641 US gal/min	1 US gal.min	3.7864 l/min
1 daNm	88.4956 lbf.in	1 lbf.in	0.0113 daNm
1 daNm	7.3801 lbf.ft	1 lbf.ft	0.1355 daNm
1 m	3.2809 ft	1 ft	0.3040 m
1 mm	0.0394 in	1 in	2.54 cm
1 cm ³	0.06102 in ³	1 in ³	16.393 cm ³
1 hPa	0.0145 psi	1 psi	68.965 hPa



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SECTION

2

SECTION 2 – LIMITATIONS

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2.1 INTRODUCTION

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

2.2 AIRSPEED LIMITATIONS

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 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_{SO}	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

All speeds, except Vne (KTAS), are KIAS.

MARKING	KIAS	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	Maximum speed permissible with flaps extended at (+2) stage
	81	Maximum speed permissible with flaps extended at (+1) stage
	135	Maximum speed permissible with flaps at (0) stage
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 is the maximum speed for all operations (V_{NE}) (KTAS).

2.4 ENGINE LIMITATIONS

Engine (Rotax 912 S3) - please refer to *Rotax 912 Series Operators Manuals* 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

Tachometer (0 - 6000 RPM)	WHITE RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT		
	0 - 1750	1750 - 5500	5500 - 5800	5800 - 6000		
Coolant Temp. (30 - 130 °C)	WHITE RANGE		RED RANGE + ALERT			
	30 - 120		120 - 130			
Exhaust Gas Temp. (400 - 930 °C)	WHITE RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT		
	400 - 550	550 - 865	865 - 880	880 - 930		
Manifold Press. (0.0 - 35.0 In Hg)	WHITE RANGE	GREEN RANGE	WHITE RANGE			
	0.0 - 15.0	15.0 - 29.5	29.5 - 35.0			
Fuel Flow (0.0 - 30.0 LPH)	WHITE RANGE	GREEN RANGE	WHITE RANGE			
	0.0 - 5.0	5.0 - 25.0	25.0 - 30.0			
Fuel Press. (0.0 - 0.50 Bar)	WHITE RANGE	GREEN RANGE	WHITE RANGE			
	0.0 - 0.15	0.15 - 0.40	0.40 - 0.50			
Oil Temp. (40 - 140 °C)	BLACK RANGE	WHITE RANGE	GREEN RANGE	WHITE RANGE	YELLOW RANGE	RED RANGE + ALERT
	40 - 50	50 - 90	90 - 110	110 - 120	120 - 130	130 - 140
Oil Press. (0.0 - 7.8 Bar)	RED RANGE + ALERT	YELLOW RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT	
	0.0 - 0.8	0.8 - 2.0	2.0 - 5.0	5.0 - 7.0	7.0 - 7.8	
Voltmeter (11.5 - 16.0 V)	RED RANGE	YELLOW RANGE	GREEN RANGE	YELLOW RANGE	RED RANGE + ALERT	
	11.5 - 12.8	12.8 - 13.2	13.2 - 14.6	14.6 - 15.5	15.5 - 16.0	

NOTE: the information presented in the table above reflects the latest G3X configuration file version. Please refer to the latest revision of *SB-121-00-81-999 Garmin G3X configuration overview* for more information about approved configuration file versions.

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
Typical empty weight	349 kg / 768 lbs
Typical useful load	251 kg / 552 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.

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

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-912-016 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 by Rotax specification: see latest edition of Rotax Service Instruction *SI-912-016 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 idle. See *Section 4.16* for details.

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 makings.

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

VFR-night (if the aircraft complies with SB-121-00-80-005 Service Bulletin Installation of Night VFR kit)

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	VFR Night	Remarks
VHF COM / NAV	-	-	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*	1*	
Battery	1	1	

Battery voltage indication	1*	1*	
Generator fail light	1	1	
Safety belts and harnesses	2	2	<i>One may be inoperative if the flight is conducted in single pilot operations, and if the affected seat is not occupied.</i>
BPRS	-	-	<i>Needs to be operative when installed.</i>
ELT	1	1	
Pitch trim system/indicator	1	1	
Stall warning system	1	1	
Fuel selector valve	1	1	
Fuel quantity indicator	2	2	
Clock	-	-	<i>Also a wristwatch indicating hours, minutes, seconds is acceptable</i>
Hour meter	-	-	<i>May be inoperative provided a procedure is established to record flight time.</i>
Instrument lights	-	All	
Anti-collision light system	-	1	
Navigation light system	-	1	
Landing light	-	1	
Airspeed indicator	1	1	
Altimeter	1	1	
Vertical speed indicator	-	1*	
Attitude indicator	-	1*	
Turn and slip indicator	-	1	<i>Mechanical slip indicator, PFD shows also turn coordinator.</i>
Magnetic compass	1	1	
Stabilized heading indication	-	1*	
Transponder	-	-	<i>Depends on the type of operation and applicable regulations.</i>
MAP indicator	1*	1*	
Tachometer (RPM indicator)	1*	1*	
Coolant temperature indicator	2*	2*	
Oil pressure indicator	1*	1*	
Oil temperature indicator	1*	1*	

* The indication is integrated into the G3X system/display

2.16 OPERATIONAL RESTRICTIONS

Flight into known icing conditions is prohibited.

No flights in heavy rainfall or blizzard conditions.

Areas with risk of thunderstorms should be avoided.

Smoking is prohibited.

Engine: -25°C (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 take-off with airbrakes extended.

Avoid applying more than 75% rudder deflection during cruise/ climb/landing as this may cause a pitch-down moment.

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

No intentional spins with configurations other than flaps 0 airbrakes retracted and power IDLE.

G3X attitude, heading and positioning information is for information only and should not be used for primary navigation as well as attitude and heading references.

Do not take-off and land with flaps negative (-).

Night-VFR flying should be conducted only above areas with ground reference and/or in presence of celestial/cultural illumination.

2.17 PFD / AUTOPILOT RESTRICTIONS

No autopilot operations with the PFD inoperative.

Flight under Instrument Flight Rules (IFR) is not permitted.

Flight with unapproved Garmin G3X software and/or config file versions is not permitted. See SB-121-00-81-999 Garmin G3X configuration overview for more information.

In addition, the following limitations apply:

Autopilot operation is prohibited above 135 KIAS.

The autopilot must not be engaged for takeoff or landing.

The autopilot must be disengaged for missed approach, go-around, and balked landing.

Autopilot operation is prohibited below 81 KIAS.

Flap deflection is limited to (0) and (-) during autopilot operations.

The autopilot must be disconnected in moderate or severe turbulence.

Minimum engage height for the autopilot is 2000 ft AGL.

Minimum speed with the autopilot engaged is 1.3 Vs for the given configuration.

Autopilot maneuverability is limited to 30 degrees bank and +-1000 fpm.

WARNING: autopilot may not be able to maintain all selectable vertical speeds. Selecting a vertical speed that exceeds the aircraft's available performance may cause the aircraft to stall.

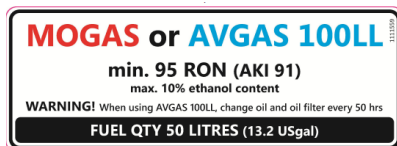
2.18 PLACARDS

NOTE: Please see latest revision of *SB-121-00-81-998* for clarification regarding the applicability of certain placards.

NOTE: The latest revision of the Virus SW 121 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.

2.18.1. PLACARDS (EXTERNAL)

Next to each wing fuel tank filler neck:



Next to nose wheel:



Next to main wheels:



On each main landing gear wheel fairing:



Next to each the static port:



Next to each fuel system water trap:



Next to door opening latches:



Next to fuel drain (engine cowling):

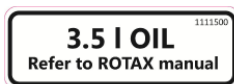


Next to drain holes (21x)

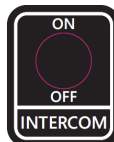
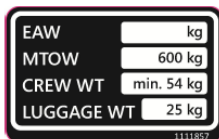


2.18.2 PLACARDS (ENGINE COMPARTMENT)

On coolant bottle, oil bottle:

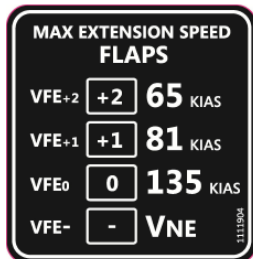
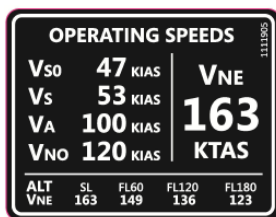


2.18.3 PLACARDS (INSTRUMENT PANEL)



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

1111844



On the side of the instrument
panel (2x):



NOTE: The BATTERY CAUTION placard is found on aircraft
VSW121001 - VSW1210041 that comply with SB-121-00-80-
008. It is also found on aircraft VSW1210042 - VSW1210049:



2.18.4 PLACARDS (CENTER CONSOLE)

Next to propeller lever:



Next to choke and throttle levers:



On flap lever (2x):



Next to cabin-air control lever:

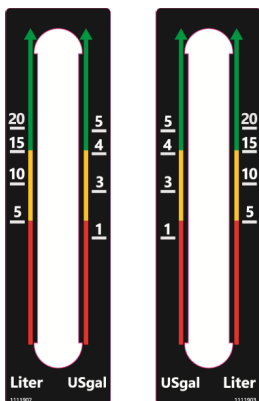


Next to parking brake lever:



2.18.5 PLACARDS (CABIN)

Next to fuel level indicators:



Fuel selector:



On the dashboard
(compass):

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

Next to microphone jacks:



Next to headphone jacks:



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



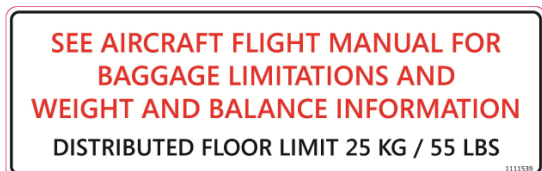
Below each door to depict door handle operation:



On upper tube in front of pilot:



On inside of luggage compartment door:

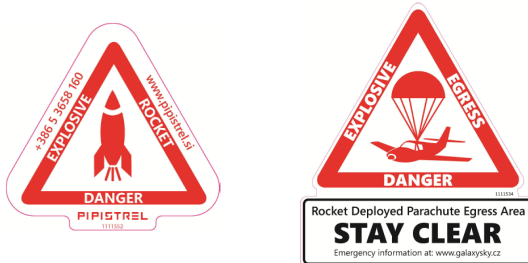


On inside and outside luggage compartment lock:



2.18.6 PLACARDS (BALLISTIC PARACHUTE RESCUE SYSTEM)

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



Next to doors:



Next to rocket exhaust (bottom of fuselage):



Next to activation handle (cockpit):



On the parachute rescue system container:

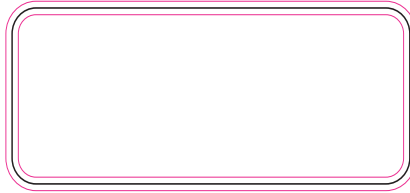
 Galaxy GRS GALAXY RESCUE SYSTEMS BALLISTIC PARACHUTE GALAXY HOLDING s.r.o. Czech Republic - Liberec Ph/Fax: +420 485 104 492 www.galaxysky.cz Ser.No. _____ Part No. GRS 6/600-VSW121-2016	RESCUE BALLISTIC PARACHUTE	
	GRS 6 SD ASTM F 2316-12	
	Model: _____ (max MTOW) 600 kg	
	Allowed speed under: 315 km/h 195 Mph WARNING: Exceeding these limitations, or using improper installation, may cause deployment failure and death or serious injury to occupants.	
	Modification: SOFT-IN VSW 121 Patent: CZ 859-94 Patent No: US, 997,535 B2 / 16.8.11 Manufacture date: _____ Must be replaced by the co. GRS only and inspected before: _____	

Galaxy rescue ballistic parachute system GRS WARNING!		Patent: CZ 859-94 Patent No: US, 997,535 B2 / 16.8.11
- The system GRS is loaded and ready to fire! - It is prohibited to remove or open any part that have been marked by a red seal. - After the montage cut the red yarn on the handle and the system is ready for use. - All the other instructions see in a manual book on www.galaxysky.cz		

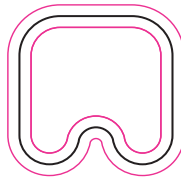


2.18.7. PLACARDS (FUEL PROTECTION)

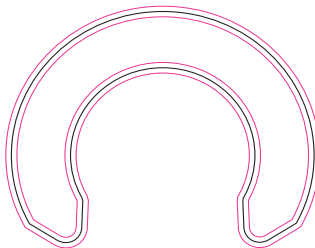
Protects the placards near the wing filler necks (2x):



Protects water trap placards (2x):



Protects fuel drain placard near the gascolator:





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SECTION

3

SECTION 3 – EMERGENCY PROCEDURES

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3.1 INTRODUCTION

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

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

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

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

Maintain Aircraft Control

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

Analyze the Situation

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

Take Appropriate Action

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

SECTION 3

EMERGENCY PROCEDURES

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

Land immediately

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

Land as soon as possible

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

Land as soon as practical

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

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

When flames are extinguished:

4	Ignition switch	OFF
5	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	Master Switch	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. If the engine is left running, set the parking brake prior to evacuating the airplane.

3.4 IN-FLIGHT EMERGENCIES

3.4.1 ENGINE FAILURE AT TAKEOFF (LOW ALTITUDE)

If the engine fails immediately after 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	Best Glide or Landing Speed (as appropriate)	ESTABLISH
2	Fuel Selector	OFF
3	Ignition Switch	OFF
4	Flaps	AS REQUIRED

If time permits:

1	Throttle Lever	IDLE
2	Master Switch	OFF
3	Seat Belts	ENSURE SECURED

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 identify the cause of the failure and correct it. If 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* procedure.

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 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 (@600 kg):

Flaps	0
Best Glide Speed:	70 KIAS
Max. Glide Ratio:	15 : 1

3.4.3 ENGINE RESTART IN FLIGHT AFTER FAILURE

The following procedures address 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 Start in flight may be performed during 1g flight anywhere within the normal operating envelope of the airplane.

1	Master Switch	ON
2	Throttle Lever	10 mm OPEN
3	Starter (if propeller not windmilling)	ENGAGE
4	Throttle Lever	gradually INCREASE

NOTE: 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* procedure. Consider BPRS deployment if a suitable landing site is not available.

