Sling 2

SERIAL NO : ____________

REGISTRATION : ____________

DC-POH-002-X-B-2.8

PILOT OPERATING HANDBOOK

DATE: JANUARY 2026

REVISION 2.8

SLING AIRCRAFT | HANGAR 8 | TEDDERFIELD AIRPARK | JHB SOUTH | EIKENHOF | 1872 | SOUTH AFRICA
PO BOX 308 | EIKENHOF | 1872 | SOUTH AFRICA
Phone: +27 11 948 9898 | Information: technical@slingaircraft.com

Airplane model :	**Sling 2**
Manufacturer :	**Sling Aircraft (Pty) Ltd**
Airplane Serial Number :	**……………………………….**
Date of Construction :	**………………………………..**
Registration :	**…………………………………**
Airworthiness Category :	**CS-VLA (Very Light Aircraft)**
Issue Date of POH :	**30/01/2026**

PLEASE ADVISE SLING AIRCRAFT ON CHANGE
OF OWNERSHIP OF THE AIRCRAFT

This airplane must be operated in compliance with information and limitations contained herein. This pilot operating handbook must be available on board of the airplane at all times.

NOTICE

THIS MANUAL IS WRITTEN FOR THE STANDARD 912 ULS POWERED SLING 2, AS MANUFACTURED ON PREMISES BY SLING AIRCRAFT (PTY) LTD. DIFFERENCES APPLICABLE TO THE STANDARD 914 UL AND THE 912 iS, 915 iS OR 916 iS POWERED SLING 2 AIRCRAFT, AS MANUFACTURED ON PREMISES BY SLING AIRCRAFT (PTY) LTD, ARE INCLUDED IN APPLICABLE SUPPLEMENTS IN SECTION 9 OF THIS HANDBOOK.

AIRCRAFT WHICH DIFFER FROM THE PRODUCTION STANDARD, IN WHATEVER WAY, ARE NOT ADDRESSED IN THIS MANUAL, EXCEPT TO THE EXTENT SAID AIRCRAFT CORRESPOND WITH THE PRODUCTION STANDARD.

NOTICE

THIS EDITION OF THIS MANUAL IS APPLICABLE TO AIRCRAFT REGISTERED IN THE REPUBLIC OF SOUTH AFRICA. DEFINITIONS ARE ACCORDINGLY CONSISTENT WITH RSA REGULATIONS ONLY.

RECORD OF REVISIONS

Any revisions to this Pilots Operating Handbook must be recorded in the following table, and, where applicable, be endorsed by the responsible airworthiness authority.

Revision numbers and dates appear at the foot of each page.

Rev No.	Affected Section	Affected Pages	Date of Issue	Approved by	Date of approval	Date inserted	Sign.
1.1	All	All	2011/04/20	A Pitman	2011/04/20	2011/04/20	[signature]
1.2	All	All	2012/03/12	A Pitman	2012/03/12	2012/03/12	[signature]
1.3	All	All	2012/05/10	A Pitman	2012/05/10	2012/05/10	[signature]
2.0	All	All	2012/06/04	A Pitman	2012/06/04	2012/06/04	[signature]
2.1	2	7	2012/09/01	A Pitman	2012/09/01	2012/09/01	[signature]
2.2	All	All	2012/11/01	A Pitman	2012/11/01	2012/11/01	[signature]
2.3	All	All	2014/11/10	A Pitman	2014/11/10	2014/11/10	[signature]
2.4	All	All	2015/04/07	A Pitman	2015/04/07	2015/04/07	[signature]
2.5	9	9-52 – 9-56	2017/12/08	Andrew Pitman	2017/12/08	2017/12/08	[signature]
2.6	1,2,4,6,7,8,9	43	2018/08/01	Andrew Pitman	2018/08/01	2018/08/01	[signature]
2.7	9	13	2019/06/10	Andrew Pitman	2019/06/10	2019/06/10	[signature]
2.8	1,2,6,7,9	See List of Manual Revisions	2026/01/30	Andrew Pitman	2026/01/30	2026/01/30	[signature]

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1 GENERAL INFORMATION

1.1 Introduction to airplane

The Sling 2 is a two-seat (side-by-side), single engine, tricycle undercarriage aluminium aircraft with a conventional low wing design.

The aircraft is based upon the EASA CS-VLA (Certification Standard Very Light Aircraft) standard, having a maximum all up weight of 700 kg.

With only minor modifications to the aircraft and the application of a revised Pilot Operating Handbook the Sling 2 may be made to comply with the requirements of the FAA Light Sport Aircraft (LSA) category according to ASTM Standards F2245, F2279 and F2295. In this configuration the Sling 2 is known as the Sling LSA.

The Sling 2 is intended chiefly for recreational and cross-country flying. It is not intended for aerobatic operation. It is considered to be suitable for use as a trainer. This Pilot Operating Handbook has been prepared to provide pilots with information for the safe and efficient operation of the Sling 2.

1.2 Warnings, cautions and notes

The following definitions apply to warnings, cautions and notes in the Pilot Operating Handbook.

WARNING

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

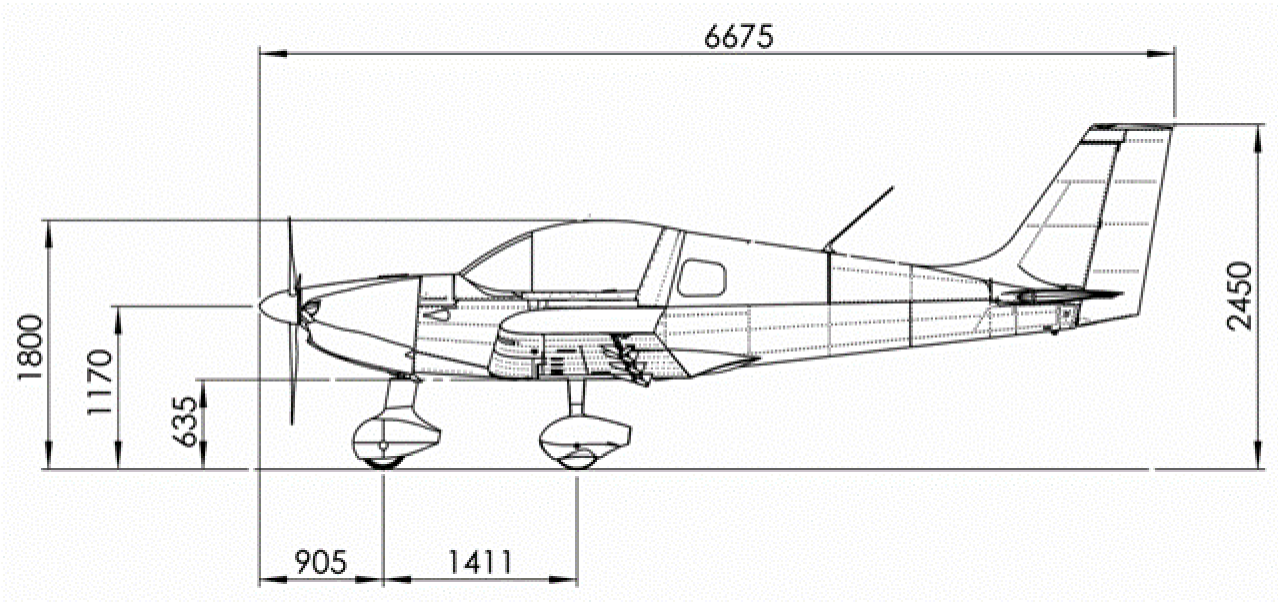
CAUTION

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

NOTE

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

1.3 Aircraft 3-view drawing



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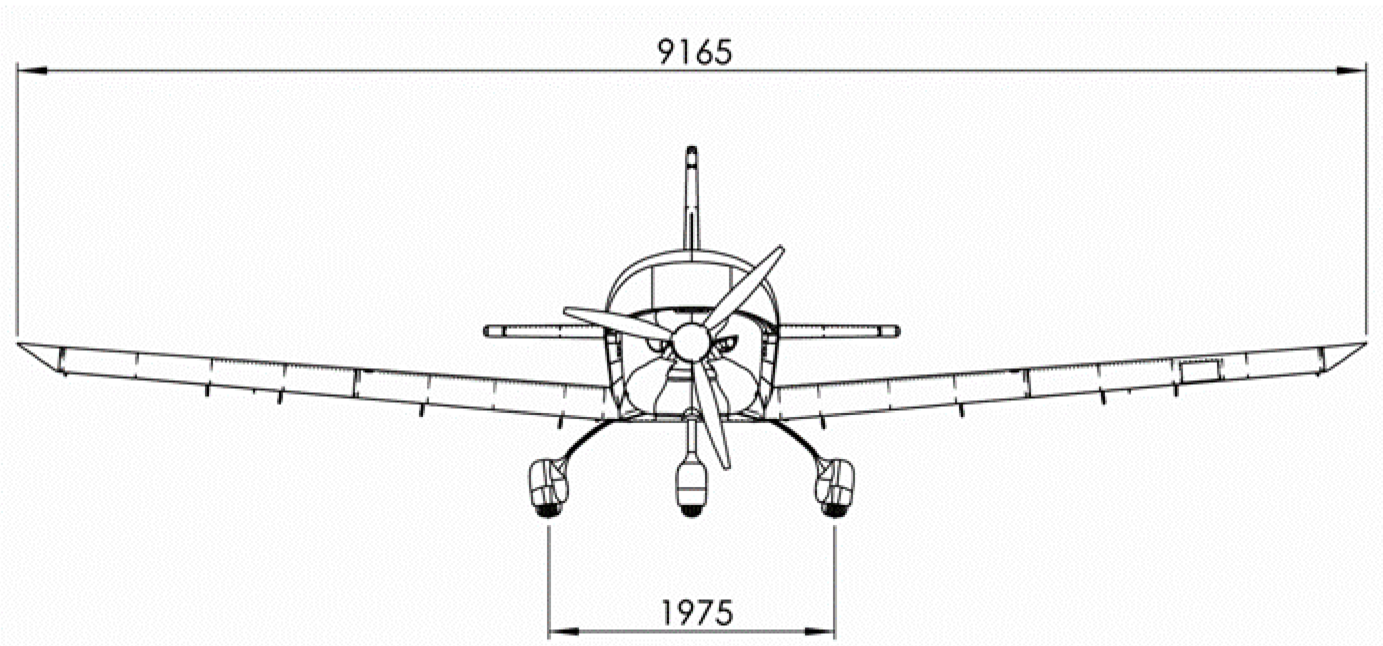

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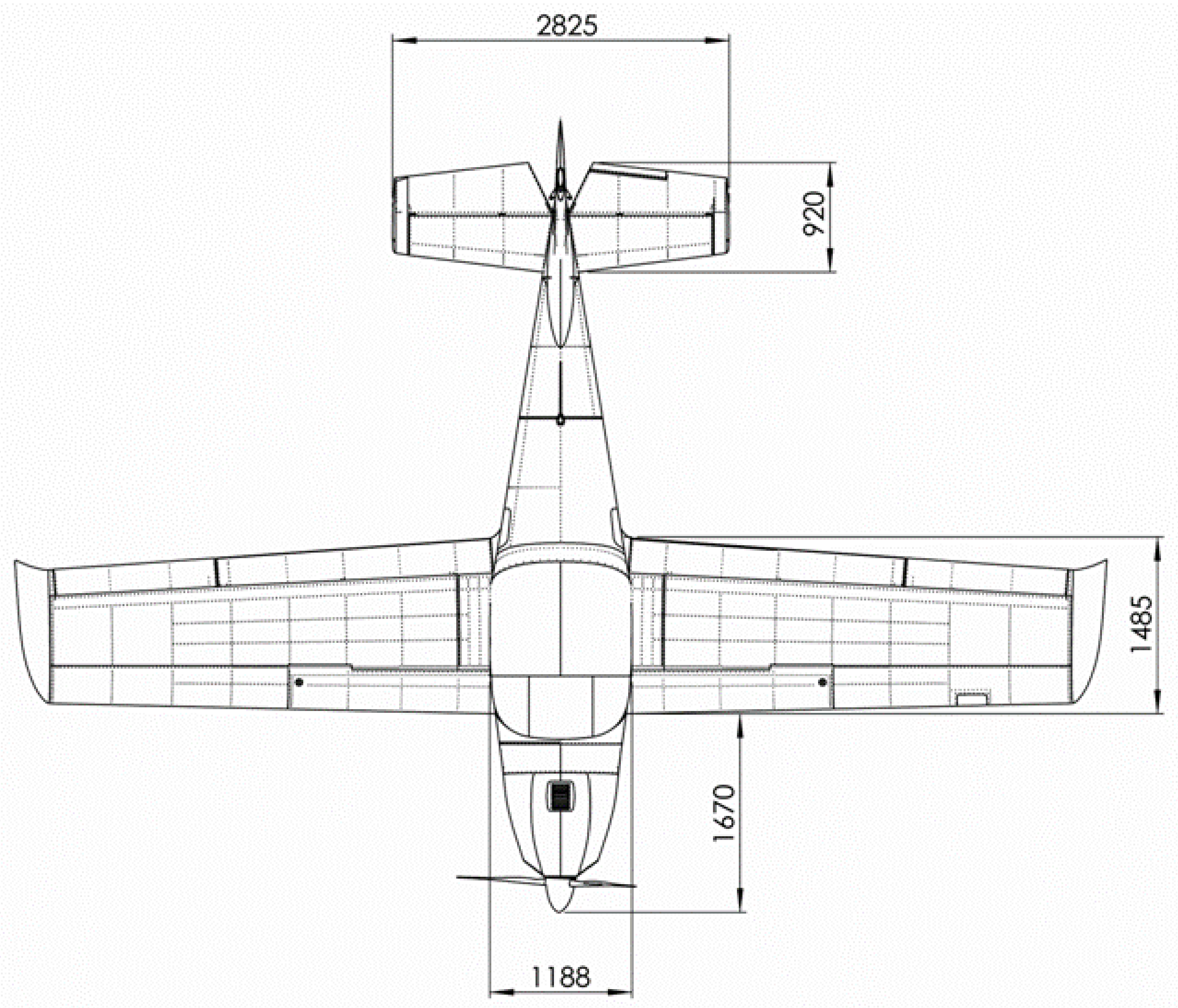


1.4 Data for Sling 2 aircraft and systems

WING		
Wing span:	9.165 m	30 ft
Mean Aerodynamic Chord:	1.339 m	52.7 inch
Wing surface area:	11.845 m^2	131.75 sq ft
Wing loading:	59.10 kgm^{-2}	11.7 lbs /sq ft
Aspect ratio:	7.04	
Taper ratio:	1.375	
Dihedral:	5°	
FUSELAGE		
Fuselage length:	5.77 m	19 ft
Overall length:	6.675 m	21ft 11 inch
Overall width:	1.18 m	45 inch
Overall height:	2. 45m	98 inch
EMPENNAGE		
Horizontal stabilizer span:	2.825 m	9 ft 3 inch
Horizontal stabilizer surface area:	0.96 m^2	10 ft^2
Elevator surface area:	1.02 m^2	11 ft^2
Horizontal stabilizer angle of incidence	-4°	
Vertical stabilizer span:	1.47 m	16 ft
Vertical stabilizer surface area:	0.53 m^2	6 ft^2
Rudder surface area:	0.59 m^2	6 ft^2
LANDING GEAR		
Wheel track:	1.95 m	6 ft 5 inch
Wheel base:	1.41 m	4 ft 6 inch
Brakes:	Hydraulic.	
Main gear tyres:	15x6.00-6, 6-ply (2.2 bar (31.908 psi) pressure).	