3.4.4 ENGINE PARTIAL POWER LOSS

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

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

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

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

WARNING: If there is a strong smell of fuel in the cockpit, divert to the nearest suitable landing field. Fly a precautionary 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

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	Precautionary Landing	AS SOON AS POSSIBLE

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

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

3.4.6 HIGH OIL PRESSURE

High oil pressure (up to 7 bar) is admissible only at cold engine start and for a short period. If high oil pressure condition happens in flight, immediately reduce engine power to minimum required and monitor oil pressure. If pressure does not decrease select a suitable landing field for *PRECAUTIONARY LANDING*. Engine failure may be imminent.

1	Throttle Lever	MINIMUM REQUIRED
2	Precautionary Landing	AS SOON AS POSSIBLE

3.4.7 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

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 *PRECAUTIONARY LANDING* and shut down the fuel supply to the engine once a safe landing is assured.

1	Cabin Air Selector	OFF (Push)
2	Door air inlets/Roof outlet	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	Master Switch	OFF
6	Land	AS SOON AS POSSIBLE

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

NOTE: 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, do not attempt to restart the engine.

1	Fuel Selector	OFF
2	Cabin Air Selector	OFF (Push)
3	Throttle Lever	Full Forward
4	Ignition Switch	OFF
5	Land	IMMEDIATELY

3.5.3 WING FIRE IN FLIGHT

1	NAV/AC Light Switch	OFF
2	Fuel level light	OFF
3	Side slip to keep flames away from fuel tank and cabin	IF POSSIBLE
4	Land	IMMEDIATELY

NOTE: As an alternative, putting the airplane into a dive may put the fire out. Do not exceed VNE 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	Battery disconnect switch	PULL
3	Master Switch	OFF
4	Fire Extinguisher (if available)	ACTIVATE
5	Door air inlets/Roof outlet	OPEN (if necessary)

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

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

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

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

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

6 Land

AS SOON AS POSSIBLE

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

3.6 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.

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

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

In any case, spin recovery technique is classic:

1	Throttle Lever	Idle
2	Roll input	Neutral
3	Rudder	Full deflection in the direction opposite of the spin.

As the rotation is about to stop, or fully stopped:

4	Rudder	Neutral
5	Control Stick	Release control force towards neutral elevator position, roll input neutral
6	Horizontal Flight	Resume (do not exceed g-load and airspeed limitations)

3.7 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 KIAS.

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	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	Master Switch	OFF
6	Ignition Switch	OFF
7	ELT	ACTIVATE
8	Seat Belts	TIGHTEN

All occupants must have seat belts securely fastened.

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

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

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

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

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

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

3.8 LANDING EMERGENCIES

3.8.1 PRECAUTIONARY LANDING WITH ENGINE POWER

If engine power is available, before attempting an “off airport” landing, fly over the landing area at a safe altitude to inspect the terrain for obstructions and surface conditions. Consider also wind and presence of obstacles for determining the best approach direction. Evacuate the aircraft after landing.

Once a suitable field has been selected:

1	Approach speed	Establish (60 - 65 KIAS)
2	Propeller Lever	Full Forward
3	Throttle Lever	As required
4	Flaps	As required
5	Trim	As required
6	Airbrakes	As required
7	Seat Belts	Check fastened and tightened
8	ELT	ACTIVATE, if necessary
9	Report your location and intentions	Transmit (121.5 MHz) MAYDAY
10	Transponder	SQUAWK 7700

Before landing:

11	Fuel Selector	OFF
12	Ignition Switch	OFF
13	MASTER Switch	OFF

3.8.2 EMERGENCY LANDING WITHOUT ENGINE POWER

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. Consider also wind and presence of obstacles for determining the best approach direction. For emergency landings on unprepared surfaces, use full flaps if possible.

SECTION 3

EMERGENCY PROCEDURES

Land on the main gear and hold the nose wheel off the ground as long as possible. Evacuate the aircraft after landing.

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

1	Best Glide Speed	ESTABLISH - 70 KIAS
2	Radio	Transmit (121.5 MHz) MAYDAY, giving location and intentions
3	Transponder	SQUAWK 7700
4	ELT	ACTIVATE, if necessary
5	Throttle Lever	IDLE
6	Fuel Selector	OFF
7	Ignition Switch	OFF
8	Flaps (when landing is assured)	+2
9	Master Switch	OFF
10	Seat Belts	SECURED

3.8.3 DITCHING

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

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

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

3.8.4 LANDING WITH A DEFECTIVE MAIN LANDING GEAR TIRE

1	Land the airplane at the edge of the runway that is located on the side of the intact tire, so that changes in direction during roll-out due to the braking action of the defective tire can be corrected on the runway.
2	Land with the wing low on the side of the intact tire.
3	Direction should be maintained using the rudder. This should be supported by use of the brake. It is possible that the brake must be applied strongly - if necessary to the point where the wheel locks.

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

3.8.5 LANDING WITH DEFECTIVE BRAKES

1	Seat Belts	CHECK FASTENED AND TIGHTENED
After a safe touch-down:		
2	Ignition	OFF
3	Fuel Selector	OFF
4	Master Switch	OFF

3.9 PFD-MALFUNCTION

In the unlikely event of a PFD failure, the pilot may lose the ability to control the autopilot through the PFD controls. If this malfunction occurs, the PFD circuit breakers may be disengaged and the airplane flown using the reversionary mode, where the MFD screen displays also airspeed, altitude, attitude and compass information and/or the mechanical instruments.

NOTE: The avionics system is equipped with dual ADAHRS units, which provide air and attitude data to the screens. In event of PFD screen failure, there is the reversionary mode, which will automatically display main PFD data (airspeed, altitude, attitude, compass) on the MFD screen.

In case of ADAHRS failures:

PFD - Loss of Air Data

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

PFD - Loss of Attitude Data

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

For a more complete description of the PFD and MFD functions, refer to Section 7.

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

3.10 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. Usually, electrical power malfunctions are accompanied by an excessive rate of charge or a discharge rate shown on the ammeter. In this condition on board battery should provide power for at least 30 minutes.

If generator failure persists:

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

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

of a battery failure. To assure generator restart power is available if the generator fails, the battery disconnect switch should not be pulled during flight.

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

3.11 ENGINE INDICATING SYSTEM FAILURE

In the event of a Data Acquisition Unit failure, the engine indications displayed on the MFD and PFD 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

3.12 COMMUNICATION FAILURE

1	Switches, Controls, Volume	CHECK
2	Frequency	CHANGE
3	Circuit Breakers	CHECK
4	Headset	CHANGE
5	Transmission	ATTEMPT

If unsuccessful:

6	Transponder	SQUAWK 7600
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3.13 PITOT STATIC MALFUNCTION

Static Source Blocked

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

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

Pitot Tube Blocked

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

1	Groundspeed indicator	+10 KTS for procedures, observe winds
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3.14 AUTOPILOT FAILURE

Any failure or malfunction of autopilot can be overridden by use of the control stick. If autopilot servo is the problem, cut the circuit by disengaging respective circuit breaker and continue to fly manually.

1	Airplane Control	Fly manually
2	Autopilot (if engaged)	Disengage (red button on control stick)
3	AP PNL and AP SERVO Circuit Breakers	Disengage

3.15 ELECTRIC TRIM FAILURE

In case of electric trim failure, cut the circuit by disengaging respective circuit breaker and manually counter stick pressure. Land as soon as practical.

1	Airplane Control	Fly manually
2	Autopilot (if engaged)	Disengage (red button on control stick)
3	EL TRIM Circuit Breaker	Disengage
4	Throttle lever	As required
5	Control Stick	Manually hold pressure
6	Land	AS SOON AS PRACTICAL

3.16 BATTERY OVERVOLTAGE / MALFUNCTION

If the Aliant battery is installed and overvoltage occurs (over 14.8 V), the battery must be disconnected from the system to prevent adverse effects. The EarthX battery disconnects itself in case of over- or undervoltage. The battery must be disconnected if its battery caution light starts flashing.

1 Battery disconnect switch

PULL

WARNING: After pulling the battery disconnect switch an engine restart will no longer be possible!

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

3.17 EXCEEDING V_{NE}

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

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

3.19 EMERGENCY DESCENT

The emergency descent is the maneuver to be performed when it is necessary to descend rapidly to a lower altitude or for an emergency landing in time-critical situation.

1	Throttle Lever	Idle
2	Propeller Lever	Full Forward
3	Airspeed	V_{NE} ($< V_{NO}$ in case of turbulence)

When target altitude is reached:

4	Airspeed	Reduce as required
---	----------	--------------------

CAUTION: If significant turbulence is expected during the descent, do not exceed V_{NO} .

3.20 LOSS OF FLIGHT CONTROLS

3.20.1 LOSS OF PITCH CONTROL

If pitch control is lost due to mechanical failure, blockage or damage to the control surfaces, the activation of the BPRS is recommended.

1	Throttle Lever	Idle
2	BPRS deployment procedure	PERFORM

3.20.2 LOSS OF ROLL CONTROL

If roll control is lost due to mechanical failure or damage to the control surfaces, limited roll control is possible by use of rudder. If it is not possible to keep the wings leveled or residual control is not sufficient and does not permit a safe approach, BPRS activation is recommended. If positive control is established and conditions permit (e.g. wind), use rudder control for very flat turns and perform a long final approach without flaps.

If wings can be maintained leveled and the aircraft is still safely controllable:

1	Turns	Perform wide turns with rudder
---	-------	--------------------------------

During a long final approach:

2	Flaps	0
3	Airspeed	Establish 65 KIAS

CAUTION: Do not use flaps for approach.

If it is impossible to keep wings leveled and/or the aircraft is not safely controllable:

1	Throttle Lever	Idle
2	BPRS deployment procedure	PERFORM

3.20.3 LOSS OF YAW CONTROL

If yaw control is lost due to mechanical failure or damage to the control surface, use ailerons and elevator to control flight direction and perform very flat (low bank) turns. Avoid large roll inputs to limit adverse yaw effects. If positive control is established and conditions permit (e.g. wind), perform a long final approach without flaps. If residual controllability is not sufficient and does not permit a safe approach, BPRS activation is recommended.

If the aircraft is still safely controllable:

1	Turns	Perform wide turns with small roll inputs
---	-------	---

During a long final approach:

2	Flaps	0
3	Airspeed	Establish 65 KIAS

CAUTION: Do not use flaps for approach.

If the aircraft is not safely controllable:

1	Throttle Lever	Idle
2	BPRS deployment procedure	PERFORM



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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
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Fuel Selector	OFF
---------------	-----

Throttle Lever	FULL FORWARD
----------------	--------------

When flames are extinguished:

Ignition Switch	OFF
-----------------	-----

Master Switch	OFF
---------------	-----

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

EMERGENCY ENGINE SHUTDOWN

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

Fuel Selector	OFF
---------------	-----

Ignition Switch	OFF
-----------------	-----

Master Switch	OFF
---------------	-----

EMERGENCY GROUND EGRESS

Engine	SHUTDOWN
--------	----------

Parking Brake	ENGAGED
---------------	---------

Seat Belts	RELEASED
------------	----------

Airplane	EXIT
----------	------

IN FLIGHT EMERGENCIES

ENGINE FAILURE AT TAKE OFF (LOW ALT)

Best Glide or Landing Speed (as appropriate)	ESTABLISH (see POH)
Fuel Selector	OFF
Ignition Switch	OFF
Flaps	as required

If time permits:

Throttle Lever	IDLE
Master Switch	OFF
Seat belts	ensure secured

ENGINE FAILURE IN FLIGHT

Best Glide Speed	ESTABLISH (70 KIAS)
Fuel Selector	CHECK/SWITCH TANKS
Ignition Switch	CHECK, BOTH
Flaps	as required

ENGINE START IN FLIGHT

Master Switch	ON
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: perform engine failure in flight check-list	
LOW OIL PRESSURE	
Throttle Lever	Minimum Required
Land	AS SOON AS POSSIBLE
HIGH 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



SMOKE IN THE COCKPIT

Cabin Air Selector	OFF (Push)
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Door Air Inlets/Roof Outlet	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):

Master Switch	OFF
---------------	-----

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

ENGINE FIRE FLIGHT

Fuel Selector	OFF
---------------	-----

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

Throttle Lever	FULL FORWARD
----------------	--------------

Land	IMMEDIATELY
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WING FIRE IN FLIGHT

NAV/AC Light Switch	OFF
Fuel Level Light	OFF
Side slip to keep flames away from fuel tank and cabin	If possible
Land	IMMEDIATELY

COCKPIT FIRE IN FLIGHT

Cabin Air Selector	OFF (Push)
Battery disconnect switch	PULL
Master Switch	OFF
Fire Extinguisher (if available)	ACTIVATE
Door air inlets/roof outlet	OPEN (if necessary)
If airflow is not sufficient to clear smoke or fumes from cabin - After fire has been extinguished:	
Land	AS SOON AS POSSIBLE

EMERGENCY DESCENT

Throttle Lever	Idle
Propeller Lever	Full Forward
Airspeed	V_{NE} ($<V_{NO}$ in case of turbulence)
When target altitude is reached:	
Airspeed	Reduce as required

SPIN RECOVERY

Throttle Lever	Idle
Roll input	Neutral
Rudder	Full opposite deflection
As the rotation is about to stop, or fully stopped:	
Rudder	Neutral
Control Stick	Release force towards neutral elevator position, maintain roll input neutral
Horizontal Flight	Resume (do not exceed airspeed and g-load limits)

BPRS DEPLOYMENT

Airspeed	MINIMUM POSSIBLE
Ignition switch (if time/altitude permits)	OFF
Activation Handle	PULL
After Deployment:	
Fuel Selector	OFF
Master Switch	OFF
Ignition Switch	OFF
ELT	ACTIVATE
Seat Belts	TIGHTEN
Loose Items	SECURE
Assume emergency landing body position. After the impact break out the windows to exit if doors are jammed.	

LANDING EMERGENCIES

PRECAUTIONARY LANDING WITH ENGINE POWER

Approach Speed	ESTABLISH (60-65 KIAS)
Propeller Lever	Full Forward
Throttle Lever	As required
Flaps	As required
Trim	As required
Airbrakes	As required
Seat Belts	CHECK fastened and tightened
ELT	ACTIVATE, if necessary
Report your Location and Intentions	Transmit (121.5 MHz) MAYDAY
Transponder	SQUAWK 7700

Before Landing:

Fuel Selector	OFF
Ignition switch	OFF
Master Switch	OFF

EMERGENCY LANDING WITHOUT ENGINE POWER

Best Glide Speed	ESTABLISH - 70 KIAS
Radio	Transmit (121.5 MHz) MAYDAY
Transponder	SQUAWK 7700
ELT	ACTIVATE, if necessary
Throttle Lever	IDLE
Fuel Selector	OFF
Ignition Switch	OFF
Flaps (When landing is assured)	+2
Master Switch	OFF
Seat Belts	SECURED

DITCHING

Radio	Transmit (121.5 MHz) MAYDAY giving location and intentions
Transponder	SQUAWK 7700
BPRS	ACTIVATE
Doors	UNLATCH before impact with water
Airplane	EVACUATE
Flotation Devices	INFLATE when clear of the airplane

LANDING WITH DEFECTIVE BRAKES

Seat Belts	SECURED
After safe touch-down	
Ignition	OFF
Fuel Selector	OFF
Master Switch	OFF

GENERATOR FAILURE

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

BATT OVERVOLTAGE / MALFUNCTION

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

COMMUNICATION FAILURE

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

If unsuccessful:

TRANSPONDER	SQUAWK 7600
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PITOT STATIC MALFUNCTION

Refer to GPS for flying:

Ground speed indicator	+10 KTS for procedures, observe winds
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AUTOPILOT FAILURE

Airplane Control	Fly manually
Autopilot (if engaged)	Disengage (red button on control stick)
AP PNL/AP SERVO Circuit Breakers	Disengage

ELECTRIC TRIM FAILURE

Airplane Control	Fly manually
Autopilot (if engaged)	Disengage (red button on control stick)
EL TRIM Circuit Breaker	Disengage
Throttle lever	As required
Control Stick	Manually hold pressure
Land	AS SOON AS PRACTICAL

LOSS OF PITCH CONTROL

Throttle Lever

Idle

BPRS deployment
procedure

PERFORM

LOSS OF ROLL CONTROL

If wings can be maintained leveled and the aircraft is still safely controllable:

Turns

Perform wide turns with
rudder

During long final approach:

Flaps

0

Airspeed

Establish 65 KIAS

If it is impossible to keep wings leveled and/or the aircraft is not safely controllable:

Throttle Lever

Idle

BPRS deployment
procedure

PERFORM

LOSS OF YAW CONTROL

If the aircraft is still safely controllable:

Turns

Perform wide turns with
small roll inputs

During long final approach:

Flaps

0

Airspeed

Establish 65 KIAS

If the aircraft is not safely controllable:

Throttle Lever

Idle

BPRS deployment
procedure

PERFORM

ICE BUILD UP

Turn back or change altitude to exit icing conditions

Cabin Heating

ON

If ice on pitot static system is suspected, refer to GPS for flying:

Ground Speed Indicator

+10 kts for procedures,
observe winds

If ice on control surfaces or wings is suspected, maneuver gently and increase speed to avoid stall. Leave flaps retracted.

Approach speed

+15 kts (refer to GPS)
observe winds

Land

AS SOON AS POSSIBLE



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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.

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

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	18 Knots
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4.3 PREFLIGHT INSPECTION

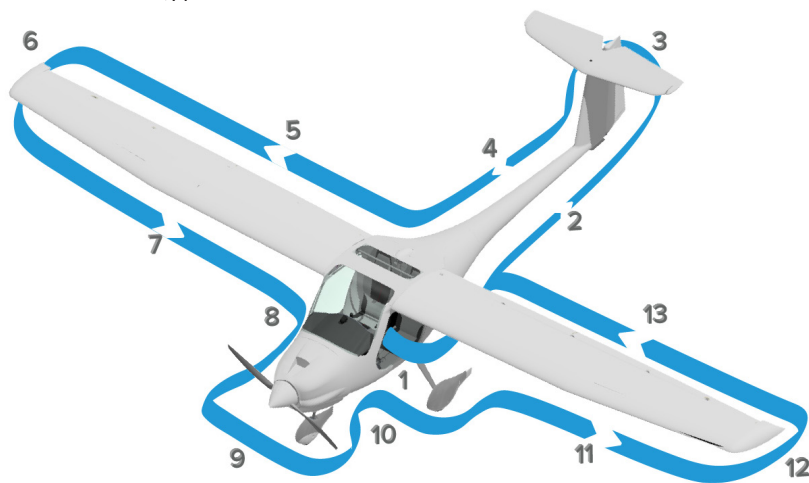
Before carrying out preflight inspections, ensure that all required maintenance has been performed. Review your flight plan and compute weight and balance and calculate performance.

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 wheel fairings are free of snow and ice accumulation.

4.3.1 PREFLIGHT WALK-AROUND

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



1) CABIN		
1	Doors	UNLOCK/OPEN/ CLOSE/SECURE
2	BPRS handle, pin inserted	CHECK
3	Ignition switch	CHECK OFF
4	Green electrical switches	ALL OFF
5	Required documents	On board
6	Battery disconnect switch	CONNECT
7	Controls and airbrakes	Free and Correct
8	Master switch	ON
9	Avionics switch	ON
10	Circuit breakers	CHECK ENGAGED
11	PFD / MFD	Verify ON
12	Avionics cooling fan	Audible
13	Voltmeter	12 - 14 Volts
14	Lights	Check operation
15	Fuel quantity	CHECK
16	Fuel selector	Select fullest tank
17	Flaps	Check handle movement
18	Avionics switch	OFF
19	Master switch	OFF
20	Circuit breakers	CHECK ENGAGED
21	ELT (transmitter and remote switch)	ARM/ARMED

NOTE: Check that ELT transmitter and Remote switch are BOTH in the ARM/OFF (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.

2) LEFT FUSELAGE		
1	COM antenna (top)	Condition and attachment
2	Wing / fuselage seal	CHECK
3	XPDR antenna (underside)	Condition and attachment
4	VOR antenna (if available)	Condition and attachment

5	Baggage compartment	Baggage is secure
6	Baggage door	Closed and secure (locked)
7	Static pressure port	CHECK for blockage
8	Fuel system water drain	Perform

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

4) RIGHT FUSELAGE		
1	Static pressure port	Check for blockage
2	Fuel system water drain	Perform
3	Wing / fuselage seal	CHECK
4	Door lock	Unlock
5	Parachute cover, strap covers	Sealed and secure

5) - 6) - 7) RIGHT WING		
1	Flaperon	Condition, security and movement
2	Flaperon gap seal	Security, no wrinkles
3	Hinges, bolts and safety nuts	Secure
4	NAV/AC light and lens	Condition and security
5	Leading edge and tip	CHECK condition
6	Fuel cap	CHECK fuel quantity and secure
7	Water drain holes	Clean
8	Pitot tube	Cover removed, tube clear
9	Airbrake	Condition, position

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	Condition*
3	Spinner	Condition, security and oil leaks
4	Air inlets, outlets	Unobstructed

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

* **NOTE:** for affected aircraft, perform also propeller snap ring inspection according to SI-121-006.

9) ENGINE AND NOSE LANDING GEAR AREA		
1	Engine oil	Check quantity, leaks, cap and door secure
2	Exhaust pipe	Condition, security and clearance
3	Gascolator	Drain 1 cup, sample
4	Landing light	Attachment, security, lens
5	Strut	CHECK condition
6	Nose landing gear	General condition
7	Wheel and tire	Condition, inflation and wear
8	Wheel Fairing	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 fuel quantity and secure
2	Leading edge and tip	Condition
3	NAV/AC light and lens	Condition and attachment
4	Flaperon	Condition, attachment, movement
5	Flaperon gap seal	Condition, no wrinkles
6	Hinges, bolts and safety nuts	Secure
7	Water drain holes	Clean
8	Airbrake	Condition, position

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	BPRS Safety Pin	Removed
6	Seats, Pedals, Seat Belts and Baggage net	Adjust and Secure
7	Parking brake	Disengage
8	Brakes	Hold
9	Master switch	ON
10	Avionics switch	ON
11	NAV/AC Lights	ON
12	Doors	Closed and latched

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

4.4.2 STARTING ENGINE

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

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

1	Brakes	Hold
2	Fuel Selector	Fullest Tank
3	Master Switch	ON (Check Volts)
4	Choke	As required
5	Propeller Area	Clear

6	Throttle Lever	Idle
7	Oil Pressure Indication	Available
8	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.

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

10	Throttle Lever	2000 RPM for first two minutes, then ~2500 RPM for warm up
11	Choke	gradually close
12	Engine Parameters	Monitor
13	Ammeter/Indication	Check

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 tanks (to check flow from both tanks)
5	Fuel Selector	Select fullest tank

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.

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

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

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

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	Parking brake	Engage
2	Brakes	Hold
3	Doors	Latched
4	Choke	Verify closed

5	Throttle Lever	4000 RPM
6	Alternator	Check value and warning light
7	Voltage	Check value
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 150 RPM.

10	Propeller lever	Cycle lever 3 times, observe RPM drop
11	Propeller lever	Full forward
12	Throttle lever	Set to just above idle
13	Parking brake	Disengage

NOTE: RPM drop must not exceed 300 RPM for either “magneto” and the difference in drop should not exceed 150 RPM. If there is doubt concerning operation of the ignition system, RPM checks at higher engine speeds will usually confirm whether a deficiency exists. An absence of RPM drop may indicate faulty grounding of one side of the ignition system or magneto timing set in advance of the specified setting.

BEFORE TAKEOFF		
1	Seat Belts and Shoulder Harness	Secure
2	BPRS activation handle	Verify Pin Removed
3	Airbrakes	Closed and locked
4	Flaps	Set (+1)
5	Trim	Set neutral
6	Fuel tank selector	Select fullest tank
7	Fuel Quantity	CHECK
8	NAV/AC Lights	As required
9	Landing Light	As required

10	Circuit breakers	CHECK
11	NAV/COM, GPS, XPDR	SET
12	Autopilot	Check disconnected
13	Annunciator (PFD)	CHECK
14	Altimeter	SET
15	Engine Parameters	CHECK
16	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. Oil Temperature should read min 50 °C and other engine parameters should read in the green. If power is not developed, abort take-off.

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

4.5.2 FLAP SETTING

Normal 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 high-

er than normal while decreasing the aileron deflection as speed increases then rotate to prevent possibly settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

NORMAL TAKEOFF		
1	Brakes	Release (Steer with rudder only)
2	Propeller lever	Full forward
3	Throttle lever	Full forward
4	Engine Parameters	Monitor
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 set flaps/RPM	Flaps (0) / RPM 5500

SHORT FIELD TAKEOFF		
1	Brakes	Hold
2	Propeller lever	Full forward
3	Throttle Lever	Full forward
4	Engine Parameters	Monitor
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 set flaps/RPM	Flaps (0) / RPM 5500
10	Airspeed	Increase as required

4.6 CLIMBING

Normal climbs are performed with flaps UP (0) and maximum continuous power (MCP) and best rate-of-climb speed (V_y). Climb airspeeds of 5 to 10 kts higher than best rate-of-climb speeds provide the best combination of performance, visibility and engine cooling.

CAUTION: RPM above 5500 is limited to 5 minutes!

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

For maximum rate of climb, use the best rate-of-climb speeds shown in 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	Switch to other Wing Fuel Tank	Every 30 min

The fuel tanks must be changed every 30 min. Otherwise the airplane may roll into the direction of the fuller fuel tank.

Always grasp stick firmly before disengaging the autopilot to prevent advert effects of improperly set elevator trim.

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.

CAUTION: Avoid operation below normal operation oil temperature 90 to 110 °C, as possible formation of condensation water in the lubrication system badly influences the oil quality. To evaporate possibly accumulated condensation water, at least once a day 100 °C oil temperature must be reached.

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

4.8 DESCENT/APPROACH

1	Altimeter	Set
2	Autopilot	Disengage
3	Cabin Heat/Defrost	As required
4	Landing Light	ON
5	Fuel System	Check
6	Parking brake	Disengaged
7	Brake pressure	Check (pump pedals)
8	Seat Belt and Shoulder Harness	Secure

4.9 BEFORE LANDING

1	Approach Speed	ESTABLISH
2	Propeller Lever	Full Forward
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. Glideslope should be controlled with throttle. Landings with less than full flaps are recommended in crosswinds or if the flaps fail to deploy, or to extend the aircraft's glide distance due to engine malfunction.

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	Check Full Forward
2	Airbrakes	Close
3	Flaps	(+1)
4	Airspeed	57 - 60 KIAS

After clear of obstacles:

5	Flaps	(0)
6	Airspeed	Best climb speed

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). Press "reset" on the remote switch to end transmission. Please check OEM documentation for additional information.

4.13 SHUT DOWN

1	Green electrical switches	All OFF
2	Throttle lever	IDLE
3	Ignition Switch	OFF
4	BPRS safety pin	Insert
5	AVIONICS	OFF
6	MASTER	OFF

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.

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.

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: misapplied elevator push-over during spin recovery may result in negative G accelerations.

Entry height 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-turns spin*:	800-1250 ft
3-turns spin*:	1000-1660 ft

* depending on aircraft loading and control inputs

Minimum recommended height to enter an intentional 3-turns spin is 5500 ft AGL.

SPIN ENTRY PROCEDURE

- 1 Airbrakes retracted, flaps 0, trim for 67 KIAS, power setting IDLE.
- 2 Pull the control stick back to reach stall.
- 3 At the moment the stall occurs, hold stick in full aft position and apply full rudder in the desired spin direction.
- 4 Hold controls steady while spinning, full aft position, roll input neutral.

SPIN RECOVERY PROCEDURE

- 1 Keep throttle IDLE.
- 2 Roll input neutral.
- 3 Apply full rudder deflection in the direction opposite of the spin.

As the rotation is about to stop , or fully stopped:

- 4 Neutralize rudder, release stick force towards neutral elevator position, maintaining roll input neutral. *
- 5 Slowly establish horizontal flight without exceeding g-load or airspeed limitations.

NOTE: during the spin recovery procedure, do not push the stick to pitch down/forward position, just ease the stick pull force and center it to neutral elevator position.