Nose gear tyres:	5.00-5, 6-ply (1.8 bar (26.107 psi) pressure)

CONTROL SURFACE TRAVEL LIMITS

Ailerons:	24° up and down (±2°)
Elevator:	30° up and 20° down (±2°)
Trim tab:	8° up and 20° down (±5°)
Rudder:	21° left and right (-2° / +14°)
Flaps:	0° to 30° down (±3°)

ENGINE

Manufacturer:	BRP-Rotax GmbH & Co KG .
Model:	912 ULS.
Type:	4 Cylinder horizontally opposed with overall displacement 1 352 cc, mixed cooling (water-cooled heads and air-cooled cylinders), twin carburetors, integrated reduction gearbox with torque damper
Maximum power:	73.5 kW (98.5hp) at 5 800 rpm (max 5 minutes). 69 kW (92.5hp) at 5 500 rpm (continuous).

For Sling 2 aircraft fitted with the 912 iS, 914 UL, 915iS or 916iS engine refer to the applicable supplement at the end of this manual.

PROPELLER

Fixed Pitch Propellers

Manufacturers	Hub - Airmaster Blades - Warp drive or Whirlwind DUC
Number of Blades	3, Composite
Diameter	Warp drive 72"/ 1.83m Whirlwind 70" / 1.79m DUC Inconel Flash 68.9" / 1.75m

Constant Speed Propellers

Parameter / Item	Value
Manufacturers	Airmaster hub, with Sensenich or Whirlwind Blades[1], or, MT MTV-6/190-69[2] or DUC FlashBlack-3-R[3]
Model	AP431HCTF-WWR72B *or* AP431HCTF-SNR72K or MTV-6-A/190-69 *or* MTV-6-R/190-69 *or* FlashBlack-3-R
Number of Blades	3, Composite or 4, Composite (only for DUC propeller)
Diameter	AP430CTF-SNR72K 72"/ 1.83m MTV-6/190-69 75" / 1.90m FlashBlack-3-R 75" / 1.90m

For aircraft fitted with the Airmaster 332 constant speed propeller refer to the applicable supplement at the end of this manual.

[1] To be used with a Rotax 915 iS only.
[2] To be used with either a Rotax 915 iS or a 916 iS.
[3] To be used with a Rotax 916 iS only.

FUEL

Fuel grade: Minimum RON 95 / minimum AKI 91.
MOGAS: EN 228 Super, EN 228 Super plus, ASTMD4814.
Leaded AVGAS: AVGAS 100LL (ASTM D910).
Unleaded AVGAS: UL91 (ASTM D7547).

(Refer to latest revision of engine operator / maintenance manual and latest revision of service instruction SI-912-016. For aircraft fitted with the 912 iS or 914 UL engine refer to the applicable supplement at the end of this manual).

Fuel tanks: 2 x Wing tanks, one tank integrated within each wing leading edge, each tank equipped with finger strainers (in pick up line) and drain fittings.

Capacity of each tank: 75 litres (19.81 US gallons)
Total capacity: 150 litres (39.63 US gallons)
Total usable fuel: 146 litres (38.57 US gallons)

Brake System

Parameter / Item	Value	
Brake System	MATCO Brakes Beringer Brakes	
Brake Fluid	MATCO	MIL-H-5606 / MIL-H-83282
	Beringer	MIL-PRF-87257

OIL SYSTEM

Oil system type:	Forced, with external oil reservoir.
Oil:	Shell AeroShell Oil Sport Plus 4 with specification RON 424 with viscosity SAE 10W-40. XPS Full Synthetic Aviation Engine Oil with specification RON 451 with viscosity SAE 5W-50. (Refer to latest revision of engine operator / maintenance manual and latest revision of service instruction SI-912-016. For aircraft fitted with the 912 iS or 914 UL engine refer to the applicable supplement at the end of this manual).
Capacity:	3.5 litres / 7.4 pints (approximately).

COOLING

Cooling system:	Mixed: air and liquid pressurized closed circuit system.
Coolant:	1. Conventional coolant based on ethylene glycol with 50% water content. 2. Waterless coolant based on propylene glycol applicable for engine S/N without suffix -01. Do not use waterless coolant based on propylene glycol for operation of 912i Series **Note: Do not mix the above types of coolant.**
Capacity:	2.5 litres / 5.28 pints (approximately).

MAXIMUM WEIGHTS

Maximum take-off weight:	700 kg	1 543.23 lb
Maximum landing weight:	700 kg	1 543.23 lb
Maximum baggage weight:	35 kg	77 lb
Main Fwd luggage compartment maximum		35 kg (77 lb)
Main Aft luggage compartment maximum		25 kg (55 lb)

STANDARD WEIGHTS

Standard empty weight:	370 kg	814 lb
Maximum useful load:	330 kg	726 lb

SPECIFIC LOADINGS

Wing loading:	59.07 $kg.m^{-2}$	11.69 $lb.ft^{-2}$
Power loading:	7.00 kg/hp	15.4 lb/hp

1.5 Terminology, symbols and conversion factors

General terminology / acronyms

AC	Alternating Current.
ALT	Altimeter.
API	American Petroleum Institute
ASI	Airspeed Indicator.
ASTM	American Society for Testing and Materials
AKI	Anti-Knock Index
AVGAS	Aviation gasoline.
COM	Communication (radio).
CS-VLA	Certification Standard Very Light Aircraft
EASA	European Aviation Safety Agency
EFIS	Electronic Flight Information System.
FAA	Federal Aviation Authority.
GLS	GPS Landing System.
GmbH	Gesellschaft mit beschränkter Haftung (company with limited liability).
GPS	Global Positioning System.
IFR	Instrument Flying Rules.
IMC	Instrument Meteorological Conditions.
LED	Light Emitting Diode.
LSA	Light Sport Aircraft
MOGAS	Automobile (car) gasoline.
NGL	Normal Ground Line.
NRV	Non-Return Valve.
POH	Pilot Operating Handbook.
PTT	Push-To-Talk (button).
RON	Research Octane Number
RSA	Republic of South Africa
VFR	Visual Flying Rules.
VMC	Visual Meteorological Conditions.
VSI	Vertical Speed Indicator.

General airspeed terminology and symbols

IAS	Indicated Airspeed.
KCAS	Calibrated Airspeed, being the indicated airspeed corrected for position and instrument error, expressed in knots.
KIAS	Indicated Airspeed, being the speed shown on the airspeed indicator, expressed in knots.
KTAS	True Airspeed, being the airspeed, expressed in knots, relative to undisturbed air, and which is KCAS corrected for altitude and temperature.
TAS	True Airspeed.
V_A	Maneuvering speed.
V_{BG}	Best Glide Speed, being the speed (at MAUW) which results in the greatest gliding distance over the ground.
V_{FE}	Maximum Flap Extended Speed, being the highest speed permissible with wing flaps deployed.
V_H	Maximum Speed in level flight at maximum continuous power.
V_{LOF}	Lift-off Speed, being the speed at which the aircraft generally lifts off from the ground during take-off.
V_{NE}	Never Exceed Speed, being the speed that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed, being the speed that should not be exceeded, except in smooth air, and then only with caution.
V_{REF}	Indicated airspeed at 15 m (50 ft) above threshold, which is not less than $1.3V_{so}$.
V_{ROT}	Rotation Speed, being the speed at which the aircraft should be rotated about the pitch axis during take-off (i.e. the speed at which the nose wheel is lifted of the ground).
V_S	Stall Speed, maximum weight, engine idling, flaps fully retracted.
V_{SO}	Stall Speed in landing configuration (flaps fully extended), MAUW, engine idling.

V_X	Best Angle of Climb Speed, being the speed (at MAUW, flaps fully retracted) which results in the greatest altitude gain over a given horizontal distance (i.e. highest climb angle).
V_Y	Best Rate of Climb Speed, being the speed (at MAUW, flaps fully retracted) which results in the greatest altitude gain over a given time period.

Meteorological terminology

ISA	International Standard Atmosphere.
QNH	The local pressure setting that if set on the subscale of an altimeter will cause the altimeter to indicate local altitude above mean sea level.
QFE	The local airfield pressure setting that if set on the subscale of an altimeter will cause the altimeter to indicate local height above airfield.

Engine terminology

CHT	Cylinder Head Temperature.
EGT	Exhaust Gas Temperature.
OHV	Overhead Valve.
RPM/ rpm	Revolutions per minute, being the number of revolutions per minute of the engine crank.
TCU	Turbocharger Control Unit

Airplane performance and flight planning terminology

Crosswind component	The velocity of the crosswind component for which adequate control of the aircraft during takeoff and landing can be demonstrated.
g	The acceleration / load factor.
Landing run	The distance measured during landing from actual touchdown to the end of the landing run.
Landing distance	The distance measured during landing from clearance of a 15 m obstacle (in the air) to the end of the landing run.
Take-off distance	The take-off distance measured from the actual start of the take-off run to clearance of a 15 m (50 ft) obstacle (in the air).
Take-off run	The take-off distance measured from actual start of the take-off run to the wheel lift off point.
Usable fuel	The fuel available for flight planning.

Weight and balance terminology and symbols

Arm	The horizontal distance from the reference datum to the centre of gravity of an item.
CG	Centre of Gravity, being the point at which the airplane, or equipment, would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the airplane.
Datum	Reference datum is an imaginary vertical plane from which all horizontal distances are measured for balance purposes. (In the Sling this plane runs through the centre point of the flat front face of the engine flange of the Rotax engine).
Empty weight	The weight of the airplane with engine fluids and oil at operating levels.
MAC	Mean Aerodynamic Chord.
MAUW	Maximum All Up Weight.
Maximum Landing Weight	The maximum weight approved for the landing touch down.
Maximum Take-off Weight	The maximum weight approved for the start of the take-off run.
Moment	Is the product of the weight of an item multiplied by its arm.

W_R	Weight read from scale under right main wheel during aircraft weighing.
W_L	Weight read from scale under left main wheel during aircraft weighing.
W_N	Weight read from scale under nose main wheel during aircraft weighing.
W_E	Aircraft empty weight.
W_T	Aircraft total weight.
W_{MAUW}	Aircraft maximum (allowed) all up weight.
L_R	Right main wheel arm (aft of reference).

L_L	Left main wheel arm (aft of reference).
L_N	Nose wheel arm (aft of reference).
M_T	Total moment arm.

Useful conversion factors

1 pound	=	0.4536 kilogram
1 pound per square inch	=	6.895 kilopascal
1 inch	=	25.4 millimetres
1 foot	=	0.3048 metre
1 statute mile	=	1.609 kilometres
1 nautical mile	=	1.852 kilometres
1 millibar	=	1 hectopascal
1 millibar	=	0.1 kilopascal
1 imperial gallon	=	4.546 litres
1 US gallon	=	3.785 litres
1 US quart	=	0.946 litre
1 cubic foot	=	28.317 litres
degrees Fahrenheit	=	[1.8 x degrees Celsius] + 32
degrees Celsius	=	(degrees Fahrenheit - 32) x (5/9)

1.6 Supporting documents

The following documents are regarded as supporting documents to this Pilot Operating Handbook:

1. For aircraft fitted with 914 UL engines: latest revision / edition of the Operators Manual For Rotax® Engine Type 914 Series, Ref No.: OM-914.

2. For aircraft fitted with 912 ULS engines: latest revision / edition of the Operators Manual For Rotax® Engine Type 912 Series, Ref No.: OM-912.

3. For aircraft fitted with 912 iS engines: latest revision / edition of the Operators Manual For Rotax® Engine Type 912 i Series, Ref No.: OM-912 i.

4. For aircraft fitted with an Airmaster constant speed propeller: latest revision / edition of the Airmaster AP3 series And AP4 Series Constant Speed Propeller Operators Manual.

5. Latest revision / edition of Rotax service instruction SI-914-019, SI-912-016 or SI-912i-001, as applicable (to type of engine fitted).

6. Garmin G3X Installation Manual.

7. Operator manuals for COM radio and transponder (if fitted) equipment fitted to the aircraft.

8. Latest revision / edition of the Stratos 07 Magnum ballistic parachute manual for mounting and use, where applicable.

Reference should be made to these documents for operational guidelines and instructions. These should be incorporated into the normal and emergency procedures for the aircraft as applicable.

2 LIMITATIONS

2.1 Introduction

This section includes operating limitations, instrument markings and basic placards necessary for the safe operation of the Sling 2, its engine, systems and equipment.

2.2 Airspeed limitations

SPEED		KIAS	REMARKS
V_{NE}	Never exceed speed	135	Never exceed this speed in any operation.
V_{NO}	Maximum structural cruising speed	110	Never exceed this speed unless in smooth air, and then only with caution.
V_A	Maneuvering speed	91	Do not make full or abrupt control movements above this speed as this may cause stress in excess of limit load factor.
V_{FE}	Maximum flap extended speed	85	Never exceed this speed unless the flaps are fully retracted.
V_H	Maximum speed in level flight	116	The aircraft will not exceed this speed at MAUW in level flight, at maximum continuous power.
V_S	Stall speed (at MAUW)	46	At maximum all up weight in the most forward CG configuration, with flaps fully retracted, engine idling, the aircraft will stall if flown slower than this speed.

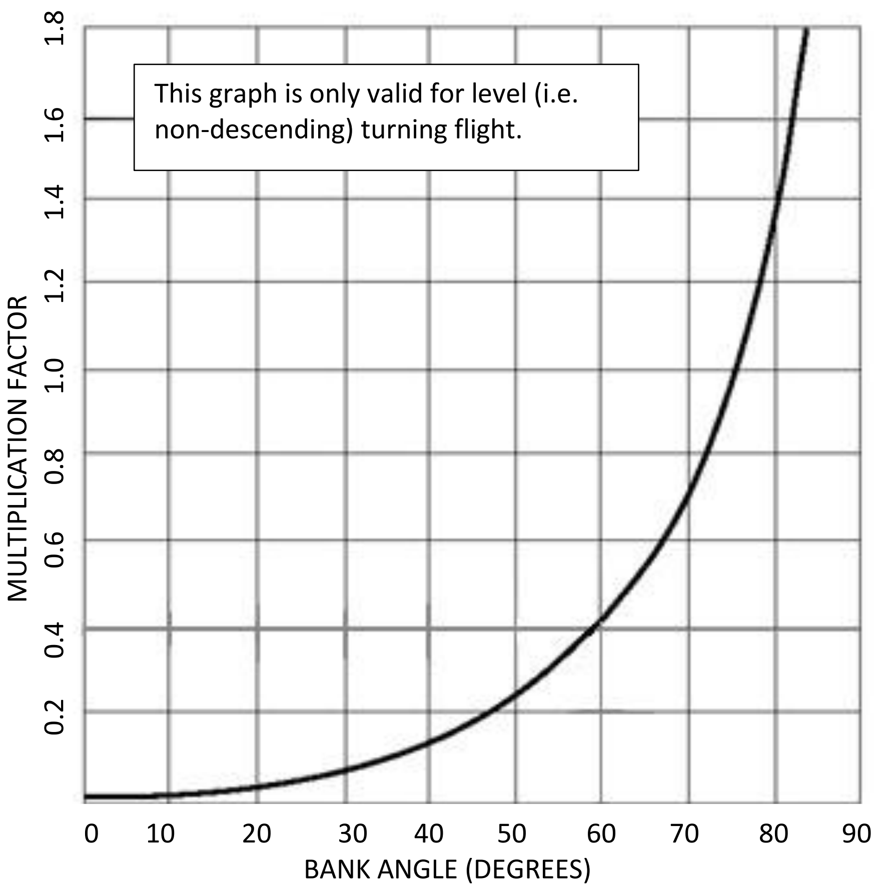
V_{S0}	Stall speed with flaps	42	With full flap, maximum all up weight, engine idling, the aircraft will stall if flown slower than this speed.

2.3 Airspeed indicator markings

MARKING	KIAS	SIGNIFICANCE
White arc	42-84	Flap Operating Range (lower limit is V_{S0} at maximum weight, and upper limit is the maximum speed (V_{fe}) permissible with flaps deployed).
Green arc	46-105	Normal Operating Range (lower limit is V_S at maximum weight, most forward CG with flaps retracted, engine idling; upper limit is maximum structural speed VNO).
Yellow arc	105-135	Manoeuvres must be conducted with caution and only in smooth air.
Red line	135	Maximum speed for all operations.

2.4 Stall speed adjustment for turning flight and load factor

Stall speeds listed in Section 2 (this section) are listed for straight and level (non-turning) flight at load factor = 1 g and should be adjusted for turning flight or increased load factor:



$V_T = V + (V \times \text{MULTIPLICATION FACTOR})$

- V is straight and level stall speed (at load factor = 1 g).
- V_T is stall speed in turn (non-descending).

$V_{ST} = V\sqrt{N}$

- V is straight and level stall speed (at load factor = 1 g).
- V_{ST} is stall speed due to increased load factor.
- N is (positive) load factor.

2.5 Crosswind and wind limitation (demonstrated)

Maximum demonstrated cross wind component for take-off and landing	15 kts

2.6 Service ceiling

Service ceiling	12 000 ft

2.7 Load factors

Maximum positive limit load factor	+ 4 g
Maximum negative limit load factor	- 2 g
Maximum positive load factor with flaps	2 g
Maximum negative load factor with flaps	-1 g

2.8 Weights

Maximum take-off weight	700 kg (1 543.24 lb)
Maximum landing weight	700 kg (1 543.24 lb)
Maximum total baggage weight	35 kg (77 lb)
Main Fwd luggage compartment maximum	35 kg (77 lb)
Main Aft luggage compartment maximum	25 kg (55 lb)

2.9 Centre of gravity range

Datum	Centre of front face of engine flange (without propeller extension).
Reference (longitudinal leveling)	Upper surface of canopy sliders on cockpit side skins, with canopy open.
Reference (transverse leveling)	Upper surface of centre spar cap under pilot and passenger seats.
Forward limit	1.635 m / 5.364 ft (20% MAC) aft of datum.
Rear limit	1.808 m / 5.931 ft (33% MAC) aft of datum.

WARNING
It is the pilot’s responsibility to ensure that the airplane is properly loaded. Refer to section 6 for information on weight and balance

2.10 Prohibited maneuvers

The Sling is approved for normal maneuvers including the following:

- Steep turns not exceeding 60° bank.
- Lazy eights.
- Chandelles.
- Stalls (not including whip stalls).

WARNING
Aerobatics and intentional spins are prohibited

WARNING
Limit load factor would be exceeded by moving flight controls abruptly to their limits at a speed above V_A (91 KIAS – maneuvering speed)

2.11 Flight crew

Minimum crew for flight is one pilot seated on the left or right side.

2.12 Passengers

Only one passenger is allowed on board the aircraft (in addition to the pilot).

2.13 Kinds of operation

The Sling 2, in standard configuration, is approved only for day VFR operation with visual contact with terrain.

Minimum equipment required is as follows-

- Altimeter with encoding transponder
- Airspeed indicator.
- Compass.
- Fuel gauges.
- Oil pressure indicator.
- Oil temperature indicator.
- Cylinder head temperature indicator.
- Outside air temperature indicator.
- Tachometer.
- Chronometer.
- First aid kit (compliant with national legislation).
- Fire extinguisher.

Subject to the legal requirements applicable in the country of registration, Sling 2 aircraft fitted with the following additional equipment may also be operated at night, provided that operations are at all times conducted in VMC and in accordance with VFR-

- Red Beacon / Strobe lights
- Navigation Lights
- Landing light/s (two separate lights or a single light with two independent filaments)
- Instrument panel lighting
- Serviceable hand torch per required crew member

NOTE
Additional equipment may be required to fulfill national or specific requirements and may be fitted.

WARNING
Notwithstanding that installed equipment may include GPS and other advanced flight and navigational aids, such equipment may not be used as the sole information source for purposes of navigation or flight, save where specifically permitted by law. The airplane instrumentation is not certified and applicable regulations should be complied with

NOTICE
Provided that the aircraft is appropriately equipped, the aircraft may also be safely flown in IMC and in accordance with IFR. The equipment required by and referred to in this Pilot Operating Handbook, however, anticipates only VFR flight in VMC. Pilots intending to fly in IMC and in accordance with IFR should ascertain the legal and practical requirements of the jurisdiction within which they will be operating the aircraft and must ensure that all required systems and instrumentation are fitted. It is the responsibility of the aircraft operator to ensure that all legal and safety requirements are met for IFR and/or IMC flight.

2.14 Engine operating limits

Instruments reflecting engine parameters should in each case be marked / set to reflect the minimum and maximum figures.

Always refer to latest edition / revision of the Operators Manual for latest information regarding operating limitations.

ENGINE START AND OPERATION TEMPERATURE LIMITS (912 ULS)	
Maximum	50 °C (122 °F) (ambient temperature)
Minimum	-25 °C (-13 °F) (oil temperature)

ENGINE LOAD FACTOR (ACCELERATION) LIMITS	
Maximum	5 seconds at maximum -0.5 g.

For airplanes with the Rotax 912iS or 914UL engine installed, refer to the applicable supplement at the end of this manual.

ENGINE OPERATING AND SPEEDS LIMITS (912 ULS)		
Engine Model:		ROTAX 912 ULS
Engine Manufacturer:		BRP-Rotax GmbH & Co KG
Power	Maximum take-off	73.5 kW (98.6 hp) at 5800 rpm, max. 5 min.
	Maximum continuous	69 kW (92.5 hp) at 5500 rpm
RPM	Maximum take-off	5800 rpm, maximum 5 minutes
	Maximum continuous	5500 rpm
	Idle	1 400 rpm (minimum)
Cylinder head temperature	Minimum	N/A
	Maximum	135 °C (275 °F)
	Normal	75 to 110 °C (167 to 230 °F)
Oil temperature	Minimum	50 °C (122 °F)
	Maximum	130 °C (266 °F)
	Normal	90 to 110 °C (194 to 230 °F)
EGT	Maximum	880 °C (1616 °F)
Coolant temperature	Maximum	120 °C (248 °F)
Oil pressure	Minimum	0.8 bar (12 psi) – below 3500 rpm
	Maximum	7 bar (102 psi) – permissible for short period during cold engine start
	Normal	2 to 5 bar (29 to 73 psi) – above 3500 rpm

2.15 Other limitations

- No smoking is allowed on board of the airplane.
- VFR flights only are permitted.

WARNING
IFR flights and intentional flights under icing conditions are prohibited!

2.16 Flight in rain

When flying in the rain no additional steps are required. Airplane qualities and performance are not substantially changed. However, VMC should be maintained.

2.17 Limitation placards

The following limitation warning placards must be placed in the aircraft and positioned in plain view of the pilot, passenger or third person, as the case may require.

On the instrument panel –

OPERATE UNDER VMC ONLY
MAXIMUM PERMISSABLE AIRSPEED 135 KIAS
MAXIMUM PERMISSIBLE RPM 5 800 RPM FOR 5 MINUTES
MAXIMUM CONTINUOUS RPM 5 500
MAXIMUM PERMISSIBLE MASS 700 KG/1 540 LB

In a place visible to pilot and passenger -

WARNING
NON-CERTIFIED AIRCRAFT
THIS AIRCRAFT IS NOT REQUIRED TO COMPLY WITH ALL THE REGULATIONS FOR TYPE CERTIFIED AIRCRAFT
YOU FLY IN THIS AIRCRAFT AT YOUR OWN RISK

NO SMOKING

WARNING
AEROBATICS AND INTENTIONAL SPINS ARE PROHIBITED

On the baggage space separator channel -

MAX BAGGAGE WEIGHT – FRONT SECTION – 35 KG / 77 LB
MAX BAGGAGE WEIGHT – REAR SECTION – 25 KG / 55 LB
MAX TOTAL BAGGAGE WEIGHT – 35 KG / 77 LB

Adjacent to the fuel filler caps -

AVGAS
OR
MOGAS
75 LITRES

On the inboard upper wing flap surface -

NO STEP

On a fireproof metal plate attached to the aircraft -

##-###
CONSTRUCTOR – SLING AIRCRAFT
MODEL – SLING 2
SERIAL NO – ###
ENGINE ROTAX 912 ULS – 100 HP
MANUFACTURED - ###

Note: ### represents the information applicable to the aircraft.

The airplane must be placarded to show the identity of:

- All fuses/circuit breakers.
- Magneto / ignition switches.
- All other switches.
- Choke.
- Starter.
- Trim: Nose up and down.
- Flaps: Up and Down.

3 EMERGENCY PROCEDURES

3.1 Introduction

This section provides checklists and amplified procedures for coping with various emergencies that may arise.

Emergencies caused by aircraft or engine malfunction are extremely rare if proper pre-flight inspections and maintenance are practiced. However, should an emergency arise, the basic guidelines described in this section should be considered and applied as necessary to correct the problem.

In case of emergency the pilot should remember the following priorities –

1. Keep control of and continue flying the aircraft.
2. Analyze the situation.
3. Apply applicable procedures.
4. Inform air traffic control of the situation if time and conditions permit it.

3.2 Speeds for emergency operations

SPEED		KIAS	REMARKS
V_{BG}	Best Glide Speed	72	The speed (at MAUW, flaps fully retracted) which results in the greatest gliding (horizontal) distance. Horizontal distance travelled (still air) is approximately 3 048 m (10 000 ft) per 304.8 m (1000 ft) descent (i.e. glide ratio of 10 : 1).
	Speed for in-flight engine start	> 72	Recommended speed.

3.3 Engine related emergencies

3.3.1 Engine failure during take-off run

1. Throttle - idle
2. Magnetos / ignition - off
3. Brakes - apply as needed

With airplane under control –

4. Radio communication as required.
5. Master switch - off
6. Fuel selector valve - off
7. Auxiliary (electric) fuel pump - off (912 ULS)
   Electric fuel pumps (both) - off (914 UL / 912 iS)
8. Other electrical system switches - off

3.3.2 Engine failure immediately after take-off

1. Speed / trim - best glide speed (72 KIAS).
2. Find a suitable place on the ground to land safely. The landing should be planned straight ahead with only small changes in direction not exceeding 45 degrees to either side.
3. Flaps - as needed (plan to land as slowly as possible).

WARNING
Flaps and elevator trim cannot operate without power on the main bus. Make final flap selection before turning master switch off.

Before touch down

4. Magnetos / ignition - off
5. Master - off
6. Fuel selector valve - off
7. Electric fuel pump - off (912 ULS)
   Electric fuel pumps (both) - off (914 UL / 912 iS)

3.3.3 Engine irregularities in flight

3.3.3.1 Irregular engine rpm

1. Verify magneto switches - both on.
2. Verify throttle position.
3. Verify engine and fuel quantity indicators.
4. Electric fuel pump on (912 ULS).
   Auxiliary electric fuel pump on (914 UL / 912 iS).

If engine continues to run irregularly

5. Change fuel selector valve to tank not in use (if not empty).

If engine continues to run irregularly

6. Change to fullest tank.
7. Land as soon as possible.

3.3.3.2 Low fuel pressure (refer to engine limitations, Section 2 (912 ULS) or specific (914 UL / 912 iS) supplements.

1. Check fuel quantity indicator.
2. Switch electric fuel pump on (912 ULS).
   Switch auxiliary electric fuel pump on (914 UL / 912 iS).