After landing 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	Release stick to neutral elevator position, 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

Doors	UNLOCK/OPEN/ CLOSE/SECURE
BPRS Handle / Pin	CHECK, Pin inserted
Ignition Switch	CHECK OFF
Green Electrical Switches	All OFF
Required Documents	On Board
Battery Disconnect Switch	CONNECT
Flight Controls, Flaps and Airbrakes	Free and Correct
Master Switch	ON
Avionics Switch	ON
Circuit Breakers	CHECK ENGAGED
PFD / MFD	Verify ON
Avionics Cooling Fan	Audible
Voltmeter	12 - 14 V
Lights	CHECK operation
Fuel Quantity	CHECK
Fuel Selector	Select Fullest Tank
Avionics Switch	OFF
Master Switch	OFF
Circuit Breakers	CHECK ENGAGED
ELT (transmitter and re- mote switch)	ARM/ARMED

LEFT FUSELAGE

COM Antenna (top)	Condition and attachment
Wing / Fuselage Seal	CHECK condition
XPDR Antenna (underside)	Condition and attachment
VOR Antenna (if applicable)	Condition and attachment
Baggage Compartment	Baggage secured
Baggage Door	Closed and secured (locked)
Static Pressure Port	CHECK for blockage
Fuel System water drain	Perform

EMPENNAGE

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

RIGHT FUSELAGE

Static Pressure Port	CHECK for blockage
Fuel System water drain	Perform
Wing / Fuselage Seal	CHECK condition



RIGHT FUSELAGE (continue)	
Door Lock	Unlock
BPRS Cover, Strap Covers	Condition and attachment
RIGHT WING	
Flaperon, airbrake	Condition and movement, position
Flaperon Gap Seal	CHECK condition, attachment and no wrinkles
Hinges, Bolts, Safety Nuts	CHECK condition and secured
NAV/AC light	CHECK condition and attachment
Leading Edge and Tip	CHECK condition
Fuel Cap	CHECK fuel quantity and secure
Water Drain Holes	Clean
Pitot Tube	Cover REMOVED Tube clear
RIGHT MAIN LANDING GEAR	
Landing Gear	CHECK condition
Tire	Condition, inflation and wear
Wheel and brake	Fluid Leaks, evidence of overheating, general condition and wear
Wheel Fairing	CHECK attachment
Checks and Tiedown rings / ropes	REMOVE



PROPELLER AND COWLINGS AREA

Engine Cowlings	Attachment secured
Propeller	CHECK condition (check also snap rings on aircraft affected by SI-121-006)
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	CHECK security and condition
Gascolator	Drain 1 cup, sample
Landing Light	Attachment and condition
Nose Landing Gear and Strut	CHECK 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	
Flaperon, airbrake	Condition and movement, position
Flaperon Gap Seal	CHECK condition, attachment and no wrinkles
Hinges, Bolts, Safety Nuts	CHECK condition and secured
NAV/AC light	CHECK condition and attachment
Leading Edge and Tip	CHECK condition
Fuel Cap	CHECK fuel quantity and secure
Water Drain Holes	Clean



STARTING ENGINE

BEFORE STARTING ENGINE

Preflight Inspection	Completed
Fuel Quantity	Sufficient
Emergency Equipment	On board
Passenger	Briefed
BPRS Safety Pin	Removed
Seats, Pedals, Seat belts and Baggage	Adjust and Secure
Parking Brake	Disengage
Brakes	Hold
Master Switch	ON
Avionics Switch	ON
NAV / AC Lights	ON
Doors	Closed and latched

STARTING ENGINE

Brakes	Hold
Fuel Selector	Fullest tank
Master Switch	ON (Check Volts)
Choke	As required
Propeller Area	Clear

STARTING ENGINE (continue)

Throttle Lever	Idle
Oil Pressure Indication	Available
Ignition Switch	START (release after engine starts)
Oil Pressure	CHECK
Throttle Lever	2000 RPM for 2', then warm up at ~2500 RPM
Choke	gradually close
Engine Parameters	Monitor
Ammeter / Indication	CHECK

BEFORE TAXIING

Flaps	(0) or (-)
COM / Avionics / XPDR	As required
Cabin Heat / Defrost	As required
Fuel Selector	Switch tanks (to check flow from both)
Fuel Selector	Select fullest tank

TAXIING

Parking Brake	DISENGAGE
Brakes	CHECK
Instruments	CHECK, SET

BEFORE TAKEOFF

ENGINE TEST

Parking Brake	Engage
Brakes	HOLD
Doors	Latched
Choke	Verify CLOSED
Throttle Lever	4000 RPM
Alternator	Check value and Warning light
Voltage	CHECK Value
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
Parking Brake	Disengage

BEFORE TAKEOFF

Seat Belts	Secured
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
NAV/COM, GPS, XPDR	SET
Autopilot	Check disconnect
Annunciator (PFD)	CHECK
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	Monitor
Airspeed Indication	CHECK
Elevator Control	Rotate smoothly at 45 - 48 KIAS
Best Climb Speed	$V_Y = 78$ KIAS
At safe altitude > Set FLAPS / RPM	Flaps (0) / RPM 5500

SHORT FIELD TAKEOFF

Propeller Lever	Full Forward
Throttle Lever	Full Forward
Engine Parameters	Monitor
Brakes	Release (steer with rudder only)
Airspeed Indication	CHECK
Elevator Control	Rotate smoothly at 45 KIAS
Airspeed at Obstacle	60 KIAS
At safe altitude > Set FLAPS / RPM	Flaps (0) / RPM 5500
Airspeed	Increase as required

CLIMB

Climb Power / RPM	SET
Flaps	Verify (0)
Engine Parameters	CHECK
Fuel Selector	Switch to the other tank every 30 min

CRUISE

Flaps	(-)
Cruise Power	SET
Engine Parameters	CHECK
Fuel Selector	Switch to the other tank every 30 min
Autopilot	As required



DESCENT / APPROACH

Altimeter	SET
Autopilot	Disengage
Cabin heat / Defrost	As required
Landing Light	ON
Fuel Selector	Fullest Tank
Parking Brake	Disengaged
Brake Pressure	CHECK (pump pedals)
Seat Belts	Secure

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	Check Full Forward
Airbrakes	CLOSE
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
BPRS Safety Pin	Insert
Avionics Switch	OFF
Master Switch	OFF

PARKING

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

STALL RECOVERY

Control Stick	Release stick to neutral elev. position, to reduce AoA
Throttle Lever	Add power
Horizontal flight	Resume

SPIN ENTRY

(See POH for approved configurations)

Airbrakes/flaps/trim	Airbrakes retracted, flaps 0, trim for 67 KIAS
Throttle Lever	Idle
Control Stick	Roll input neutral, pull to reach stall

At the moment the stall occurs:

Flight Controls	Hold stick full aft, apply full rudder in the desired spin direction
-----------------	--

While spinning:

Flight Controls	Hold controls steady (full aft, roll input neutral)
-----------------	---

SPIN RECOVERY

(See POH for approved configurations)

Throttle Lever	Idle
Roll input	Neutral
Rudder	Full opposite deflection

As the rotation is about to stop, or fully stopped:

Rudder	Neutral
Control stick	Release control force towards neutral elevator position, roll input neutral
Horizontal Flight	Resume (do not exceed g-load/speed limitations)



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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.

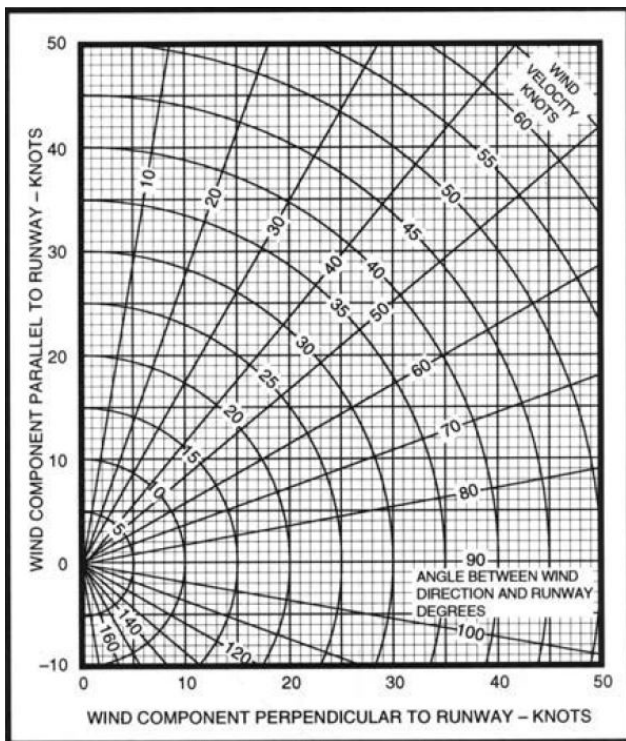
The performance tables do not take into account the expertise of the pilot or the maintenance condition of the airplane. The performance illustrated in the tables can be achieved if the indicated procedures are followed and the airplane is in good maintenance condition.

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

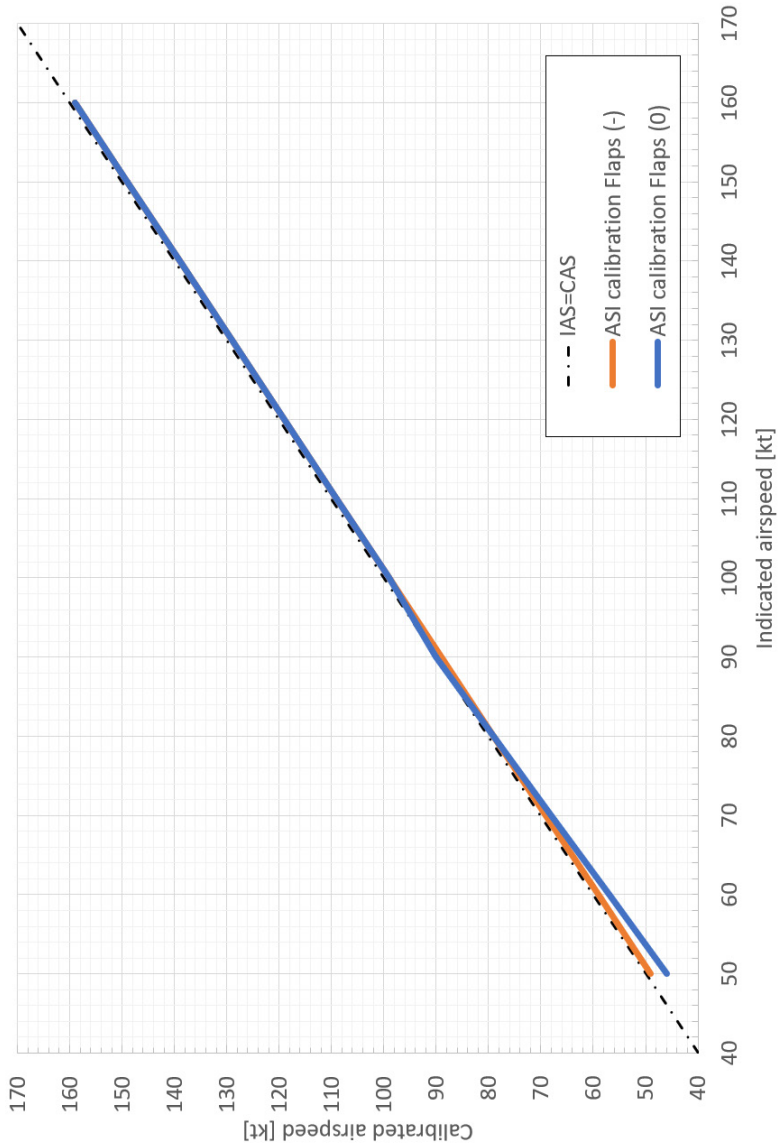
Power: power level for level flight, or max. continuous power whichever is less

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	---	---	---
150	149	---	---	---
160	159	---	---	---
163	162	---	---	---

NOTE: Aibrake 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. TAKE-OFF

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 (VX)

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 degrees
	2000	60	9.42 degrees
	4000	60	8.36 degrees
	6000	60	7.08 degrees
	8000	60	5.79 degrees

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

5.9. CRUISING - POWER SETTING, FUEL CONSUMPTION

Conditions

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-912-016* 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	<i>Not achievable</i>		MCP	<i>Not achievable</i>	
	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	<i>Not achievable</i>		MCP	<i>Not achievable</i>	
			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	<i>Not achievable</i>		MCP	<i>Not achievable</i>	
			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	<i>Not achievable</i>		MCP	<i>Not achievable</i>	
			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	<i>Not achievable</i>		MCP	<i>Not achievable</i>	
			85%		
			75%		
			65%		
	5500	18	55%	120	20.4

5.10. LANDING

<u>Conditions</u>	Wind:	zero
	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.
	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 15 °C
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	ISA 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	ISA 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	ISA 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 in-flight weight and C.G. of the aircraft. Once calculated, these two values can be used to find a point on the weight and balance chart (see section 6.3) and thus determine whether aircraft is within the flight limits (see section 2.6). A sample calculation is provided for reference.

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

NOTE: The aircraft's empty weight and empty weight C.G. are the starting point for all weight and balance calculations. Please refer to the aircraft's weight and balance report (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 6.3, to determine whether the aircraft is within the flight limits prescribed in section 2.6.

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

	WEIGHT [kg]	ARM [mm]	MOMENT [kgmm]
Aircraft empty weight	349*	270*	94230
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	596	-	194210
C.G.	-	326	-

* 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. Use this document also to perform and log weight and balance of the aircraft.

Example Center of Gravity at 326 mm is 31.5 % MAC, which is within the range given in Section 2 - Limitations (267 - 356 mm or 25 - 35 %MAC).

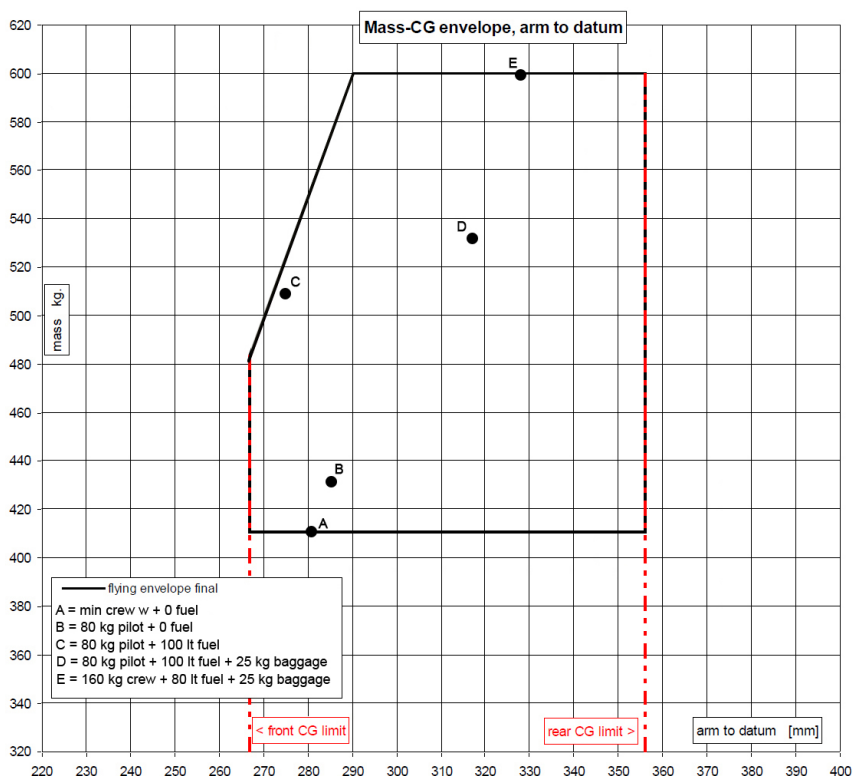
CG expressed as %MAC can be calculated from CG(mm) using the following:

$$CG_{\%MAC} = 100 \times \frac{CG_{(mm)} - R}{MAC} = 100 \times \frac{326 - 43}{898} = 31.5 \%MAC$$

NOTE: MAC = 898 mm, R = 43 mm is the arm of Leading Edge of MAC.

6.3 WEIGHT AND BALANCE CHART

The chart below shows the Virus SW 121's mass-CG envelope. Once the aircraft's in-flight 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 luggage. The baggage compartment floor is made out of CFRP. It is bolted to the bulkheads and to the CFRP tunnel, that covers the elevator control rod. The back rest is made out of GFRP and fixed to the bulkhead by velcro for easy access to the baggage compartment. The cabin floor is also the lower seat structure and made out of CFRP with aramide. The external structure is covered by a protective acrylic paint coating, which has already been applied in the mold.

7.2.2 WINGS

The detachable wing is a single spar cantilever wing. The left and right wing are connected by two bolts through the spar ends. The wing structure is made mostly from carbon fibre. The main spar shear web and the root ribs are made from glass fibre. This is for visual inspection and easier damage detection reasons. The spar caps are produced using carbon roving. The wing spar is designed as double-T-type spar. Lateral loads and twisting moments are conventionally transferred to the fuselage through root ribs and lateral-force bolts.

The wing shell is designed as a 2-cell CFRP sandwich shell which is closed by a rear shear web to which the flaperons are attached. The wings are connected as it is classic with gliders by two spar ends being connected with two main bolts. There is also the third middle bolt to provide torsion stiffness mating the wings to the fuselage. The wings attach with shear pins to bushes at the fuselage root ribs. 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 maintenance-free bushings mounted on stainless steel brackets at the stabilizer rear spar and bottom shell. Counterbalance weights are integrated into the elevator tips.

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

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

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 are 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 AILERON 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 T-shaped bellcranks located behind the seats and below the baggage compartment floor. Single cables run from the T-shaped bellcranks backwards and are attached directly to the rudder. The tension of the cables is adjusted with cable tensioners and rudder neutralization is achieved by means of two retaining springs attached to the T-shaped bellcrank junctions.

The nose wheel is part of the yaw control system and is moved whenever the pedal is pressed. Cables for nosewheel steering run from the bellcranks behind the seats forward to the nosewheel hinge element, where a anti-shimmy damper 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°, +9.5°, +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 luggage compartment. The motion of the linear servo is controlled through a cockpit switch and an integral position sensor. Trim position is indicated with discrete steps on a dedicated LED display adjacent to the trim switch as well as a gauge in the G3X PFD.

7.4 LANDING GEAR

7.4.1 MAIN GEAR

The landing gear is a conventional, fixed tricycle type. The main landing gear consists of a single composite landing gear strut made of glass fibre. The strut is composed by two parallel elements producing a semi-redundant structure and allowing for predictable locations of stress points. The tubeless type wheel tire is 4.00 x 6. Wheel track is 1.60 m, wheel base 1.58 m. Inflate to 2.8 bar. The wheels are equipped with aerodynamic fairings made of CFRP.

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. The nose wheel is equipped with an aerodynamic fairing made of CFRP.

7.4.3 BRAKE SYSTEM

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

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.

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 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.

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 luggage 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 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 cabin air exhaust in the sun roof.

7.5.3 SEATS

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

The seats are not adjustable in position or recline, however the back panel can be removed/reclined to access the baggage compartment. The back panel features a manual pneumatic pump to adjust the size of the lumbar bladder and thus lumbar support.

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.

7.5.5 CABIN SAFETY EQUIPMENT

Passenger Restraints

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

7.6 POWERPLANT

7.6.1 ENGINE

The engine installed is a Rotax 912 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 reaches the activation temperature, the thermostat opens, allowing the oil to flow through the coolers. A dipstick is present on the oil tank to check oil quantity.

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

Engine Cooling

The engine is air and water cooled. 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 water cooling system consists of a cooler and mechanically-driven pump to provide cooling to cylinder heads. The heated air exits the engine compartment through a common outlet on the bottom aft portion of the cowl. 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 its 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

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 cowlings 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 ("mag-

netos”) are grounded and will not operate. Normally, the engine is operated on both magnetos (switch in BOTH position) except for magneto checks and emergency operations. The R and L positions are used for individual magneto checks and for single magneto operation when required. When the master switch ON, rotating the switch to the spring loaded START position energizes the starter and activates both magnetos. The switch automatically returns to the BOTH position when released.

7.6.4 ENGINE MONITORING INSTRUMENTS

The aircraft is equipped with electronic engine instrumentation, which is part of the MFD.

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

A Data Acquisition Unit (Garmin GEA24 EIM), mounted inside the instrument panel, converts analog signals from the coolant temperature, EGT, MAP, oil pressure, oil temperature, fuel pressure, fuel flow, voltage, amperage and tachometer sensors to digital format, which are then transmitted to the MFD and/or PFD for display.

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

The PFD presents manifold pressure and RPM in the upper left area of the display in horizontal tape format and as text immediately nearby. Other parameters are continuously displayed in the engine data block located in the right of the MFD. A dedicated full page indication is also available upon pilot's selection.

System health, caution, and warning messages are displayed in colorcoded advisory boxes on the MFD. In addition, the text of the engine parameters displayed on the PFD change to the corresponding color of advisory box during an annunciation event.

NOTE: EGT probes are installed to each exhaust pipe. Refer to Garmin G3X Pilot's guide for a more complete description of the MFD, its operating modes, and additional detailed operating procedures for the Engine Monitoring functionality.

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.

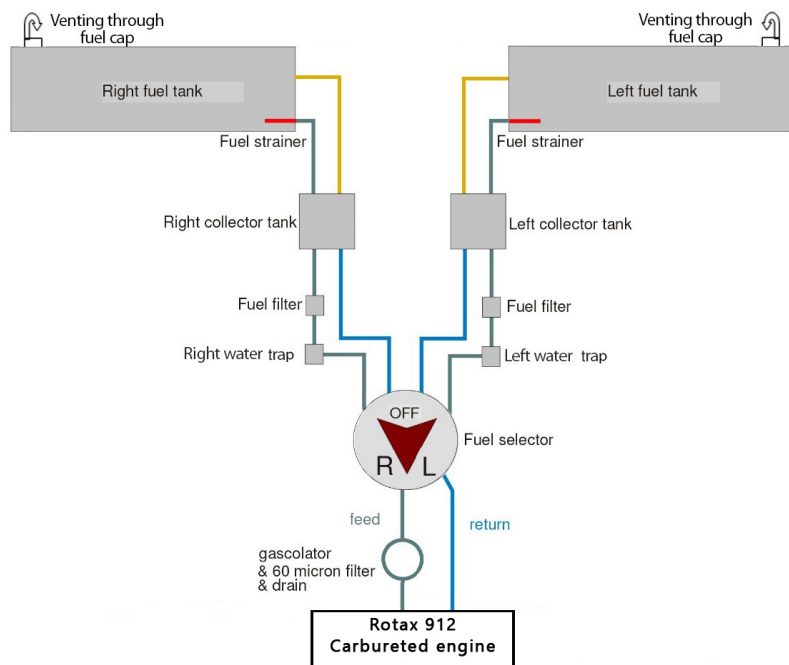
7.7 FUEL SYSTEM

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. Two fuel flow sensors are used to measure flow in feed and return lines and calculate fuel flow which is displayed on the MFD.

NOTE: Indicated fuel flow on MFD is for information only and should not be used for navigation and flight planning purposes. Refer to visual fuel quantity indicators for actual fuel quantity on board and tracking of fuel situation.



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 raise 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 colorcoded. 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.

Fuel Flow Indication

Indicated fuel flow on MFD is for information only and should not be used for navigation and flight planning purposes. 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-alternator, 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 avionics, flight instrumentation, lighting, and other electrically operated and controlled systems during normal operation.

7.8.2 POWER GENERATION

The electrical system is a 12/14 V DC system. Power is supplied by integrated generator with approximately 250W AC 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 onboard battery (12V, 11Ah or 12.4Ah for EarthX). In case of emergency, the battery will supply reduced number of necessary direct-current loads with power for 30 minutes. The electrical system is controlled by means of switch/fuse which are arranged in one row at the upper half of the switch panel under the instrument panel.

The circuit breakers (CB) are located under the switch/fuses of the switch panel. An ammeter and a voltmeter are integrated in the MFD system and they are displayed on EMS mode display to monitor electrical system operating. Generator failure is indicated by a warning red LED light on the Switch panel (top, left, labeled GENERATOR FAIL).

7.8.3 POWER DISTRIBUTION

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

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

The avionics bus comprises all avionics loads and electrically operated instruments. For more detailed information see AMM - Chapter 91. Harnesses of the electrical system from the engine is leading through the firewall and connected to the electrical board and to other provided systems.

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

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

Equipment	Electrical Consumption [A] @ 14 V
Garmin G3X avionics system which includes dual display GDU37x (PFD, MFD), GEA24 (EIS), GMC305 (AP PNL), 2x GSA28 (Servo motors), 2x GSU25 (ADAHRS), GMU22 (Magnetometer), GTP59 (OAT sensor), and GAP26 (Pitot tube).	8.63 A (Max - Total)
Garmin GTR225 transceiver (optionally can be installed GNC255 transceiver.)	0.5 A (Typical) 4.2 A (Max)
Garmin GTX328ES transponder	1.1 A (Typical) 3.1 A (Max)
Landing light	5 A
Nav lights	0.27 A
AC (anti-collision/strobe) lights	0.44 A
Cockpit illumination and dimming	0.4 A
Electrical trim	0.3 A

7.8.4 SWITCHES

Master Switch

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

Avionics Power Switch

A toggle switch, labeled AVIONICS, controls electrical power from the main bus to the Avionics Bus. The switch is located next to the MASTER switch.

Typically, the switch is used to energize or de-energize all avionics on the Avionics Bus simultaneously. With the switch in the OFF position, no electrical power will be applied to the avionics equipment, regardless of the position of the master switch or the individual equipment switches.

For normal operations, the AVIONICS switch should be placed in the OFF position prior to activating the MASTER switches or applying an external power source.

Battery Disconnect Switch

The battery can be disconnected from the circuit. The battery disconnection lever is a red flag-type lever found on the main electric board (cabin-side of the firewall) above the main battery on the right-hand side of the cabin. It is attached to a wire which leads to the battery disconnection ring on the instrument panel's switch column. To disconnect the battery from the circuit, pull the battery disconnection ring on the instrument panel's switch column. To reconnect the battery back to the circuit, use the flag-type lever on the firewall. Deflect the lever so that its flag end points towards the firewall. Having done this correctly, you will feel the flag-lever jam into position.

7.8.5 WARNING LIGHTS

Generator Fail Light

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

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

NOTE: The LOW VOLTS warnings come from the Garmin G3X displays and are displayed on both displays. See Garmin G3X Pilot's Guide for details.

Battery Caution Light

The orange Batt Caution light is installed on the switch panel only when EarthX battery is installed. Batt Caution light is ON when the battery management system (BMS) integrated in the battery detects any malfunctions (See Chapter 3 - Emergency procedures for additional details).

7.8.6 CIRCUIT BREAKERS AND FUSES

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

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

7.8.7 MISCELLANEOUS COMPONENTS

Convenience Outlets

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

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 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 navigation light operation is supplied through the LDG light switch, which includes a resettable circuit breaker element. The landing light has a built-in thermal protection and its operation is not time limited.

7.9.2 INTERIOR LIGHTING

Instrument Lights

Mechanical instruments, Airspeed Indicator and Altimeter are TSO'd and internally illuminated. Other instrumentation has backlit dimmable LCD displays and illuminated buttons.

Panel Flood Lights

A cabin flood-light is present and provides illumination to master electrical panel and circuit breakers. Fuel level indicator tubes are lighted individually with dedicated LED elements and are controlled on demand with a labeled switch on the instrument panel.

Dimming

Intensity of all displays' illumination is synchronized and controlled by the SmartDim controller, either reacting to ambient light conditions automatically or as manually set by the pilot. Rotating the knob to the right will result in brighter illumination, rotating the knob to the left will result in dimming. Pressing the knob for 2 seconds will engage automatic illumination which reacts to ambient light conditions using a built-in light sensor. Corresponding SmartDim display indications are provided.

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, next to the battery disconnect ring. Pull to open, twist to lock, push to shut. Make sure the Cabin Air Selector is open before using the 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 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 inbetween 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 temperature 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).

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 drives the total pressure to both to the Garmin ADAHRS units as well as the mechanical airspeed indicator. The pitot tube also has a AOA sensing port.

The lines from the static ports join together and then drive the static pressure to both Garmin ADAHRS units as well as the mechanical airspeed indicator and altimeter.

7.12 STALL WARNING SYSTEM

Stall onset awareness is greatly improved with the visual and aural stall warning systems. The visual and aural stall warning systems are integrated in the PFD by using AOA pressure information from the AOA port on GARMIN GAP26 pitot tube and the associated AOA display on the PFD.

A further sign of imminent stall may be an aerodynamic buffet, which can be felt on control stick.