If fuel pressure remains low

3. Change fuel selector valve to tank not in use (if not empty).
4. Decrease throttle setting if viable to do so.

If fuel pressure remains low

5. Land as soon as possible.

3.3.3.3 Low oil pressure (refer to engine limitations, Section 2 (912 ULS) or specific engine (914 UL / 912 iS) supplements at end of manual)

1. Check oil temperature.

If oil temperature is high or increasing

2. Set throttle to a setting which gives an aircraft speed of 72 KIAS (most efficient speed).

If oil pressure remains low or temperature remains high or increasing

3. Land as soon as possible and remain vigilant for impending engine failure.

3.3.4 In-flight engine restart

1. Electric fuel pump	- on (912 ULS).
Electric fuel pumps (both)	- on (914 UL / 912 iS).
2. Fuel selector	- switch to unused / fullest tank.
3. Throttle	- set to middle position.
4. Master switch	- check on.
5. Magnetos / ignition	- check both on.
6. Starter	- engage.
7. Electric fuel pump	- off (912 ULS) (after positive start).
Auxiliary fuel pump	- off (912 iS) (after positive start).

If engine should fail to restart

8. Apply forced landing without engine power procedure, according to 3.5.1.

It is possible that the propeller may continue to rotate if the airspeed remains above approximately 72 KIAS and that no application of the starter switch may be required. If the propeller stops rotating increasing airspeed may result in it again starting to do so.

NOTE

It is possible that the propeller may continue to rotate if the airspeed remains above approximately 75 KIAS. In such circumstances no application of the starter switch may be required. If the propeller stops rotating increasing airspeed may result in it again starting to do so.

3.4 Smoke and fire

3.4.1 Engine fire on ground during start

1. Starter	- release
2. Fuel selector	- close
3. Electric fuel pumps (both)	- off (914 UL / 912 iS)
4. Throttle	- idle
5. Magnetos / ignition	- off
6. Master switch	- off

7. Retrieve fire extinguisher if possible
8. Exit the airplane.
9. Extinguish fire by fire extinguisher or call for a fire-brigade if you cannot do it.

3.4.2 Engine fire on ground with engine running

1. Cabin heat	- close
2. Fuel selector	- close
3. Electric fuel pumps (both)	- off (914 UL / 912 iS)
4. Throttle	- idle
5. Magnetos / ignition	- off
6. Master switch	- off

7. Retrieve fire extinguisher if possible.
8. Leave the airplane.
9. Extinguish fire by fire extinguisher or call for a fire-brigade if you cannot do it.

3.4.3 Engine fire during take-off run

1. Throttle - idle
2. Brakes - stop the aircraft
3. Cabin heat - close
4. Fuel selector - close
5. Electric fuel pump(s) - off
6. Magnetos / ignition - off
7. Master switch - off
8. Retrieve fire extinguisher if possible.
9. Exit the aircraft.
10. Extinguish the fire by fire extinguisher or call for fire services if unable to do so.

3.4.4 Engine fire in flight

1. Cabin heat - close
2. Fuel selector - close
3. Throttle - full power
4. Magnetos / ignition - switch off after the fuel in carburetors is consumed and engine has shut down.
5. Electric fuel pumps (both) - off (914 UL / 912 iS).
6. Choose landing area - choose emergency landing area.
7. Emergency landing - perform according to 3.5.1.
8. Retrieve fire extinguisher if possible.
9. Leave the airplane.
10. Extinguish fire by fire extinguisher / call for fire-brigade if you cannot do it.

NOTE
Estimated time to empty carburetors after fuel selector valve is closed is 30 seconds

WARNING
Do not attempt to re-start the engine!

3.4.5 Electrical fire in flight

An electrical fire is often characterized by white smoke and an acrid smell.

1. Auxiliary fuel pump - on (914 UL: see WARNING below).
2. Master switch - off (see NOTE below).
3. Cabin heat - close.
4. Use the fire extinguisher (if possible).
5. Ventilate cabin if required / applicable (open air vents on instrument panel).
6. If fire is extinguished consider executing a precautionary landing / land as soon as practical. If fire does not extinguish land immediately.

NOTE:

- If the location / source of the electrical fire can be determined and electrical power can be removed from that system / location by isolating / switching the system off, do so. This may alleviate the need to switch off the master switch.

- For aircraft equipped with a 912 iS engine, refer to the applicable supplement at the end of this manual, with regard to the Master switch.

The EFIS and associated equipment (iBox, RDAC etc.) can still be powered (to provide engine monitoring) from the EFIS back-up battery circuit when the master switch is off, provided that the EFIS system is not the location / source of the electrical fire.

WARNING (914 UL)

If the master switch is switched off without the auxiliary fuel pump being ON both fuel pumps will be inoperative! This will lead to engine stoppage due to fuel starvation.

3.4.6 Cabin fire

If the fire is electrical in nature, follow the procedure for electrical fires in flight (3.4.5).

Alternatively:

1. Cabin heat - close.
2. Use the fire extinguisher (if possible).
3. Ventilate cabin if required / applicable (open air vents on instrument panel).
4. If fire is extinguished consider executing a precautionary landing / land as soon as practical.
5. <u>If fire does not extinguish land immediately</u>.

3.5 Emergency landings

Emergency landings are generally carried out in the case of engine failure during which the engine cannot be re-started. Other reasons for an emergency landing may, however, arise.

3.5.1 Engine-off emergency landing

1. Speed	- best glide speed (72 KIAS).
2. Trim	- trim for best glide speed.
3. Landing location	- locate most suitable landing location, free of obstacles and preferably into wind.
4. Safety harness	- tighten.
5. Engine restart	- if time permits and if appropriate attempt to identify reason for engine failure and attempt restart.
6. Propeller (if applicable)	- if windmilling consider feathering to extend glide range (refer to emergency feather procedure below).
7. Flaps	- extend as needed.
8. Communications	- report your location to third parties if possible.
9. Passenger	- brief

WARNING
Flaps and elevator trim cannot operate without power on the main bus. Make final flap selection before turning master switch off.

Immediately before touchdown-

10. Fuel selector	- shut off
11. Auxiliary (electric) fuel pump	- off (912 ULS)
Electric fuel pumps (both)	- off (914 UL / 912 iS)

12. Magnetos / ignition - off
13. Master switch - off

EMERGENCY PROPELLER FEATHER PROCEDURE (IF APPLICABLE)

1. Select AUTO / FEATHER.
2. Actuate feather engage switch to initiate the propeller automatic feathering cycle.

CAUTION

The pilot should be aware that a feathered propeller is less likely to break if it hits the ground, as it is stronger in this orientation. In this a situation, the impact of the propeller with the ground may cause the aircraft to tip over. In the event of a forced landing where a propeller blade may dig into the landing surface due to an undercarriage failure or the like, consideration should be given to leaving the propeller unfeathered.

NOTE

The automatic feather cycle takes 20 to 40 seconds depending on what pitch the propeller is at when the cycle is commenced and at what pitch the feather pitch limit is set at.

NOTE

The propeller may be unfeathered at any time by simply selecting any other position on the propeller control selector (i.e. the hold speed governing mode or one of the pre-set speed governing modes). The propeller will then automatically move to the flight range and constant speed governing will commence as soon as a controllable engine/propeller speed is achieved.

3.5.2 Precautionary landing

A precautionary landing is generally carried out in cases where the pilot may be disorientated, the aircraft has no fuel reserve or possibly in bad weather conditions.

1. Choose landing area, determine wind direction.
2. Report your intention to land and the landing location via radio.
3. Perform a low altitude pass into wind, over the right-hand side of the selected area, with flaps extended as required and thoroughly inspect the landing area.
4. Perform a circuit pattern.
5. Perform approach at increased idle with flaps fully extended.
6. Reduce power to idle when flying over the runway threshold and touch-down at the very beginning of the selected area.
7. After stopping the aircraft switch off all switches, shut off the fuel selector, lock the aircraft and seek assistance.

NOTE
Keep the chosen area in sight during precautionary landing.

3.5.3 Landing with a flat tyre / damaged wheel

1. If a main landing gear tyre is flat or a wheel is damaged, perform touch-down at the lowest practical speed with the aircraft slightly banked towards the serviceable tyre / wheel. Maintain directional control during the landing run and keep the flat tyre / damaged wheel off the ground, just above or very lightly on the ground, until the lowest speed possible.
2. If the nose wheel is damaged / flat perform touch-down at the lowest practical speed and hold the nose wheel off the ground as long as possible, via elevator control.

3.5.4 Recovery from unintentional spin

WARNING
Intentional spins are prohibited!

The aircraft is unlikely to enter an unintentional spin unless extreme inputs are applied.

Unintentional spin recovery technique:

1. Throttle - idle.
2. Lateral control - ailerons neutral.
3. Rudder pedals - full rudder in direction opposite to spin
4. Rudder pedals - neutralize rudder immediately when rotation stops.
5. Longitudinal control - neutralize control column or push forward if necessary to lower nose, then recover from dive ensuring V_{NE} and load factor limitations are not exceeded.

In the unlikely event that applied control inputs result in the aircraft entering a flat spin and the steps listed above do not result in recovery (following their application for a sustained period), the following technique may be implemented:

1. Throttle - set to full power.
2. Lateral control - ailerons neutral.
3. Rudder pedals - full rudder in direction opposite to spin.
4. Rudder pedals - neutralize rudder immediately when rotation stops.
5. Throttle - reduce to idle.
6. Longitudinal control - as per step 5 (longitudinal control) above.

3.6 Other emergencies

3.6.1 Vibration

If any abnormal aircraft vibration occurs:

1. Set engine speed to a setting where the vibration is least, if viable.
2. Land on the nearest airfield or perform a precautionary landing according to 3.5.2.

3.6.2 EFIS System Failure

If the EFIS system freezes, otherwise fails or reacts incorrectly in flight:

1. Maintain straight and level flight utilizing other instruments and ground references.
2. Switch the EFIS back-up battery and the EFIS main switch off (i.e. remove power from the EFIS).
3. Following a 3 second delay, apply power to the EFIS, maintaining straight and level flight at all times.
4. Maintain straight and level for at least another 15 seconds while the system boots up (when the system reboots, the navigation system(s) should remain active and any active routes (preceding the failure) should continue to be shown).

In case the system fails to re-boot properly:

5. Execute a precautionary landing at the first safe opportunity and have the instrument repaired.

3.6.3 Carburetor icing

Carburetor icing is evidenced through a decrease in engine power and an increase of engine temperatures.

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

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

If you fail to recover engine power, land at the nearest airfield (if possible) or, depending on the circumstances, perform a precautionary landing according to paragraph 3.5.2.

3.6.4 Alternator / charge system failure

For aircraft fitted with the 912 iS or 914 UL engine please refer to the supplement at the end of this manual

Failure of the alternator / charge system will result in the main battery not being charged. Alternator (914 UL / 912 ULS) failure is evidenced by the illumination of the (red) alternator charge warning light.

> **NOTE**
> The 912 ULS engine operation is independent from the aircraft main battery (except for start motor operation) / alternator. The engine will continue running after an alternator failure and / or with a depleted battery.

1. EFIS main switch - off
2. All non-critical electrical equipment (navigation, strobe, taxi, landing lights etc.). - off
3. Auxiliary fuel pump - off
4. Autopilot - off
5. Propeller (if applicable) - AUTO/CLIMB (or as desired).
6. When propeller (if applicable) governs at climb setting - MAN
7. Propeller switch (if applicable) - off
8. Set EFIS brightness to minimum.
9. Restrict / avoid the use of the elevator trim control. Restrict radio transmission to minimum / only that which is absolutely necessary.
10. Land as soon as possible.

> **NOTE**
> When landing with adequate battery power remaining (to power both the propeller motor (if applicable) and (if required for 912 ULS) the electric fuel pump(s)) the propeller (if applicable) can be re-energized and selections made as applicable.

3.6.5 Main bus power failure

For aircraft fitted with a 914 UL or 912 iS engine refer to the applicable supplement at the end of this manual.

Refer to paragraph 7.17, under **Main bus,** for a list of equipment affected by a loss of power to the main bus.

1. The EFIS should automatically switch over to the EFIS back-up battery supply, provided that the EFIS battery back-up switch is on (if not, switch on the EFIS battery back-up switch) and the back-up battery contains adequate charge.
2. Switch off all main bus connected equipment / switches.
3. Land as soon as possible.

4 NORMAL PROCEDURES

4.1 Introduction

This section provides checklists and recommended procedures for normal operation of the airplane.

4.2 Speeds for normal operation

Unless otherwise noted, the following speeds are based on a maximum weight of 700 kg (1 543.23 lb).

SPEED		KIAS	REMARKS
V_x	Best Angle of Climb Speed	65	The speed (at MAUW, flaps fully retracted) which results in the greatest altitude gain over a given horizontal distance (i.e. largest climb angle).
V_Y	Best Rate of Climb Speed	74	The speed (at MAUW, flaps fully retracted) which results in the greatest altitude gain over a given time period.
V_{ROT}	Rotation Speed	40	The speed at which the aircraft should be rotated about the pitch axis during take-off (i.e. the speed at which the nose wheel is lifted off the ground).
V_{LOF}	Lift-off Speed	48	The speed at which the aircraft generally lifts off from the ground during take-off.
	Cruise Climb	75 to 90	
	Approach speed - long finals	65 to 75	

V_{REF}	Threshold crossing speed	≥ 65	Indicated airspeed at 15 m (50 ft) above threshold, which is not less than $1.3V_{SO}$.

4.3 Use of taxi, landing, strobe and navigation lights

Refer to paragraph 7.22.

Taxi lights should be used as appropriate and their use should be incorporated in the applicable (taxi and before take-off) procedures as required. Give consideration to taxi lights as an aid to enhancing the aircraft's visibility to other traffic / pedestrians / wildlife.