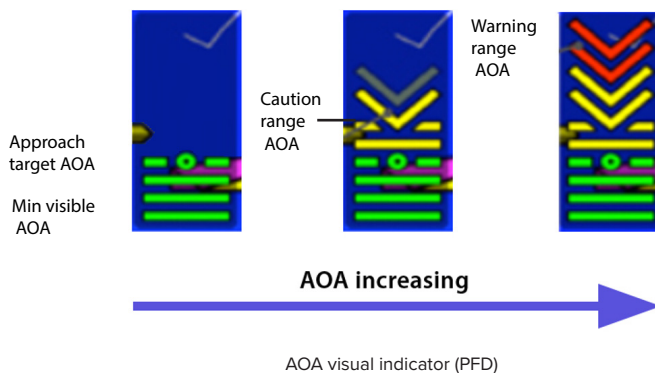
Visual AOA indication

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

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

As the AOA increases further, the number of the visible bars increases and the bars change in color (green, yellow, then flashing red) and shape (becoming chevrons) as the AOA enters the caution and warning (stall) range.

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



Aural stall warning

The system is calibrated to produce an aural warning of increasing frequency and intensity as the angle of attack is increased.

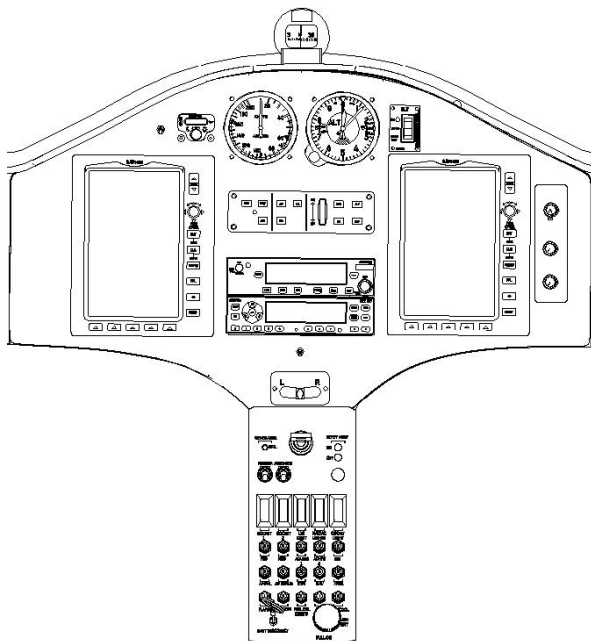
7.13 FLIGHT DECK ARRANGEMENT

Instrument Panel

The airplane is equipped with two Garmin G3X (GDU 370 or GDU 375) displays. The PFD (left) is a 7" portrait-oriented display, providing various flight parameter information (attitude, airspeed, heading, and altitude). The PFD accepts data from a variety of sources, including the GPS sensors, GNC255 (VOR, optional), the G3X autopilot, and serves as the heading source for the Multifunction Display.

A mechanical altimeter and airspeed indicator are in the top segment of the instrument panel. Mechanical instruments are primary sources for altitude and airspeed information. Attitude information to the autopilot is provided straight from the dual ADAHRS units, the PFD's function does not influence the functionality of the autopilot. The autopilot panel indicates modes that are active or armed. Below the autopilot panel are the COM Garmin GTR225 (or optional NAV/COM Garmin GNC255) and Transponder Garmin GTX328 units.

The cabin heat panel is positioned beside the right PFD (see Section 7-10).



Switch Panel

A switch panel located in the “dash board” bolster below the flight instruments contains the master switch, avionics power switch, lighting switches and circuit breakers.

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 flood cabin light and jacks for microphones and headphones.

7.14 FLIGHT INSTRUMENTS

NOTE: this section provides general information for use of the equipment. For a detailed description of the G3X suite, refer to GARMIN G3X Pilots Guide, Garmin Part Number 190/01115/00.

NOTE: the description of G3X functions, systems and features presented in the next sections reflect the latest G3X configuration file version. Please refer to the latest revision of *SB-121-00-81-999 Garmin G3X configuration overview* for more information about approved configuration file versions.

The Primary Flight Display (PFD) provides the functions of the attitude indicator, magnetic heading indicator, groundspeed indicator, AOA tape, vertical speed indicator, directional gyro, HSI (horizontal situation indicator), wind data, FMS and avionics-related annunciator. In addition, the PFD communicates with GPS1, GPS2, NAV (optional), the Multifunction Display (MFD), and Autopilot System. It also triggers aural and acoustic warnings.

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

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

Circuit breakers that apply to the PFD are labeled PFD, ADAHRS 1 and ADAHRS 2. The display presents the Initialization Display immediately after power is applied. Power-on default is 75% brightness. The dimming is via

the dedicated SmartDim controller installed to the left of the mechanical air-speed indicator.

7.14.1 PRIMARY FLIGHT DISPLAY (PFD)

Air Data

The airspeed tape to the left of the main Attitude Indicator (AI) begins indicating at 20 Knots Indicated Airspeed (KIAS) and is color-coded to correspond with airspeeds for V_{SO} , V_{FE} , V_S , V_{NO} , and V_{NE} . An altitude tape is provided to the right of the main AI and also displays a symbol for the Altitude preselect (Altitude bug). The Vertical Speed Indicator (VSI) is displayed to the right of the altitude tape. The displayed scale of the VSI is ± 2000 ft/min. An additional data blocks are provided for display of outside air temperature (OAT), true airspeed (TAS), and ground-speed (GS). Controls for selecting bug and barometric correction values are along the right side of the PFD.

Attitude Data

Attitude is depicted on the main AI using an aircraft reference symbol against a background of labeled pitch ladders and an arced scale along the top of the AI to indicate bank angle. A skid/slip indicator is attached to the bottom edge of the bank angle pointer. The Flight director function integrates into the AI.

7.14.2 HORIZONTAL SITUATION INDICATOR (HSI)

Heading Data

Magnetic heading in the PFD is represented in boxed numeric form at the left of the compass rose and the top magnetic heading strip. Heading rate (Rate of Turn Indicator) takes the form of a purple trend vector, begins behind the magnetic heading indicator and moves left or right accordingly. Graduations are provided on the rate-of-turn indicator scale to indicate half and full standard-rate turns. A heading bug is also provided on the compass rose and the heading strip above the attitude indicator.

Navigation Data

Navigation data on the PFD takes several forms. A course deviation indicator (CDI) is always provided on the HSI and a bearing pointer can be optionally selected for display on the HSI by the pilot. Controls for selecting the source of navigation data, selecting the display format of the navigation data, and

for selecting the type of compass rose and moving map to be displayed are along the right and bottom side of the PFD. The active flight plan contained in the GPS Nav/Com unit selected as the primary navigation source (Nav) can be optionally selected for display on the HSI as well as the desired range of the optionally selectable moving map display. If a localizer or ILS frequency is tuned and captured in the GPS Nav/Com selected as the Nav source, a vertical deviation indicator (VDI) and horizontal deviation indicator (HDI) are automatically displayed on the ADI.

7.14.3 ATTITUDE INDICATOR

The attitude indicator (AI) gives a visual indication of flight attitude and is part of the PFD. Bank attitude is indicated by a pointer at the top of the indicator relative to the bank scale with index marks at 10°, 20°, 30°, 45° and 60° on either side of the center mark. A yellow fixed miniature airplane superimposed over a movable mask containing a white symbolic horizon bar, which divides the mask into two sections, indicates pitch and roll attitudes. The upper “blue sky” section and the lower “earth” sections have pitch reference lines useful for pitch attitude control. The indicator can follow maneuvers through 360° in roll and 360° in pitch. When Synthetic-vision function is active the sky-up, earth-down background of the attitude indicator is replaced by a 3D terrain representation. The horizon line remains white. The Flight director function integrates onto the attitude indicator.

7.14.4 MECHANICAL AIRSPEED INDICATOR

Indicated airspeed is indicated on an internally lit 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. Mechanical airspeed indicator is primary source for airspeed indication.

7.14.5 MECHANICAL ALTIMETER

Airplane altitude is depicted on a conventional, three-pointer, internally lit barometric altimeter. The instrument 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. Mechanical altimeter is primary source for altitude indication.

7.14.6 TURN COORDINATOR

Turn Coordinator function and roll data display is integrated into the PFD.

7.14.7 COURSE DEVIATION INDICATOR

The Course Deviation Indicator is integrated into the PFD.

7.14.8 MAGNETIC COMPASS

A conventional liquid filled, magnetic compass is installed on top of the instrument panel. A compass correction card is installed with the compass.

7.15 AVIONICS SYSTEM

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

For detailed descriptions of specific avionic equipment, operating procedures, or data for optional avionic equipment, refer to the the Airplane Flight Manual Supplement, Section 9.

The standard avionics and systems configuration consists of:

1	Display Garmin GDU 370 or GDU 375 (PFD)
2	Display Garmin GDU 370 or GDU 375 (MFD)
3	ADHARS Garmin GSU25 (2x)
4	AOA Pitot probe Garmin GAP26
5	EIS Garmin GEA 24 (Engine Data Acquisition unit)
6	Magnetometer Garmin GMU 22
7	Altimeter Mikrotechna LUN1128 (Mechanical Altimeter)
8	Airspeed Indicator Mikrotechna LUN1116 (Mechanical Airspeed Indicator)
9	Radio COM Garmin GTR 225 or COM/NAV Garmin GNC 255 (option)
10	Transponder Garmin GTX 328 (S-Mode transponder)
11	Autopilot panel Garmin GMC 305
12	Pipistrel SmartDim controller
13	ELT Kannad 406 AF compact + remote panel Kannad RC200
14	Mechanical Compass
15	Slipball Winter
16	Cabin heat control panel
17	Switches and breakers

7.15.1 COMMUNICATION (COM) TRANSCEIVERS

A VHF communication (COM) transceiver is installed to provide VHF communication. The transceivers and integrated controls are mounted in the Garmin GTR 225 or GNC 255 (option) units. The transceivers receive all narrow- and wide-band VHF communication transmissions transmitted within range of the selected frequency. The antennas pick up the signals and route the communication signals to the transceivers, which digitize the audible communication signal. The digitized audio is then routed to the audio control unit for distribution to the speakers or headphones.

The Garmin GTR 225 or GNC 255 (optional) is designated as COM. COM provides transceiver active and standby frequency indication, frequency memory storage, and knob operated frequency selection. The COM transceiver provides either 760-channel (25 kHz spacing) or 2280-channel (8.33 kHz spacing) operation in a frequency range from 118.000 to 136.975 MHz. The COM antenna is located on top of fuselage behind the cabin. 12 VDC for COM transceiver operation is controlled through the Avionics Switch and supplied through the COM circuit breaker on the Avionics Bus.

7.15.2 NAVIGATION (NAV) TRANSCEIVER (OPTION)

Refer to Supplement 9-S2.

7.15.3 TRANSPONDER

The airplane is equipped with a single Garmin GTX 328 ATC Mode S (identification and altitude) transponder with squawk capability. The transponder system consists of the integrated receiver/transmitter control unit, an antenna, and an altitude encoder. The receiver/ transmitter receives interrogations from a ground-based secondary radar transmitter and then transmits to the interrogating Air Traffic Control Center. Digitized altitude information, provided by the altitude encoder, is plumbed into the airplane static system. The transponder and integrated controls are mounted in the center console. The transponder control provides active code display, code selection, IDENT button, and test functions. A FUNC (function) key allows for selection of pressure altitude, flight time, count-up timer and countdown timer modes. The display is daylight readable and dimming is operator controlled through the INST(instrument) lights control on the instrument panel bolster. The transponder antenna is mounted on the underside of the fuselage just aft of the firewall. 12 VDC for transponder operation is controlled through the Avionics Switch. 12 VDC for receiver, transmitter, and altitude encoder operation is supplied through the XPDR circuit breaker on the Avionics Bus.

7.15.4 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.

7.15.5 HOUR METER

Hour meter function (engine time) is integrated into the MFD.

7.16 AUTOPILOT

The airplane is equipped with a 2-axis G3X Automatic Flight Control System (Autopilot), controlling pitch and roll via separate servo motors (GSA 28 type). It is fully integrated with the PFD. A dedicated autopilot panel (GMC 305) is installed on the central part of the instrument panel for easier mode selection/recognition/activation/arming. When in an active autopilot mode, full guidance is provided, including smooth transitions to altitude and heading captures. If not in an active autopilot mode (i.e., "hand-flying"), there is no guidance other than the position of the appropriate bugs and/or the flight director, as set by the pilot.

A red button on pilot's control stick handle may be used to disengage the autopilot or to activate the CWS (Control Wheel Steering) mode. Press and release the AP DISC/CWS button to disengage the autopilot. Pressing and releasing the button again will acknowledge an autopilot disconnect alert and mute the associated aural tone. Pressing and holding the AP DISC/CWS button when the autopilot is engaged will temporarily disengage the pitch and roll servos and interrupt auto-trim operation. The pilot can then hand-fly the aircraft to a new attitude and release the AP DISC/CWS button to re-engage the autopilot servos and synchronize the flight director to the aircraft's new attitude.

The reference bugs' status, autopilot annunciations, and flight director steering command bars (if installed) will indicate when PFD is coupled with the autopilot. A solid magenta Heading, Altitude, or VSI bug indicates that the function is currently coupled to an active mode of the autopilot.

In flight director equipped aircraft, when a vertical mode of the autopilot is being used, a set of flight director command bars will indicate the required steering of the aircraft to achieve the commanded tracking from the autopilot. In autopilot mode, "AP" will be in the autopilot annunciation field, the command bars will be visible and magenta and the aircraft should track the bars.

In flight director only mode, “FD” will be displayed in the autopilot annunciation field, the command bars will be visible and green, and the pilot is expected to actuate the flight controls as required to track the bars.

NOTE: One of the horizontal modes (HDG, NAV, GPSS) must be engaged on the autopilot control interface before a vertical mode can be used.

When HDG mode is engaged, rotation of the heading bug greater than 180 degrees may result in a reversal of turn direction.

The following modes of the G3X Autopilot system are supported:

1	HDG (Heading Hold) Mode
2	ALT (Altitude Capture/Hold) Mode
3	VS (Vertical Speed Hold) Mode
4	GPS Track (Direct-To) Mode
5	NAV (Capture NAV track or radial) Mode
6	VNV (Vertical Navigation from GPS source) Mode
7	APR (simultaneous Vertical Navigation and NAV guidance from GPS or NAV source) Mode
8	IAS (Indicated Airspeed Hold) Mode
9	LVL (Level-button) Mode

NOTE: Pressing the LVL button in the autopilot panel will engage the autopilot in the Level Mode. The Level Mode is a coupled pitch and roll mode that will automatically bring the aircraft from most attitudes to level, both vertically and laterally. This mode is most useful in case of loss of attitude reference and spatial disorientation as a means to regain controlled flight).

WARNING: The Level Mode has not been tested in all possible aircraft attitudes and configurations and does not guarantee a successful return to level flight from any starting attitude or flight condition. It is the pilot's responsibility to maintain external visual reference for attitude determination and to maintain controlled flight.

12 VDC for autopilot and is supplied through the two circuit breakers. The autopilot panel is controlled with the AP PNL and the servos with the AP SERVO circuit breaker circuit breaker.

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

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

7.17 BALLISTIC PARACHUTE RESCUE SYSTEM (BPRS)

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

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

7.17.1 SYSTEM DESCRIPTION

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

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

The type of BPRS is Galaxy Rescue System GRS 6/600 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 inadvertently; for example, in presence of unattended children in the airplane, in presence of people who are not familiar with the BPRS activation system in the airplane, or during display of the airplane. A "Remove Before Flight" streamer is attached to the pin.

WARNING!

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

WARNING!

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

7.17.3 DEPLOYMENT CHARACTERISTICS

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

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

SECTION

8

SECTION 8 – HANDLING AND SERVICING

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8.1 INTRODUCTION

The airplane owner should establish contact with the dealer or certified service station for service and information. All correspondence regarding the airplane must include its serial number (see tail-mounted type dataplate). 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 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.

8.5.4 OIL SERVICING

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

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

- 1** Open access door on upper cowl. Open cap of the oil bottle.
- 2** Verify Master 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.

8.5.5 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 50 L. 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 Inspect top wing surface of fuel tank area. *
- 4 Place a protective cover over wing around fuel filler.
- 5 Remove fuel filler cap and fuel airplane to desired level.

* **NOTE:** Pay special attention to area fore of main wing spar, between wingroot and 100 mm past the fuel cap. If blisters are found in the area up to 50mm outwards of wing root, continued flight is not recommended. Contact manufacturer.

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.

- 6 Remove nozzle, install filler cap, and remove protective cover.
- 7 Repeat refuel procedure for opposite wing.
- 8 Remove ground wires.
- 9 Remove fire extinguisher.



Grounding wire connected to the exhaust

Fuel Draining and Sampling

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

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.

8.5.6 COOLING SYSTEM SERVICING

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

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

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

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

8.6 GROUND HANDLING

8.6.1 APPLICATION OF EXTERNAL POWER

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

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

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

To apply external power to the airplane:

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

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

To remove external power from airplane:

- 1 Carefully remove cables from battery terminal and exhaust.

8.6.2 TAXIING / GROUND MOVEMENTS

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

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

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

- 1 Remove chocks.
- 2 Start engine in accordance with Starting Engine procedure.
- 3 Release parking brake.

- | | |
|---|--|
| 4 | Advance throttle to initiate taxi. Immediately after initiating taxi, apply the brakes to determine their effectiveness. |
| 5 | Taxi airplane to desired location. |
| 6 | Shut down airplane and install chocks and tie-downs. |

8.6.3 PARKING

For parking:

- | | |
|---|---|
| 1 | Head airplane into the wind if possible. |
| 2 | Choose even terrain so that fuel does not spill because of sloped wings. |
| 3 | Retract flaps to (-), 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 tailcone 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.

Observe:

- 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, antistatic 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 contaminants. |
| 3 | Dry the windows using a dry nonabrasive cotton cloth or chamois. |

Engine Compartment

NOTE: Only to be cleaned by licensed service personnel.

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

CAUTION: Do not spray solvent into the 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 non-abrasive cotton cloth or genuine chamois to clean acrylic windows. Paper towel or newspaper are highly abrasive and will cause hairline scratches.

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

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

Instrument Panel and Electronic Display Screens

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

CAUTION: To avoid solution dripping onto display and possibly migrating into component, apply the cleaning solution to cloth first, not directly to the display screen. Paper towels or tissue may scratch the display screen.

CAUTION: The display uses a lens coated with a special anti-reflective coating that is very sensitive to skin oils, waxes, and abrasive cleaners. Cleaners containing ammonia will harm the anti-reflective coating. It is very important to clean the lens using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings. Please refer to *Garmin G3X Pilot's Guide* for additional information.

- 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 whiskbroom or vacuum. For soiled spots and stubborn stains use a non-flammable, dry cleaning fluid. Floor carpets may be cleaned like any household carpet.

8.8 RIGGING

8.8.1 WINGS REMOVAL AND INSTALLATION

Wings Removal

NOTE: A minimum of three people are required to carry out this task.

Required parts, materials and tools:

- Metric ratchet and socket set
- T-Handle hex head screwdriver set

Step	Action
1	Engage the parking brake.
2	Place wheel chocks under main landing gear wheels.
3	Remove white wing-fuselage joint seal.
4	Remove pitot tube.

Step	Action
5	Enter the cabin and disconnect all fuel lines, static/pitot lines and electrical cables from the wing roots.
6	Support each wing at the wingtip.
7	Remove central wing spar bolt.
8	With both wings supported at their ends, remove the two spar pins.

NOTE: Moving the wingtips up and down slightly makes spar pin removal easier.

9	With one person at each end of the wing, slowly remove one of the wings from the fuselage.
10	Place it in wing cart or on any dry, padded surface.
11	With one person at each end of the wing, slowly remove the other wing from the fuselage.
12	Place it in wing cart or on any dry, padded surface.
13	Disengage parking brake.
14	Remove wheel chocks.
15	Carry out visual inspection of the wings.

Wings installation

NOTE: A minimum of three people are required to carry out this task.

Required parts, materials and tools:

- Metric ratchet and socket set
- T-Handle hex head screwdriver set
- Paper towel
- White wing-fuselage joint seal (P/N 5230014)

Step	Action
1	Clean spar pins, wing positioning pins/bushings and wing spar bushings with a piece of paper towel and lubricate them.

Step	Action
2	Engage the parking brake.
3	Place wheel chocks under main landing gear wheels.
4	Support one wing at both ends and slide its spar into the fuselage. When the wing root is about 10 cm away from the fuselage pass all/any electrical cables and fuel lines through their respective openings in the fuselage. Slide the wing into its final position using the wing positioning pins as a guide. Continue to support the wingtip as the spar rests against the fuselage.
5	Support the other wing at both ends and slide its spar into the fuselage. When the wing root is about 10 cm away from the fuselage all/any electrical cables and fuel lines through their respective openings in the fuselage. Slide the wing into its final position using the wing positioning pins as a guide (see picture). Continue to support the wingtip as the spar rests against the fuselage.

CAUTION: While pushing the wings into their final position make sure that the flaperon and air brake control controls have engaged properly.

6	With the wings supported at their wingtips, slide the spar pins through the wing spar bushings and fasten them in place.
---	--

CAUTION: If, at this point, the spar pins are properly inserted and the wings are secured, it is no longer necessary to support the wingtips.

7	Secure spar pins with bolts and nuts. Tighten to torque 23 Nm
8	Insert and tighten the central spar bolt. Torque to 15 Nm.
9	Carry out operational check of the flaperon control system.
10	Carry out operational check of the air brakes.
11	Connect all fuel lines, electrical cables and pitot/static lines.

CAUTION: The pitot and static lines are marked in the cabin and on the lines themselves with a P and S respectively.

12	Install pitot tube.
13	Carry out operational check of the pitot tube.
14	Apply white wing-fuselage joint seal.

NOTE: Self locking nuts must be replaced by new ones.



Wing root positioning pins



Central spar bolt and two spar pins



Spar pin - installed



Central wing spar bolt - installed

8.8.2 HORIZONTAL STABILIZER REMOVAL AND INSTALLATION

Horizontal stabilizer removal

Required parts, materials and tools:

- 14 mm spark plug socket wrench (P/N 1190003),
- Flathead screwdriver

Step	Action
1	Weigh the tail cone down to access the horizontal stabilizer.
2	Remove the attachment bolt's black cap.
3	Slide screwdriver perpendicularly through 14 mm socket wrench and use it to unscrew/remove the horizontal stabilizers' attachment bolt assembly.
4	Lightly jolt the elevator's trailing edge, so that the horizontal stabilizer pops out of place.
5	Remove it and set it on a dry, padded surface.
6	Remove tail cone counterweight.

Horizontal stabilizer installation

Required parts, materials and tools:

- 14 mm spark plug socket wrench (P/N 1190003),
- Flathead screwdriver

Step	Action
1	Weigh the tail cone down to access the horizontal stabilizer.
2	Lubricate horizontal stabilizer pins and bushings.
3	Lubricate horizontal stabilizer attachment bolt assembly
4	Position the horizontal stabilizer so that it's pins slide into their respective bushings.
5	Use 14 mm socket wrench to fasten the horizontal stabilizer to the aircraft while simultaneously pushing down on the bolt with the screwdriver.

Step	Action
6	Orient the bolt's head so that slides into the spring-loaded locking mechanism (see figure).
7	Shake stabilizer a little to ensure it is secured to the aircraft.
8	Install the attachment bolt assembly's black cap.
9	Carry out operational inspection of the elevator.
10	Check elevator deflection angles.



Attachment bolt installation



Attachment bolt head orientation



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SECTION

9

SECTION 9 – SUPPLEMENTS

LIST OF SUPPLEMENTS

SUPPLEMENT NO.	SUPPLEMENT
9-S1	ELT KANNAD AF406 COMPACT/ AF 406 INTEGRA
9-S2	VOR EQUIPMENT
9-S3	NIGHT-VFR OPERATIONS
9-S4	AEROTOWING OPERATIONS
9-S5	FLARM EQUIPMENT
9-S6	AIRCRAFT HOIST SYSTEM

SUPPLEMENT

9-S1

SECTION 9 – SUPPLEMENT 9-S1

KANNAD AF406 COMPACT / AF406 INTEGRA 406 MHz ELT System

When the KANNAD AF406 COMPACT or KANNAD AF406 INTEGRA ELT 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 5: PERFORMANCE	NO CHANGE
SECTION 6: WEIGHT AND BALANCE	NO CHANGE
SECTION 7: SYSTEM DESCRIPTION	ADDED
SECTION 8: HANDLING AND SERVICING	ADDED

SECTION 9
SUPPLEMENT 9-S1

KANNAD AF406 COMPACT / AF406 INTEGRA
406 MHz ELT System

Signature: _____

Stamp: _____

Date of Approval: _____



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SECTION 3: EMERGENCY PROCEDURES

3.21 ELT SYSTEM

3.21.1 USE IN CASE OF EMERGENCY LANDING

In the event of imminent emergency landing:

1

Start ELT transmission manually: transmitter switch "ON" / remote switch "ON"(provided that the ELT switch is in the "ARM" position)
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.

Immediately after an emergency landing, perform the following procedure

1

ELT Remote Switch

VERIFY ON

Switch the ELT Remote Switch ON even if the red LED annunciator is flashing. If airplane radio operable and can be safely used (no threat of fire or explosion), turn radio ON and select 121.5 MHz. If the ELT can be heard transmitting, it is working properly.

2

Battery Power

CONSERVE

Do not use radio transceiver until rescue aircraft is sighted.

After sighting rescue aircraft:

3

ELT Remote Switch

**"ARM" POSITION
TO PREVENT RADIO
INTERFERENCE.**

Attempt contact with rescue aircraft with the radio transceiver set to a frequency of 121.5 MHz. If no contact is established, switch the panel mounted switch to the 'ON'-position immediately.

APPROVED

SECTION 7: SYSTEM DESCRIPTION

7.18 ELT SYSTEM

The airplane is equipped with a self-contained emergency locator transmitter (ELT) KANNAD AF 406 COMPACT or KANNAD AF 406 INTEGRA with internal GPS. 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. Once activated, the transmitter transmits VHF band audio sweeps at 121.5 Mhz until battery power is gone. In addition, for the first 24 hours of operation, a 406 MHz signal is transmitted at 50-second intervals. This transmission lasts 440 ms and contains identification data received by Cospas-Sarsat satellites. With GPS equipped KANNAD AF 406 INTEGRA the GPS will try to acquire a position in continuous mode during one hour and by different sequences up to 24 hours of 406 MHz transmission. If the GPS receiver acquires a valid position, then the message will contain the true position in the next 406 MHz burst. If the GPS receiver does not acquire a valid position, then the message will contain the default value (GPS position not valid).

The main transmitter and the remote switches have three positions labeled. Transmitter ON, ARM, OFF and remote switch ON, ARMED, RESET/ 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.

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

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

NOTE: Consult KANNAD AF 406 COMPACT or KANNAD AF 406 INTEGRA manual for additional information about ELT.

SECTION 8 – HANDLING AND SERVICING

8.8 ELT SYSTEM INSPECTION

ELT and RCPI batteries must be inspected in accordance with the Aircraft Maintenances Manual. The ELT and RCPI batteries must be replaced upon reaching the date stamped on the batteries, after an inadvertent activation of unknown duration, or whenever the batteries have been in use for one cumulative hour.

Inspection / Test

It is recommended by the manufacturer to test the ELT to detect any possible failure. Operational check must be performed regularly by a pilot or maintenance personnel from the cockpit (Remote Control Panel). It is recommended to perform a self-test at least once every six months but it should not be done more than once a month.

Self test procedure

1	Check that the antenna is correctly connected Do not perform self-test without antenna connected.
2	Tune aircraft receiver to 121.5 MHz.
3	Switch from position "OFF" to position "ARM" or press RESET & TEST on the Remote Control Panel (ensure that the ELT switch is in position "ARM")
4	Listen for the buzzer or watch the LED - it operates during the whole Selftest procedure. Close to the end of self-test a short (3 sweeps) 121.5 transmission is made - confirm this on the aircraft radio.
5	10 seconds after the beginning of the self test, the test result is displayed with the red visual indicator and the buzzer will sound:

	One long flash (duration 1 seconds) indicates that the system is operational and that no error conditions were found.
	A series of short flashes (200 ms) indicates the test has failed.
The number of flashes gives an indication of the faulty parameter detected during the self-test	
3+1	LOW BATTERY VOLTAGE
3+2	LOW RF POWER
3+3	FAULTY VCO LOCKING (FAULTY FREQUENCY)
3+4	NO IDENTIFICATION PROGRAMMED
AF 406 INTEGRA only	
3+5	FAULTY VSWR (EXT. ANTENNA)
3+6	INTERNAL GPS SERIAL LINK

NOTE: Consult KANNAD AF 406 COMPACT or KANNAD AF 406 INTEGRA manual for additional information about ELT tests.