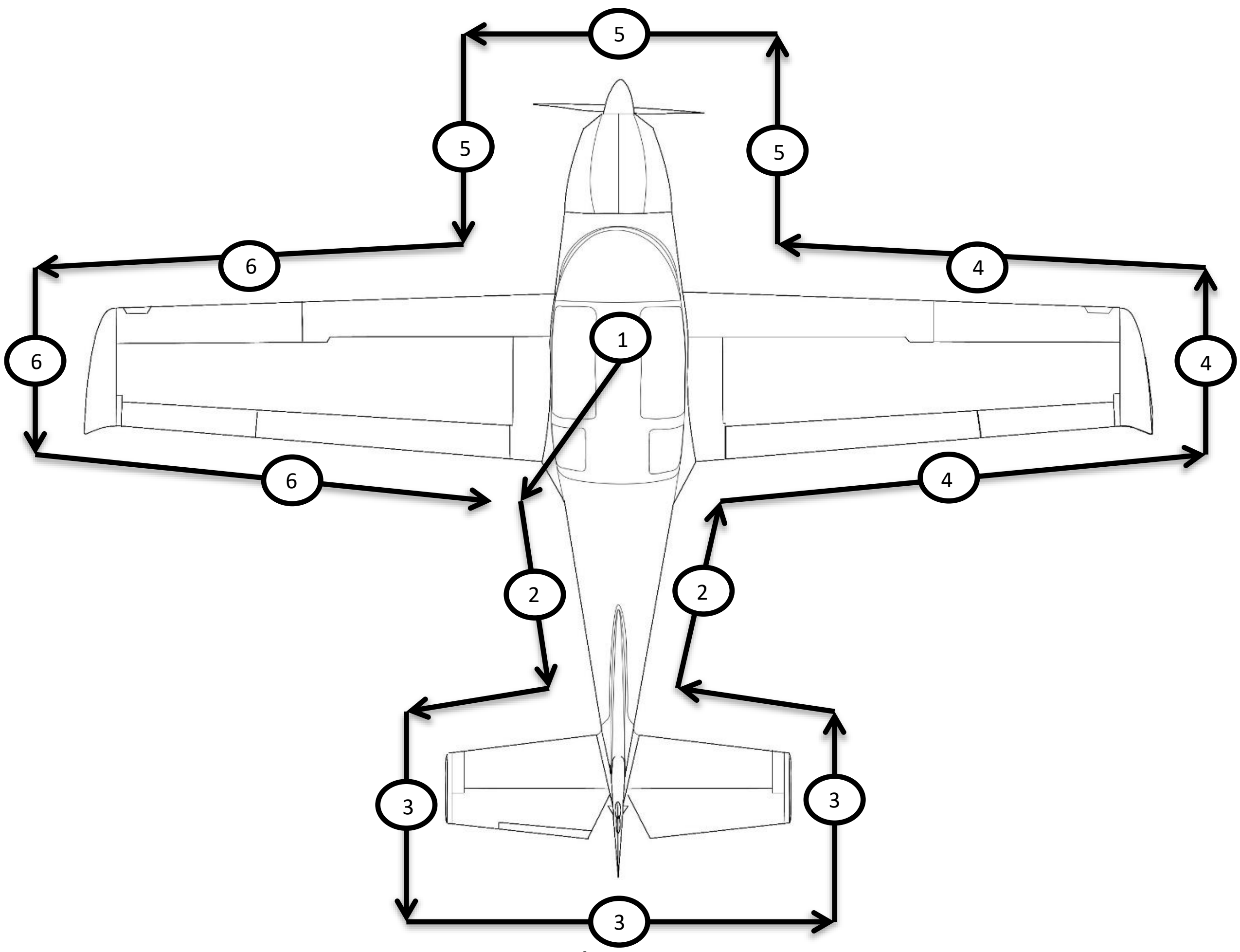
Landing lights should be used as appropriate and their use should be incorporated in the applicable (before take-off, take-off, climb, approach and landing) procedures as required. Give consideration to landing lights as an aid to enhancing the aircraft's visibility to other traffic / pedestrians / wildlife.

Strobe and navigation lights should be used as appropriate and their use should be incorporated in the following (normal) procedures as required. Give consideration to using the strobe light as an indicator / warning of imminent engine start (i.e. switch on the strobe before starting the engine).

4.4 Pre-flight check

Carry out the pre-flight inspection every day prior to the first fight. Pre-flight inspections must also be performed after any accident, incident, maintenance activity, assembly of any aircraft component or suchlike. Incomplete or careless inspection can result in an accident. Carry out the inspection following the instructions in the Inspection Check List.

NOTE
The word "condition" in the instructions means a visual inspection of surface for damage deformations, scratching, chafing, corrosion or other damages, which may lead to flight safety degradation.



Inspection Check List

1. Cabin

- Magnetos / ignition	- off
- Master switch	- on
- Fuel level indicator	- verify fuel quantity
- Flaps	- move to full down position
- Master switch	- off
- Avionics	- verify condition
- Control System	- visual inspection, free movement up to stops, verify function.
- Safety harnesses	- Verify condition, security of attachment and operation of buckles.
- Seats	- Verify security of attachment and correct operation of adjustment mechanism (ensure seat mechanisms lock correctly after adjustment)
- Canopy	- attachment condition, clean
- Cockpit	- check for loose objects
- Fire extinguisher	- verify present and valid
- Documentation	- verify present and valid

2. Fuselage

- Surface condition	- check
- Cowling attachment	- check
- Wing/fuselage fairings	- check
- Empennage fairings	- check
- Antenna/e	- check condition and security
- Luggage compartment door	- Closed and locked

3. Empennage

- Tie-down rope - removed
- Horizontal and vertical stabilizers- check condition
- Elevator and tab - condition and movement
- Rudder - condition and movement
- Hinges, control horns, bolts, pushrod - condition and secure
- Strobe light - condition

4. Right Wing and Main Gear

- Wheel fairing - security, cracks
- Wheel and brakes - fluid leaks, security, general condition, tyre condition, inflation and wear.
- Wheel strut - condition, cracks
- Leading edge condition - check
- Taxi / landing lights and lens - check for cracks and condition
- Fuel vent (underside of wing) - unobstructed
- Wing trailing edge - check condition
- Aileron - freedom of movement, attachment, surface condition.
- Aileron hinges, control horn, bolts, pushrod - secure, condition
- Flap hinges, control horn, bolts, pushrod - secure, condition
- Wing tip - check condition
- Strobe/Nav light and lens - check for cracks and condition

WARNING

Physically verify the fuel level before each take-off to make sure you have sufficient fuel for the planned flight. Fuel can be visibly seen (through the filler cap) to just cover the (total) bottom of the fuel tank with 30 litres present.

5. Nose Section and Nose Gear

- Engine cowling condition	- check
- Propeller and spinner condition	- check
- Air intakes	- check
- Radiators	- check
- Engine mount and exhaust manifold condition	- check
- Oil and coolant quantity check	- check
- Visual inspection of fuel & electrical system	- check
- Engine checks as per Rotax manual	- complete
- Other actions according to the engine manual	
- Parachute cover	- if fitted check sealed and secure.
- Tyre	- condition, inflation, wear.
- Wheels	- security, general condition.
- Chocks and tie-down ropes	- remove
- Suspension and undercarriage	- check and test

CAUTION

In case of long-term parking it is recommended to turn the engine over several times (ignition / magnetos OFF!) by turning the propeller in order to prime the lubrication system. Always handle the propeller blade area with the palm of your hand i.e. do not grasp only the blade edge with your fingers.

6. Left Wing

- Wheel fairing	- security, cracks
- Wheel and brakes	- fluid leaks, security, general condition, tyre condition, inflation and wear.
- Wheel strut	- condition, cracks
- Leading edge condition	- check
- Taxi / landing lights and lens	- check for cracks and condition
- Fuel vent (underside of wing)	- unobstructed
- Wing trailing edge	- check condition
- Aileron	- freedom of movement, attachment, surface condition.
- Aileron hinges, control horn, bolts, pushrod	- secure, condition
- Flap hinges, control horn, bolts, pushrod	- secure, condition
- Wing tip	- check condition
- Strobe/Nav light and lens	- check for cracks and condition
- Pitot tube	- security, unobstructed, remove cover.

WARNING

Physically verify the fuel level before each take-off to make sure you have sufficient fuel for the planned flight. Fuel can be visibly seen (through the filler cap) to just cover the (total) bottom of the fuel tank with 30 litres present.

4.5 Engine start

Reference should be made to the operator's manual for the Rotax 914 UL, 912 iS or 912 ULS engine, as the case may be, for operational guidelines and instructions. These should be incorporated into the normal or emergency procedures as applicable.

CAUTION
Observe temperature limits for engine start as specified in paragraph 2.14.

4.5.1 Before starting engine

1. Pre-flight inspection - completed
2. Emergency equipment - on board
3. Passenger - briefed
4. Seats, seatbelt and harnesses - adjust and secure
5. Brakes - on

CAUTION
In case of long-term parking it is recommended to turn the engine over several times (Ignition / magnetos OFF!) by turning the propeller in order to prime the lubrication system. Always handle the propeller blade area with the palm of your hand i.e. do not grasp only the blade edge with your fingers.

4.5.2 Engine start

If a Rotax 912 iS or 914 UL engine is installed (rather than a Rotax 912 ULS engine) please refer to the supplement at the end of this manual.

1. Master switch - on
2. EFIS back-up battery - on, verify EFIS on and back-up battery voltage.
3. Propeller switch (if applicable) - on

4. Propeller (if applicable)	- AUTO
5. Magneto / ignition switches	- on
6. Fuel selector	- select emptiest tank (if not empty)
7. Electric fuel pumps (both)	-on (912 iS, 914 UL)
8. Choke (cold engine)	- pull to open and gradually release after engine start (912 ULS, 914 UL).
9. Throttle	- closed if choke used, cracked just open if not.
10. Propeller area	- clear of people and obstructions
11. Starter	- engage (maximum 10 seconds)

Immediately after start-up:

12. Throttle	- adjust for smooth running (approximately 2000 rpm).
13. Oil pressure	- <u>increase within 10 seconds</u>
14. EFIS switch	- on and verify battery charging
15. Avionics master switch	- on
16. Warm engine	- 2 000 rpm for 2 minutes, then 2 500 rpm until oil temp is 50 °C (122 °F).

<u>CAUTION</u>

<u>The starter should be activated for a maximum of 10 seconds, followed by 2 minute pause to allow the starter to cool. Verify the oil pressure, which should increase within 10 seconds. Increase the engine speed only if oil pressure is steady above 2 bar (29 psi). At an engine start with low oil temperature continue to watch the oil pressure as it could drop again due to the increased resistance in the suction line. Increase engine rpm only as required to keep oil pressure steady. To avoid shock loading, start the engine with the throttle lever set to idle or 10% open at maximum, then wait 3 seconds for engine to reach constant speed before accelerating engine rpm.</u>

4.5.3 Engine warm up, engine check

Prior to an engine check, block the main wheels with wheel chocks or ensure that the park brake is on.

Initially warm up the engine at 2 000 rpm for approximately 2 minutes, then continue at 2 500 rpm until oil temperature reaches 50°C (122°F). The warm up period depends on ambient air temperature.

Verify both ignition circuits at 4 000 rpm (912 ULS / 914 UL). The engine speed (rpm) drop when either magneto is switched off should not exceed 300 rpm (912 ULS / 914 UL). The maximum difference (in rpm drop) between magnetos / ignition circuits should not exceed 115 rpm (912 ULS / 914 UL).

For verification of ignition circuits on an aircraft fitted with a 912 iS engine, refer to the applicable supplement at the end of this manual.

NOTE
Only one ignition circuit (at a time) should be switched on/off during ignition/magneto check.

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

Check acceleration from idle to maximum power.

If necessary, cool the engine at 3 000 rpm (approximately 2 minutes) before shutdown.

CAUTION
The engine check should be performed with the aircraft heading upwind and not on loose terrain (the propeller may suck grit which can damage the leading edges of blades).

4.6 Taxi

1. Fuel selector - switch tank (to fullest tank)
2. Flaps - up
3. Brakes - off (carefully verify that the stop brake valve (park brake) is off).
4. Controls - neutral position, or as required for wind
5. Power and brakes - as required
6. Brakes -verify
7. Instruments -verify

Apply power and brakes as needed. Apply brakes to control movement on ground. Taxi carefully when wind velocity exceeds 15 knots. Hold the control stick in neutral position or as required, using conventional techniques.

4.7 Normal take-off

4.7.1 Before take-off

1. Controls	- verify full and free movement, directions.
2. Trim	- neutral
3. Choke	- off (912 ULS / 914 UL)
4. Flaps	- as required (typically 1 notch)
5. Fuel quantity	- confirm
6. Fuel selector	- fullest tank
7. Electric fuel pump	- on (912 ULS)
Auxiliary electric fuel pump	- on (912 iS / 914 UL)
8. Circuit breakers	- all in
9. Instruments	- verify all
10 Altimeter	- set QNH / QFE
11. Switches	- verify, as required
12. Power and ignition	- verify magnetos at 4 000rpm, max difference 115 rpm, max drop 300 rpm (912 ULS / 914 UL).
13. Propeller check (if applicable)	- set 4000 engine rpm, select MAN, set fully coarse and verify rpm reduction/coarse indicator illuminates orange, set fully fine and observe rpm increase/fine indicator illuminates orange.
14. Propeller (if applicable)	- AUTO / TO
15. Engine parameters	- verify temperatures, pressures, current/voltage.
16. Canopy	- closed and latched
17. Safety harnesses	- on and tight
18. Ballistic parachute (if fitted)	- remove handle lock pin

4.7.2 Take-off

1. <u>Propeller (if applicable)</u>	- <u>AUTO / TO</u>
2. Take-off power	- throttle fully forward (max. 5 800 rpm for 5 minutes).
3. Engine speed	- verify rpm (5 500 to 5 800 rpm)
4. Instruments within limits	- verify
5. Rotate	- 40 KIAS
6. Airplane lift-off	- 48 KIAS
7. Wing flaps	- retract when speed of 65 KIAS is reached, at minimum height of 300 ft.
8. Electric fuel pump	- off (912 ULS) (minimum 300 ft)
Auxiliary electric fuel pump	- off (912 iS/914 UL) (300 ft minimum).
9. Brakes	- apply briefly brakes to stop wheel rotation.

10. Transition to climb.

WARNING

Take-off is prohibited if:

- The engine is running unsteadily or intermittently.
- The engine parameters (instrument indications) are outside operational limits.
- The crosswind velocity exceeds permitted limits (see 2.5).

CAUTION

Ensure that engine oil temperature is above 50 °C prior to take off.

Climbing with engine at 5 800 rpm is permissible for 5 minutes. Thereafter a maximum continuous engine rpm of 5 500 applies.

4.8 Climb

1. Propeller (if applicable) - AUTO / CLIMB
2. Throttle - Maximum take-off power, 5 800 rpm (for maximum 5 minutes).
   - Maximum continuous power, 5 500 rpm
3. Airspeed - V_X = 65 KIAS
   - V_Y = 74 KIAS
   - Cruise climb = 75 to 90 KIAS
4. Trim - as required
5. Instruments -verify:
   - Oil temperature and pressure
   - Cylinder temperature within limits

CAUTION

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

CAUTION

Climbing with engine at 5 800 rpm is permissible for 5 minutes. Thereafter a maximum continuous engine rpm of 5 500 applies.

4.9 Cruise

1. Propeller (if applicable) AUTO/CRUISE

   Refer to section 5 for recommended cruising figures.

> **WARNING**
>
> If a fuel lift pipe is exposed to air, the pump will suck air into the engine (from the empty tank) and engine stoppage will result. When one tank is empty, or close to empty, the fuel selector valve should be switched to the fullest tank.
>
> Avoid operation below the normal operational oil temperature (90 to 110 °C / 194 to 230 °F).

4.10 Descend

Optimum glide speed - 72 KIAS

> **WARNING**
>
> The fuel lift pipe in each fuel tank is situated adjacent to the lower inside wall of the tank. The aircraft should at no time be subjected to a sustained side slip towards a near empty fuel tank (i.e. - wing with near empty tank down) as, despite the baffling, this may have the consequence that the fuel runs towards the outer edge of the tank exposing the fuel lift pipe (to suck air), thereby starving the engine of fuel leading to engine stoppage. This poses a particular threat when at low altitude, typically prior to landing.

> **CAUTION**
>
> It is not advisable to reduce the engine throttle control lever to minimum on final approach or when descending from very high altitude. In such cases the engine can become over-cooled, although unlikely, and a loss of power may occur. Descent at increased idle (approximately 3000 rpm), speed between 65 to 85 KIAS and verify that the engine instruments indicate values within permitted limits.

4.11 Approach

1. Approach speed	
Long finals	- 65 to 75 KIAS
Short finals	- ≥ 65 KIAS
2. Electric fuel pump	- on (912 ULS)
Auxiliary electric fuel pump	- on (912 iS/914 UL)
3. Fuel selector	- fullest tank
4. Throttle	- as required
5. Wing flaps	- extend as required
6. Trim	- as needed
7. Brakes	- off (carefully check that the brake stop-valve is off).

CAUTION

It is not advisable to reduce the engine throttle control lever to minimum on final approach or when descending from very high altitude. In such cases the engine can become over-cooled, although unlikely, and a loss of power may occur. Descent at increased idle (approximately 3000 rpm), speed between 65 to 85 KIAS and verify that the engine instruments indicate values within permitted limits.

WARNING

If a fuel lift pipe is exposed to air, the pump will suck air into the engine (from the empty tank) and engine failure will result. When one tank is empty, or close to empty, the fuel selector valve should be switched to the fullest tank.

4.12 Normal landing

4.12.1 Before landing

1. Propeller (if applicable) - AUTO / TO
2. Throttle - as required
3. Airspeed - ≥ 65 KIAS
4. Wing flaps - extend as required
5. Trim - as required
6. Brakes - off (carefully check that the brake stop-valve is off).

4.12.2 Landing

1. Throttle - as required
2. Controls - flare to minimum flying speed, touch-down on main wheels.
3. Nose wheel - gently lower to ground
4. Apply brakes - as required (after the nose wheel touch-down) for controlled slowing down.

4.12.3 After landing

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

CAUTION
Rapid engine cooling should be avoided during operation. This especially happens during aircraft descent, taxi, low engine rpm or at engine shutdown immediately after landing. Under normal conditions the engine temperatures stabilize during descent and taxi at values suitable to stop the engine (by switching the ignition off) as soon as aircraft is stopped. If necessary (elevated engine operating temperatures), cool (for minimum 2 minutes) the engine at approximately 3 000 rpm to stabilize the temperatures prior to engine shut down.

4.13 Baulked landing procedures

1. Throttle - full power (maximum 5 800 rpm for 5 minutes).
2. Trim - as required.
3. Wing flaps - retract to 50% as soon as possible and retract fully when reaching 65 knots (at 300 ft minimum height).
4. Electric fuel pump - off (912 ULS) (300 ft minimum)
   Auxiliary electric fuel pump - off (912 iS / 914 UL) (300 ft minimum)
5. Propeller (if applicable) - AUTO / CLIMB (minimum 300 ft)
6. Trim - adjust
7. Repeat circuit pattern.

4.14 Short field take-off and landing procedures

Not considered necessary. Ordinary short field procedures may be used if pilot deems it appropriate.

4.15 Engine shutdown

Note: For Rotax 912 iS engine at least 5 minutes must elapse between landing and shutting off the engine.

1. Engine speed	- idle
2. Instruments	- engine parameters within limits
3. Avionics master switch	- off
4. Electric fuel pump	- off (912 ULS)
Electric fuel pumps (both)	- off (912 iS / 914 UL)
5. Magnetos / ignition	- off
6. Electrical switches	- off
7. EFIS	- off, battery back-up off
8. Master switch	- off
9. Fuel selector	- off

CAUTION

Rapid engine cooling should be avoided during operation. This especially happens during aircraft descent, taxi, low engine rpm or at engine shutdown immediately after landing. Under normal conditions the engine temperatures stabilize during descent and taxi at values suitable to stop the engine (by switching the ignition off) as soon as aircraft is stopped. If necessary (elevated engine operating temperatures), cool (for minimum 2 minutes) the engine at approximately 3 000 rpm to stabilize the temperatures prior to engine shut down.

4.16 Aircraft parking and tie-down

1. Site - Park the aircraft on as level an area as possible.
2. Ignition/ magneto switches - off
3. Master switch - off
4. Fuel selector - off
5. Parking brake - use as necessary
6. Canopy - close, lock as necessary
7. Secure the airplane.

NOTE

It is recommended that the parking brake (shut-off valve) be utilized for short-period parking only. If the airplane is to be parked for long periods it is advisable to use not only the parking brake, but also wheel chocks.

NOTE

Use the anchor eyes on the wings and fuselage rear section to secure the airplane. Move control stick forward and secure it together with the rudder pedals if high winds are expected. Make sure that the cockpit canopy is properly closed and locked.

5 PERFORMANCE

5.1 Introduction

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

If not stated otherwise, the performance stated in this section is valid for maximum take-off weight (700 kg/1 540 lbs) and under ISA conditions.

The performance shown in this section is valid for aircraft fitted with a ROTAX 912 ULS 73.5 kW (98.6 hp).

5.2 Take-off and landing distance

Take-off distances:

Surface	Take-off run	Take-off distance over 15m (50 ft) obstacle
Concrete	140 m / 460 ft	280 m / 920 ft
Grass	160 m / 525 ft	300 m / 985 ft

Landing distances:

Surface	Landing run (braked)	Landing distance over 15 m (50 ft) obstacle
Concrete	90 m / 295 ft	260 m / 855 ft
Grass	90 m / 295 ft	260 m / 855 ft

5.3 Rate of climb

Conditions: Max. continuous power: 5 500 rpm Weight: 700 kg/1 540 lb	Best rate of climb speed (V_Y)	Rate of climb
	KIAS	fpm
0 ft ISA	74	700
3 000 ft ISA	74	500
6 000 ft ISA	74	420
9 000 ft ISA	74	330

5.4 Cruise speeds (with fixed pitch propeller)

Altitude [ft ISA]	Engine speed [rpm]	KIAS	KTAS
100	4 500	78	79
	4 800	93	94
	5 000	98	99
	5 300	103	105
	5 500	109	111
3 000	4 500	69	73
	4 800	84	90
	5 000	95	102
	5 300	101	107
	5 500	105	111
6 000	4 500	62	70
	4 800	77	86
	5 000	87	97
	5 300	95	105
	5 500	98	112
9 000	4 500	60	70
	4 800	71	85
	5 000	84	96
	5 300	88	102
	5 500	91	105

5.5 Fuel consumption

Altitude	[ft ISA]	3 000				
Fuel quantity	[l]	150				
	[US gallons]	39.63				
Engine speed	[rpm]	**4 500**	**4 800**	**5 000**	**5 300**	**5 500**
Fuel consumption	[l/h]	14	16	18	20	21
	[US gallons]	3.70	4.23	4.76	5.29	5.55
Airspeed	[KIAS]	73	90	102	107	111
Endurance	[hh:mm]	10:40	9:20	08:20	07:30	07:10
Range (no reserve)	[nm]	782	843	850	802	792

5.6 Airspeed indicator system calibration

IAS [knots]	CAS [knots] (average)	CAS [knots] (this aircraft)
25	28	
30	33	
35	37	
40	41	
45	45	
50	50	
55	55	
60	60	
65	65	
70	70	
75	75	
80	80	
85	85	
90	90	
95	95	
100	100	
105	105	
110	110	
115	115	
120	120	
125	125	
130	130	
135	135	

6 WEIGHT AND BALANCE

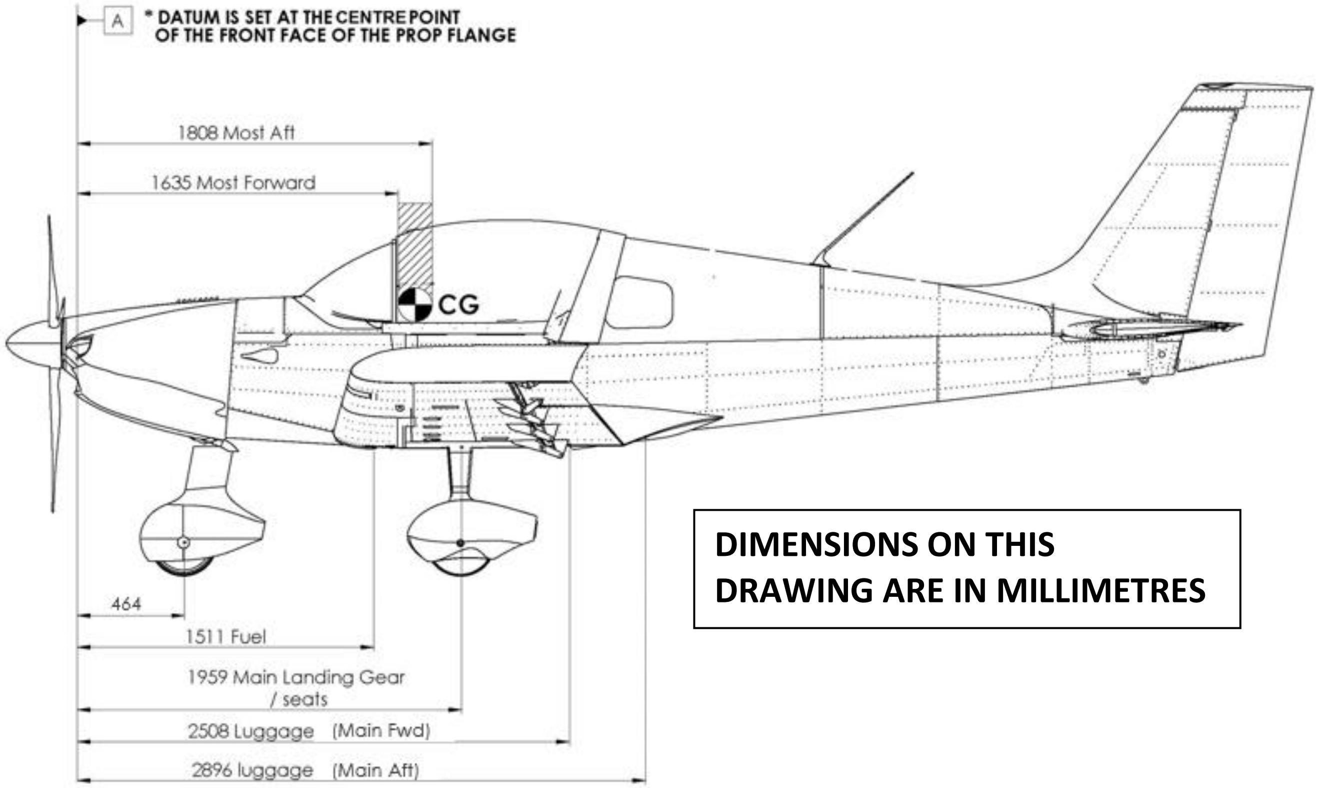
This section contains weight and balance records and the payload range for safe operating of the Sling 2.

6.1 Installed equipment list

- Garmin multifunction glass cockpit instrument – G3X.
- GTR 200 COM radio.
- Mode S transponder (optional). Analogue altimeter, airspeed indicator, ball type slip indicator.
- Magnetic compass.
- Electric trim system.
- Electric flap actuator.

6.2 Center of gravity (CG) range

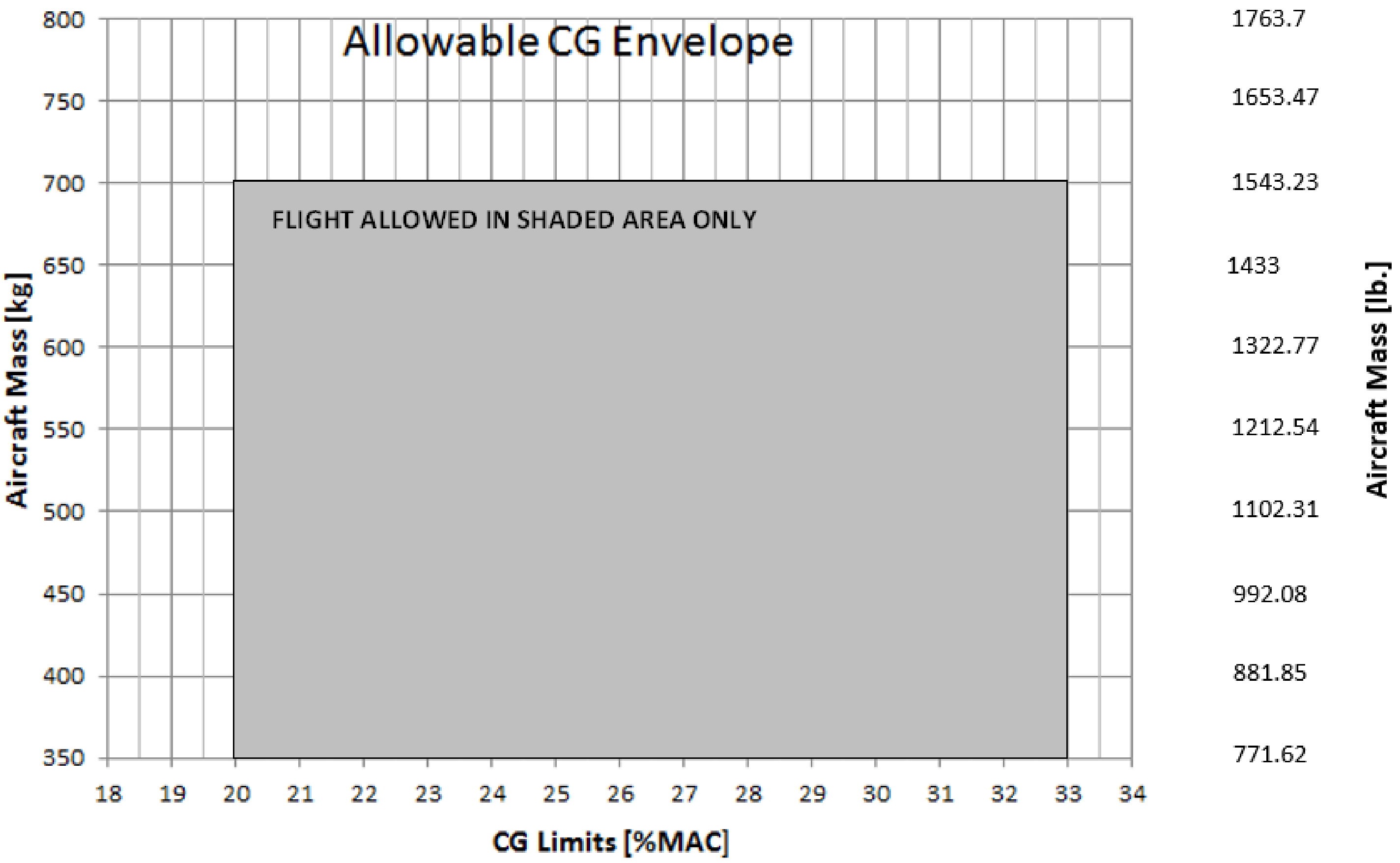
Operating CG range and allowable CG envelope



CG range is 1 635 mm (5.364 ft) to 1 808 mm (5.931 ft) aft of the reference datum (20 to 33% of MAC).