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).

SUPPLEMENT

9-S2

SECTION 9 – SUPPLEMENT 9-S2

VOR equipment

When VOR equipment, including antenna, Garmin GNC 255 NAV/COM 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 8: HANDLING AND SERVICING	NO CHANGE

SECTION 9
SUPPLEMENT 9-S2

Garmin GNC 255 NAV/COM

Signature: _____

Stamp: _____

Date of Approval: _____



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SECTION 7: SYSTEM DESCRIPTION

NOTE: This supplement provides specific procedures for use of the GNC 255 NAVCOM and a general description of GNC 255 unit.

For a detailed description of the GNC 255, refer to GARMIN GNC 255 Pilots Guide, latest revision.

7.15.2 NAVIGATION (NAV) TRANSCEIVERS

If the optional GNC 255 COM/NAV unit is installed, the airplane is equipped with an NAV receiver. The receiver is designated as NAV. The NAV receiver controls are integrated into the Garmin GNC 255. The unit has VHF Om-nirange/Localizer (VOR/LOC) capability. The VOR/LOC receiver receives VOR/LOC on a frequency range from 108.000 MHz to 117.950 MHz with 50 kHz spacing. The NAV has glideslope capability and glideslope is received from 329.150 to 335.000 MHz in 150 kHz steps. The receiver control provides active and standby frequency indication, frequency memory storage, and knob-operated frequency selection. IDENT audio output for VOR and LOC is provided to the audio system. The NAV antenna, mounted on top of the vertical tail, provides VOR/LOC input for the NAV receiver. 12 VDC for navigation receiver operation is controlled through the Avionics Switch and supplied through the NAV circuit breaker on the Avionics Bus.



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SUPPLEMENT

9-S3

SECTION 9 – SUPPLEMENT 9-S3

Night-VFR operations

When the aircraft is equipped with the applicable NVFR equipment as defined by the applicable TCDS, this POH Supplement is applicable and must be inserted in the Supplements Section of the Pilot Operating Handbook. 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 8: HANDLING AND SERVICING	NO CHANGE

SECTION 9
SUPPLEMENT 9-S3

Night-VFR operations

Signature: _____

Stamp: _____

Date of Approval: _____



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SECTION 3: EMERGENCY PROCEDURES

3.22 NIGHT- VFR FLYING

3.22.1 LOSS OF INSTRUMENT, CABIN OR FUEL-TANK LEVEL LIGHTING

Use the flash light to illuminate the area where lighting is lost. Continue flight towards a safe landing.

3.22.2 TOTAL LOSS OF ELECTRICAL POWER

If both displays along with the associated attitude indication, stop working, the nearest airport should be immediately approached. In case of poor visibility (i.e. flying over the sea at night, etc.), situation awareness may be lost, leading to additional problems or loss of control over aircraft.

In this case it is recommended to perform *BPRS deployment emergency procedure*.

3.22.3 LOSS OF ATTITUDE REFERENCE

This section considers the loss of attitude reference for example due to loss of external visual references (inadvertent flight into IMC) or pilot disorientation.

WARNING:

- The pilot should always maintain external visual attitude reference!
- The pilot should not rely only on the attitude indicator for attitude evaluation!
- Carefully check the weather forecast along the route prior to take-off to ensure VMC conditions can be maintained for the entire duration of the flight.

Should the visibility deteriorate to a point at which the pilot can no longer determine the aircraft's attitude by external visual references, the digital attitude indicator may be used as an aid to regain situational awareness and resume controlled flight to return to VMC conditions.

An additional means to recover from loss of attitude reference is the LVL

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button on the autopilot panel. Activating the LVL button will engage the autopilot in Level Hold mode (both lateral and vertical) and will automatically bring the aircraft in level flight. For more information about the LVL button see *Section 7.16 - Autopilot*.

In case the pilot is unable to determine the aircraft's attitude and regain controlled flight, perform *BPRS deployment emergency procedure*.

SECTION 4: NORMAL PROCEDURES

4.18 NIGHT-VFR OPERATIONS

Virus SW 121 is not an IFR approved type. When flying Night-VFR, the primary means of flying remain the external visual references which cannot be replaced with instruments. Therefore, when planning to perform night VFR flying, the necessary conditions should reasonably be expected to be maintained for the entire duration of the flight.

WARNING:

- Pilot should always maintain external visual attitude reference!
- Pilot should not rely on the attitude indicator for attitude evaluation!
- Pilot should not fly over areas with limited visual reference (e.g. above sea)!
- Carefully check the weather forecast along the route prior to take-off.
- Good visibility should reasonably be expected to be maintained for the entire duration of the flight.

4.18.1 EXTERNAL LIGHTS

Taxi, take-off, landing: turn-on the landing light to illuminate the taxiway surface.

All flight phases: keep NAV/AC lights ON for the entire duration of the flight.

4.18.2 INTERNAL LIGHTS

Instrument and avionic lights: set the dimmer to AUTO for automatic brightness control. Use the MANUAL mode to set the desired brightness manually.

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CAUTION: Do not dim the lights up too quickly in a very dark environment, as this could be temporarily blinding.

Cabin-lights: turn ON whenever there is a need to illuminate the cabin and/or the kneeboard. Turn OFF the cabin light when not needed in order to improve outside visibility.

Fuel-tank level lights: turn ON only for the time needed to evaluate the fuel quantity, then turn OFF.

SECTION 7: SYSTEM DESCRIPTION

7.19 NIGHT- VFR EQUIPMENT

Equipment for Night-VFR operations:

- Back-illuminated analogue instruments
- Back illuminated EFIS, EMS, COM, XPDR
- Dimmer »Pipistrel Smart-dim«
- Fuel tank level LED lights, (Figure 5)
- Cabin lights, (Figure 4)
- Glare-shield UV-LED lights, (Figure 3)
- Breakers UV-LED lights, (Figure 6)
- Complete set of placards made of self-illuminating material.
- Red personal flash-light should always be present on board.

Pilot interface for night operation:

- Switch for the cabin lights, located in the central column
- Switch for the fuel tank level lights, located on the instrument panel
- Dimmer display and knob, located on the top-left side of the instrument panel

The cabin light switch has labeled 2 positions: ON and OFF, corresponding its function.

The fuel tank level light switch has two labeled 2 positions: ON and OFF, corresponding its function.

The dimmer provides dimming function for all avionics, instruments, switches, breakers and lights at once. It features a **MANUAL** mode, which allows the pilot to dim the lights at the desired brightness lever by means of rotating a knob; and an **AUTO** function, which self-dims the lights based on the brightness sensor reading. For instructions on how to use the functions of the smart-dim, consult Section 7-Airplane Description of the Virus SW 121 main POH.



Figure 3
Glare-shield and breakers
UV-LED lights



Figure 4
Cabin lights



Figure 5
Fuel tank level LED lights



Figure 6
Circuit breakers UV-LED lights



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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 9
SUPPLEMENT 9-S4

Aerotowing operations

Signature: _____

Stamp: _____

Date of Approval: _____



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SECTION 2: LIMITATIONS

2.15 KINDS OF OPERATION

2.15.1 MINIMUM LIST OF EQUIPMENT

Aerotowing operations

NOTE: The following additional minimum equipment is required while performing aerotowing operations.

SYSTEM, INSTRUMENT, EQUIPMENT	MLE - Required for Kind of Operation		
	VFR Day	VFR Night	Remarks
Aerotowing mirror(s)	1/2	-	The number of mirrors depends on the installed configuration (fuselage or wing mounted).

2.16 OPERATIONAL RESTRICTIONS

2.16.1 RESTRICTIONS FOR AEROTOWING OPERATIONS

Take-off 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

2.18 PLACARD

2.18.1 PLACARDS (EXTERNAL)

On the tow release (optional):



2.18.3 PLACARDS (INSTRUMENT PANEL)

Next to the tow hook release handle (optional):



APPROVED

SECTION 3: EMERGENCY PROCEDURES

3.23 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.

3.23.1 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 breakes

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.

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SECTION 4: NORMAL PROCEDURES

4.19 AEROTOWING

This paragraph contains recommendations and establishes guidelines for operational consideration.

NOTE: Total take-off distance is limited by certification basis to be less than 500 m. This is achieved by limiting the take-off 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 TAKE-OFF:

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

TAKE-OFF:

3	Take-off 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 safe.

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 TAKE-OFF

Data is valid for a hard-surface runway.

TOWED GLIDER MASS	GROUND ROLL (ISA – Sea level)	TAKE-OFF 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.

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SECTION 6: WEIGHT AND BALANCE

6.2 C.G. SAMPLE CALCULATION

Towing mirror(s)

When the aircraft is equipped with the towing mirror(s), the following contributions shall be added to the weight and balance calculation performed in Section 6.2 of the POH. Depending on the towing mirror configuration installed, the first or the second item applies.

	WEIGHT [kg]	ARM [mm]	MOMENT [kgmm]
Wing mounted mirror	0.86	400	344
Fuselage mounted mirrors	1.63	-333	-543

APPROVED

SECTION 7: AIRPLANE DESCRIPTION

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

Towing mirror

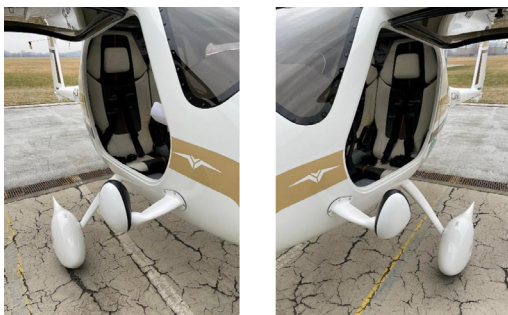
Two configurations are available: wing mounted mirror or fuselage mounted double mirrors.

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



Wing mounted towing mirror

Alternatively, a mirror can be installed on each side of the fuselage.



Fuselage mounted towing mirrors

SECTION 8: HANDLING AND SERVICING

8.8 RIGGING

8.8.3 TOWING MIRROR REMOVAL AND INSTALLATION

Towing Mirror Installation (wing mounted mirror)

Required parts, materials and tools:

- T-Handle hex head screwdriver set

Step	Action
1	Remove the left wing tie down point cover.
2	Screw the mirror mount into the left wing tie down point threaded hole.
3	Pass an Allen key or a screwdriver through the hole located at the mirror mount's base, and tighten it in place.

NOTE: the mirror can be adjusted by untightening/tightening the three screws located behind the mirror itself.

Towing Mirror Removal (wing mounted mirror)

Required parts, materials and tools:

- T-Handle hex head screwdriver set

Step	Action
1	Pass an Allen key or a screwdriver through the hole located at the mirror's mount base and tighten it in place.
2	Unscrew the mirror mount from the wing and remove the mirror assembly.
3	Install the tie down point cover.

Towing Mirror Installation (fuselage mounted mirrors)

Required parts, materials and tools:

- T-Handle hex head screwdriver set

Step	Action
1	Position the left mirror on the left fuselage attachment point.
2	Fix the mirror in place by tightening the five M5x16 hexagon socket button head screws.
3	Install the right mirror repeating steps 1 and 2 on the right side of the aircraft.

Towing Mirror Removal (fuselage mounted mirrors)

Required parts, materials and tools:

- T-Handle hex head screwdriver set

Step	Action
1	Unscrew the five M5x16 hexagon socket button head screws and remove the left mirror.
2	Repeat step 1 on the right side of the aircraft and remove the right mirror.



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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.

TABLE OF CONTENTS

POH SECTIONS	STATUS
SECTION 1: GENERAL	NO CHANGE
SECTION 2: LIMITATIONS	ADDED
SECTION 3: EMERGENCY PROCEDURES	NO CHANGE
SECTION 4: NORMAL PROCEDURES	NO CHANGE
SECTION 5: PERFORMANCE	NO CHANGE
SECTION 6: WEIGHT AND BALANCE	NO CHANGE
SECTION 7: SYSTEM DESCRIPTION	ADDED
SECTION 8: HANDLING AND SERVICING	NO CHANGE

SECTION 9
SUPPLEMENT 9-S5

FLARM EQUIPMENT

Signature: _____

Stamp: _____

Date of Approval: _____



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SECTION 2: LIMITATIONS

2.18 PLACARDS

2.18.3 PLACARDS (INSTRUMENT PANEL)

This placard is positioned on the left side wall of the 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 121. 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.

7.15.6 FLARM EQUIPMENT

If the optional AIR Traffic AT-1 by AIR Avionics unit is installed, the airplane is equipped with an FLARM system. The device is integrated in the G3X system and uses the PFD/MFD 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.

Please refer to Garmin G3X Pilot's Guide - Section 7.3 - for additional information about traffic collision avoidance system.

SUPPLEMENT

9-S6

SECTION 9 – SUPPLEMENT 9-S6

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.

TABLE OF CONTENTS

POH SECTIONS	STATUS
SECTION 1: GENERAL	NO CHANGE
SECTION 2: LIMITATIONS	NO CHANGE
SECTION 3: EMERGENCY PROCEDURES	NO CHANGE
SECTION 4: NORMAL PROCEDURES	NO CHANGE
SECTION 5: PERFORMANCE	NO CHANGE
SECTION 6: WEIGHT AND BALANCE	NO CHANGE
SECTION 7: SYSTEM DESCRIPTION	NO CHANGE
SECTION 8: HANDLING, SERVICING AND MAINTENANCE	ADDED

SECTION 9
SUPPLEMENT 9-S6

AIRCRAFT HOIST SYSTEM

Signature: _____

Stamp: _____

Date of Approval: _____



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SECTION 8: HANDLING AND SERVICING

8.6 GROUND HANDLING

8.6.6. 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.

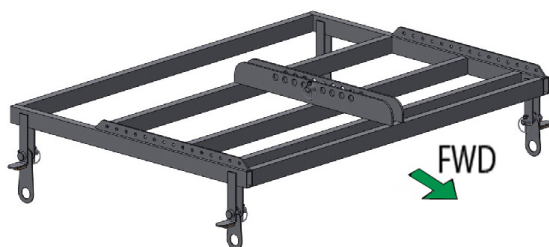
To lift the aircraft:

- 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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