- The leading edge of the MAC is 1 366 mm (4.482 ft) aft of the reference datum.
- The MAC is 1 339 mm (4.393 ft).

WARNING
Aircraft CG and MAUW limitations must be adhered to at all times.



WARNING
Aircraft CG and MAUW limitations must be adhered to at all times.

WARNING
For each flight the most forward CG (i.e. with take-off fuel) and the most rearward CG (i.e. with landing fuel) must be calculated (to be within aircraft CG range / limits).

6.3 Determination of aircraft GC

Weight and balance report list:

- Empty CG check.
- Forward CG check (example).
- Rear CG check (example).
- Blank CG form.

CG formulae:

$$\text{CG} = \frac{\text{Total Moment}}{\text{Total Weight}}$$

$$\%\text{MAC} = (\text{CG} - 1366\ \text{mm})\ \text{x}\ \frac{100}{1\ 339\ \text{mm}}$$

$$\%\text{MAC} = (\text{CG} - 4.482\ \text{ft})\ \text{x}\ \frac{100}{4.393\ \text{ft}}$$

WARNING

For each flight the most forward CG (i.e. with take-off fuel) and the most rearward CG (i.e. with landing fuel) must be calculated (to be within aircraft CG range / limits).

The aircraft empty CG is determined in a conventional manner by weighing the aircraft whilst it is standing level. (Refer to the aircraft maintenance manual for instructions on aircraft leveling and weighing).

6.4 Empty CG determination

	ITEM	WEIGHT [kg (lb)]	ARM [mm (ft)]	MOMENT (weight x arm) [kg.mm (lb.ft)]
Aircraft Empty CG	Right Main Wheel	W_R =	L_R = 1 959 (6.427)	
	Left Main Wheel	W_L =	L_L = 1 959 (6.427)	
	Nose Wheel	W_N =	L_N = 464 (1.522)	
	Computed empty CG	Empty weight: W_E = …………..kg (lb)	CG = ……….. mm (ft) (…………% MAC)	Aircraft moment:

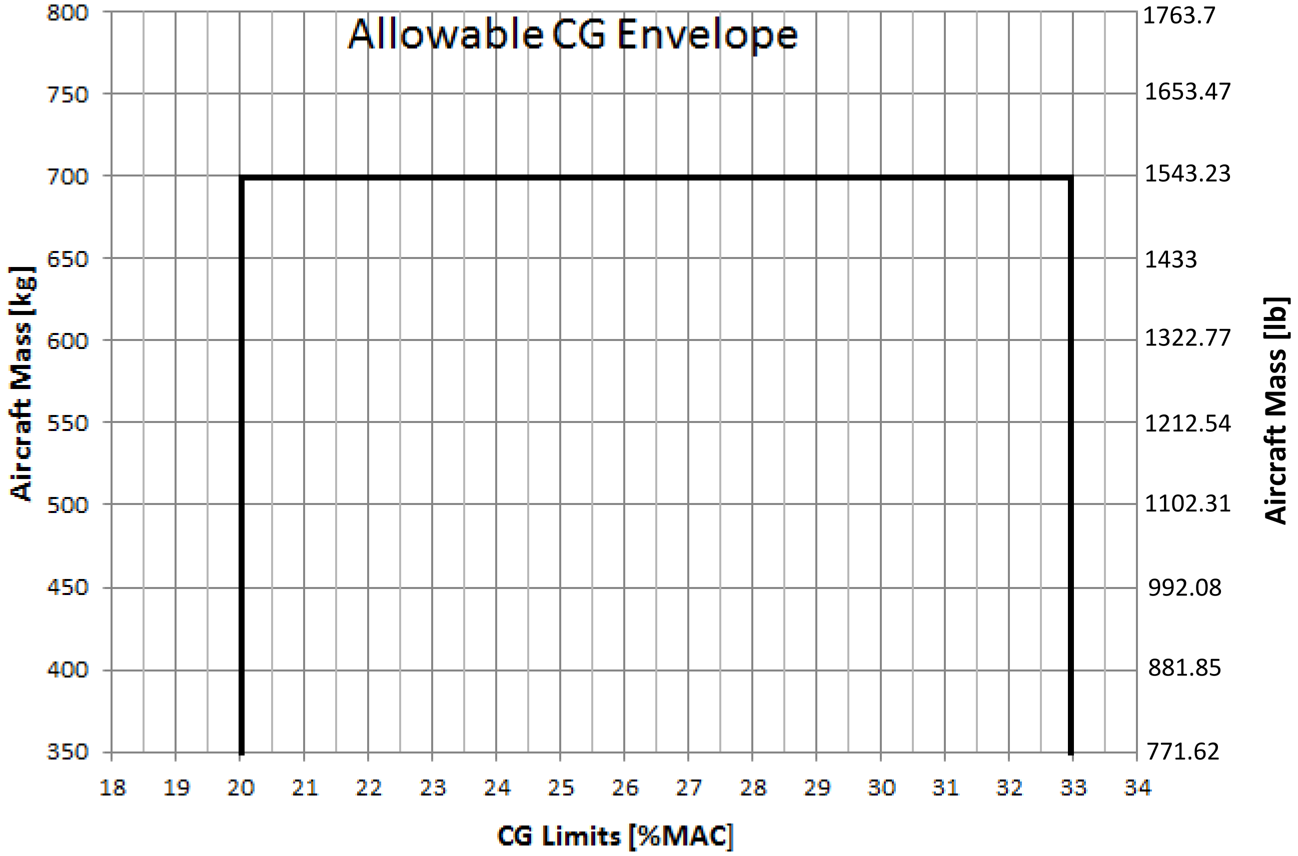
Maximum all up (take-off) weight = 700 kg (1 540 lb).

Maximum useful load (example):

$W_{max\ useful}$ = W_{MAUW} - W_E
= 700 kg (1 540 lb) -370 kg (815.7 lb)
= 330 kg (727.5 lb)

6.5 Blank form and graph for use

	WEIGHT [kg (lb)]	ARM [mm (ft)]	MOMENT (weight x arm) [kg.mm (lb.ft)]
PILOT & PASSENGER		1 959 (6.427)	
BAGGAGE (MAIN FWD)		2 508 (8.228)	
BAGGAGE (MAIN AFT)		2 896(9.501)	
FUEL		1 511 (4.957)	
ADD EMPTY VALUES			
TOTAL			
	W_T =		M_T =
			CG = %MAC


Allowable CG Envelope
Aircraft Mass [kg]
800
750
700
650
600
550
500
450
400
350
Aircraft Mass [lb]
1763.7
1653.47
1543.23
1433
1322.77
1212.54
1102.31
992.08
881.85
771.62
18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
CG Limits [%MAC]

7 SYSTEMS

7.1 Airframe

The airplane has an all-metal construction with single curvature stressed aluminium alloy skins riveted to stiffeners. Construction is of 6061-T6 aluminium alloy sheet metal riveted to aluminium alloy angles with high quality blind rivets. This high strength aluminium alloy construction provides long life and low maintenance costs thanks to its durability and corrosion resistant characteristics. The wing has a high lift airfoil (NACA 4415) and is equipped with semi-slotted Fowler type flaps.

7.2 Control system / Pilot controls

Control stick(s)

The aircraft is equipped with dual control sticks. The control sticks operate in the standard pitch and roll (elevator and aileron) configuration. See the picture below for control stick button allocation:

Button	Function
1	Trim down
2	Autopilot control
3	Trim up
4	Not allocated
5	Radio PTT

Rudder pedals / nose wheel steering

The aircraft is fitted with dual rudder pedals, which control the rudder and steer the nose wheel.

Brake lever and park brake shut-off valve

Refer to paragraphs 7.4 and 7.9.

Throttle lever and choke knob

Refer to paragraphs 7.9 and 7.15.

Fuel selector valve

Fuel tank feed selection is enabled by a red coloured, three-position (RIGHT, LEFT, OFF) rotary fuel selector valve, located at the bottom centre of the instrument panel / front of centre console. Refer to the instrument panel layout in paragraph 7.10.

An additional knob must be activated to move the selection lever through a detent to the OFF position, preventing inadvertent closure (OFF selection) of the valve.

Ballistic parachute activation lever (if fitted)

The red coloured activation lever is located at the bottom centre of the instrument panel. Refer to the instrument panel layout in paragraph 7.10.

Inadvertent operation of the lever is prevented by a lock pin (tagged with a red flag). <u>THIS PIN MUST BE REMOVED BEFORE FLIGHT.</u>

Electrical equipment selection / control switches (912 ULS)

SWITCH / LABEL	FUNCTION	POSITION
MASTER / STARTER KEY SWITCH	Power disconnected from main bus	OFF
	Main bus connected to power	ON
	Engage starter motor	START
EFIS	Switch power (from main bus) to EFIS system on / off.	UP (ON) DOWN (OFF)
EFIS BKUP	Connects EFIS system to EFIS back-up battery supply.	
FUEL PUMP	Switch auxiliary (electric) fuel pump on / off.	
LAND	Switch landing lights on / off.	
TAXI	Switch taxi lights on / off.	
NAV	Select position (navigation) lights.	
STROBE	Select anti-collision (strobe) lights.	
AVIONICS	Switch power to radio and transponder (if fitted) on / off.	
PROP (if fitted)	Switch power to propeller motor and controller on / off.	
AUTOPILOT	Switch power to autopilot servos on / off.	
MASTER	Switch power to main bus on / off.	
MAG A	Select Magneto A	
MAG B	Select Magneto B	

EFIS operation and control
EFIS function selection and control mechanisms are described in detail in the EFIS manufacturer supplied documentation. Please refer to such. Refer to paragraph 7.10 for additional information on operational use of the EFIS system.

Elevator trim

Elevator trim is electrically controlled by buttons on the control column. Refer to **Control stick(s)** for button allocation.

Flap control

Wing flaps are electrically controlled and selected (position) by a four-position rotary knob or a four-pushbutton selector located on the instrument panel (refer to paragraph 7.10).

Selector Position	Degrees flap deflection
0	0°
1	10°
2	20°
3	32°

Cabin heat

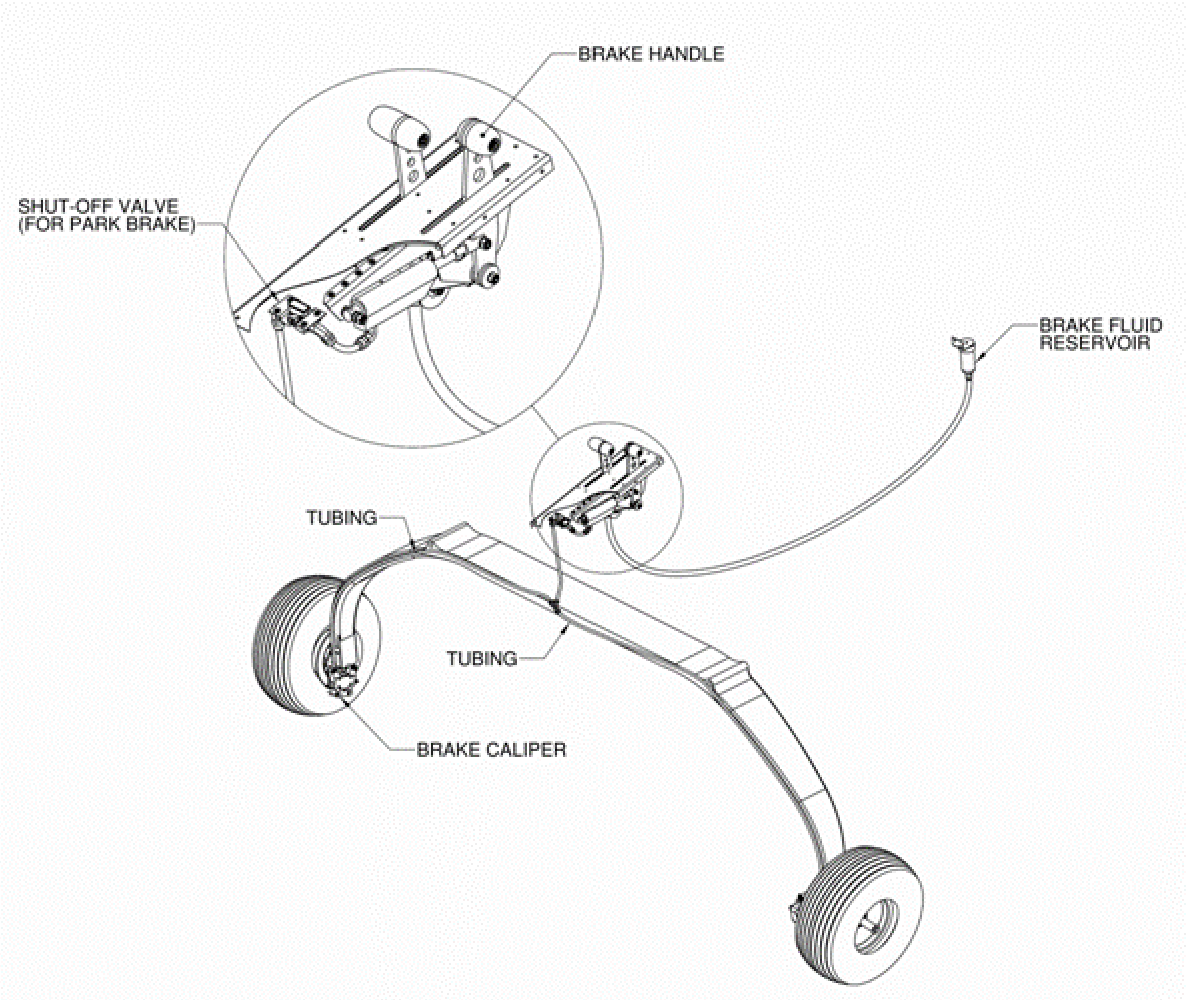
Heated air (warmed by heat exchange with engine exhaust) can be selected via a selection knob located on the instrument panel. Refer to the instrument panel layout in paragraph 7.10. Hot air is selected by pulling out the knob.

7.3 Landing gear

The landing gear is a tricycle landing gear with a steerable nose wheel. The main landing gear uses a single continuous composite spring section.

7.4 Brake system

The aircraft braking system is typically a single hydraulic system acting on both wheels of the main landing gear through disk brakes. Activation is via a lever located on the cabin centre console. Refer to paragraph 7.9. An intercept valve acts as a parking brake by stopping pressure relief. For braking to be operational the brake intercept valve must be off, and the brake lever activated. The arrangement is apparent in the diagram below:



Brake system

A conventional, differential, foot-controlled braking system may also be fitted as an option. In such cases each brake caliper is separately actuated by way of a master hydraulic brake servo fitted to the rudder pedal on the side of the airplane corresponding to the wheel on which the applicable caliper is located. The parking brake arrangement works in the same manner as with the hand actuated system.

7.5 Safety harness

The aircraft has side-by-side seating. Four-point safety belts are provided for each seat. Seats can be adjusted backwards and forwards for comfort with forward movement slightly raising the seat height.

IMPORTANT: Ensure that the seat(s) is (are) securely locked into position after adjustment

NOTE
Prior to each flight, ensure that the seat belts are firmly secured to the airframe, and that the belts are not damaged. Adjust the buckle so that it assumes a central position relative to the body.

7.6 Baggage compartment

The baggage compartment comprises two sections positioned behind the seats and is designed to carry up to 35 kg (77 lb) in total. The baggage compartment comprises a narrow, slightly lowered front section and a higher, larger back section. 35 kg (77 lb) of luggage may be loaded in the front section and 25 kg (55 lb) in the back section, subject to a total maximum baggage weight of 35 kg (77 lb). Regardless of the manner in which baggage is loaded, it is the obligation of the pilot to ensure that the aircraft CG is within the permissible limits. All baggage must be properly secured.

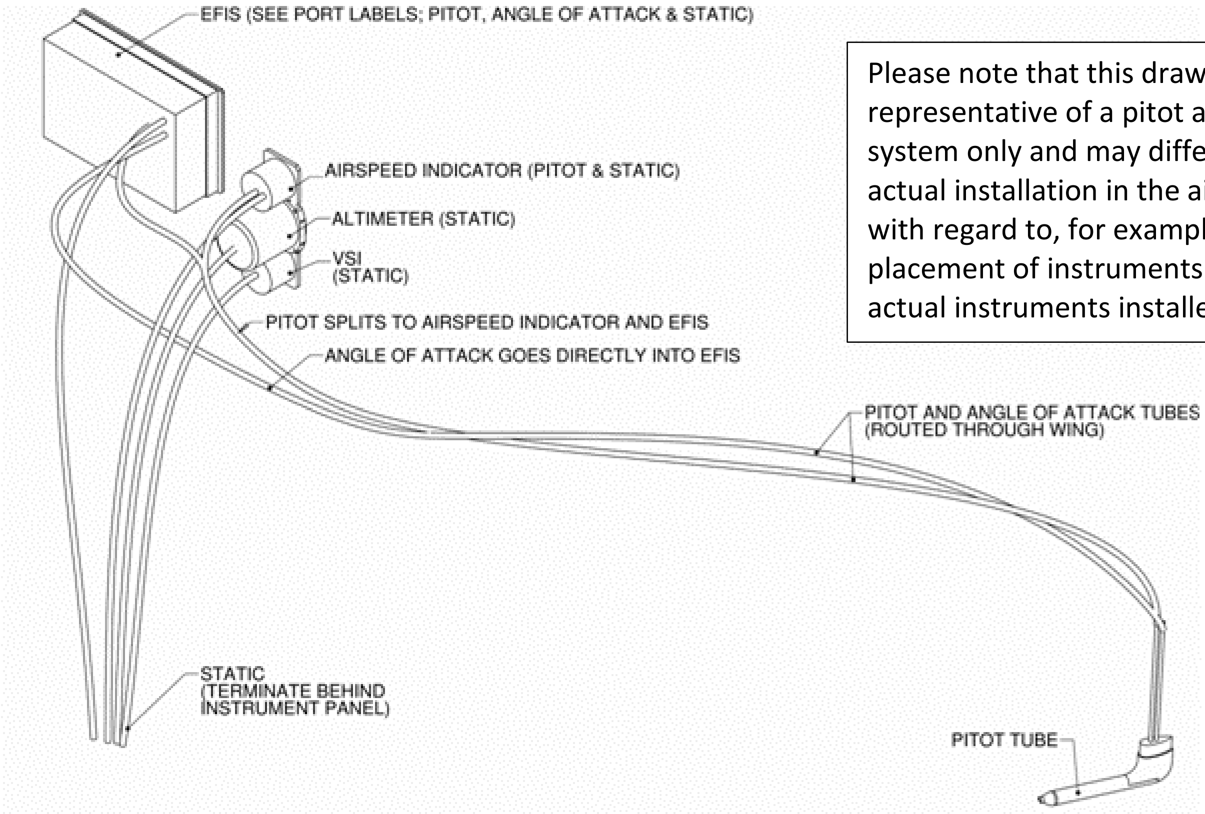
7.7 Canopy

The airplane is equipped with a sliding canopy mechanism. External access to the cabin is from either side. Latching mechanisms are provided inside the cabin at the top of the roll-over bar in the centre and outside on the centre of the canopy.

WARNING
Ensure that the canopy / mechanism is securely latched into position before operating the aircraft.

7.8 Pitot and static systems

A pitot tube is located below the left wing. Pressure distribution to the instruments is through flexible plastic hoses. The tube incorporates a second inlet for measurement of angle of attack. The static port is located behind the instrument panel. Keep the pitot head clean to ensure proper functioning of the system. Ensure that the pitot tube cover is removed prior to every flight and that it is replaced after every flight.

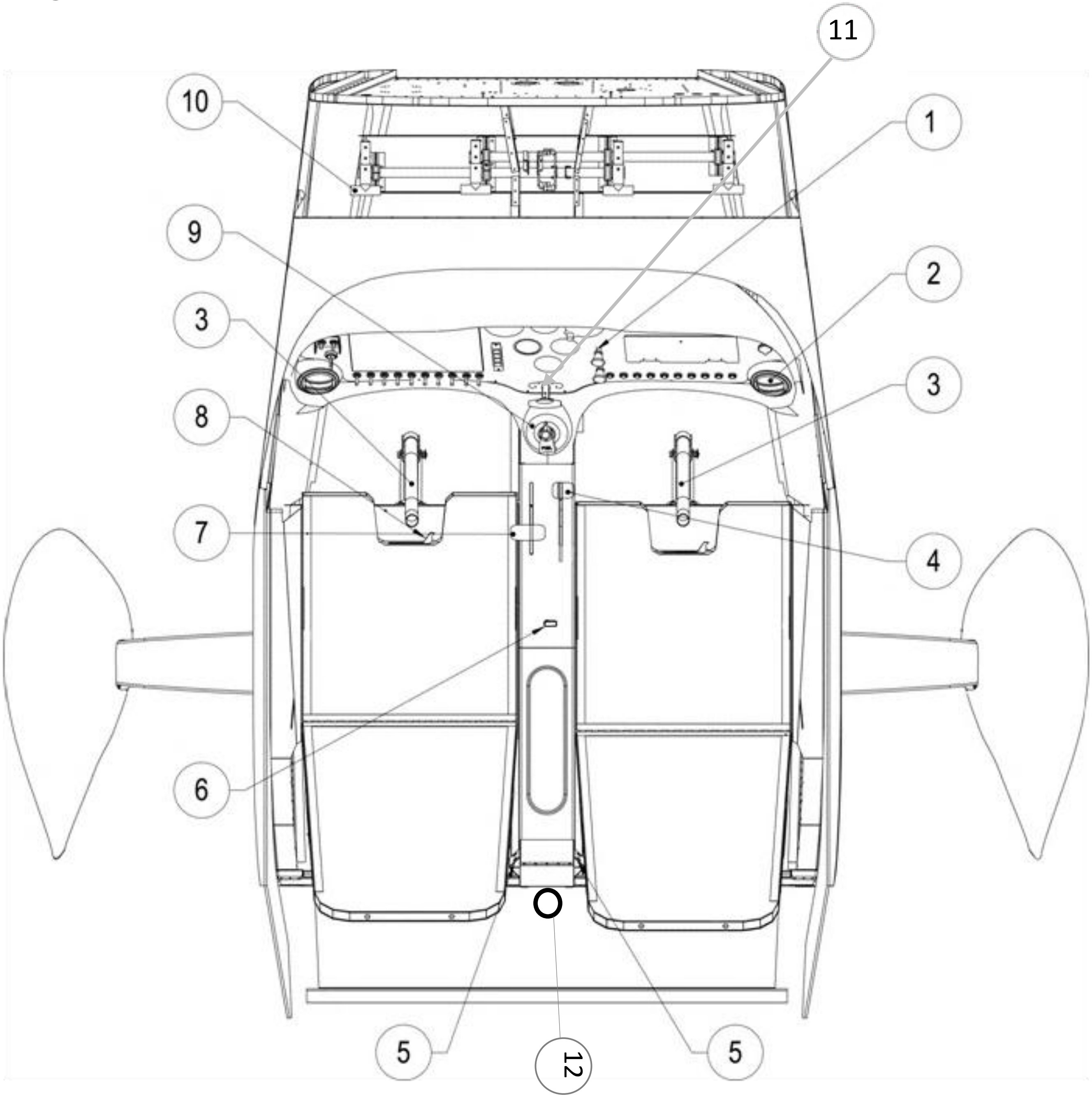


Please note that this drawing is representative of a pitot and static system only and may differ from the actual installation in the aircraft, with regard to, for example, placement of instruments and actual instruments installed.

Pitot and static systems (example)

7.9 Cockpit layout

The basic cockpit layout is the same for all Sling 2 aircraft, notwithstanding that instrumentation may differ substantially. All airplanes contain the minimum instrumentation, but particular airplanes may contain substantial additional instrumentation. The basic cockpit layout is configured as in the diagram below.



Cockpit layout

1	Instrument panel	7	Throttle
2	Air vent	8	Seat adjustment lever
3	Control stick (PTT on front of stick handle)	9	Fuel selector valve
4	Brake actuator (if footbrake not fitted)	10	Rudder pedals (incorporating brake if differential footbrakes are fitted)
5	Headset plugin sockets	11	Ballistic parachute operating lever
6	Park-brake actuator valve	12	Fire extinguisher

Cockpit layout key

If differential footbrakes are fitted the hand operated brake actuator on the centre console will be absent.

Seats have a slide mechanism with a sideways moving unlocking lever in the centre front of each seat in order to move the seat for comfort and to ensure that the rudder pedals can easily be reached by all pilots. Rudder pedals may also be adjusted through removal of a locking / setting bolt(s).

Air vents are located on the lower right and left sides of the instrument panel.

Baggage space is immediately behind the seats. A fire-extinguisher is held in place against the front retaining wall of the baggage space. An adjustable red interior cockpit light is positioned behind and between the pilot's and passenger's heads, on the rear fuselage front former structure.

7.10 Instruments and Avionics

The diagram below represents an instrument panel containing the required minimum instrumentation, together with typical back-up and additional instrumentation supplied with the aircraft. The instrument panel in any particular aircraft may differ from that illustrated in the diagram. It is the responsibility of the pilot to ensure that s/he is familiar with the instrumentation in the aircraft, its layout and its operation.

Standard instrument panel (refer to key on next page)

1	Master switch and starter	13	Cabin heat activator
2	Ignition / “Magneto” switches	14	Cubby hole
3	Charge warning light (914 UL / 912 ULS)	15	12 V Power port / socket
4	Garmin G3X	16	Air vent
5	EFIS accessory warning light	17	Circuit breakers
6	Analogue airspeed indicator	18	Blank off / Ballistic recovery parachute activator handle (if fitted)
7	Analogue magnetic compass	19	Fuel selector valve
8	Analogue altimeter	20	Flap selector
9	Garmin GTR 200 Radio	21	Electrical equipment switches
10	PM 1000 Intercom	22	USB charge port
11	Analogue slip indicator	23	Propeller controller
12	Choke (912 ULS / 914 UL)		

Instrument panel key

Radio and Transponder

Power to the radio and transponder (if fitted) is provided via the main bus and activated via a single switch (for both) labeled AVIONICS, located on the instrument panel. Refer to paragraph 7.17.2.

EFIS system

Garmin G3X instruments are multifunction "glass cockpit" instruments and typically incorporate a range of different instruments and functions. Although only the minimum specified instrumentation is required (see paragraphs 2.13 and 7.12 of this Pilot Operating Handbook), the full instrumentation provided by the EFIS will typically include:

- ASI (IAS as well as TAS and ground speed).
- ALT (and typically also height above ground).
- VSI.
- Compass.
- Attitude indicator.
- Turn coordinator.
- G meter (load factor meter).
- Clock, stopwatch and flight time record.
- Comprehensive mapping and navigation software and data, including GLS (GPS Landing System) capability.
- GPS.
- Autopilot (if servos are fitted).
- Full engine monitoring and management capacity including:
    - RPM indicator.
    - CHT and EGT indicators.
    - Oil temperature and oil pressure indicators.
    - Fuel level, fuel flow and fuel pressure indicator.
    - Hobbs and flight time recorder.
    - Voltmeter.

The EFIS installed in the aircraft is (can be) powered from two separate power sources:

- From the main bus, through a circuit breaker and a main selection switch (labeled EFIS) mounted on the instrument panel. Refer to paragraph 7.17.2.
- From a battery back-up circuit, via a selection switch (labeled EFIS BKUP) mounted on the instrument panel. Refer to paragraphs 7.17.2 and 7.17.3.

Operational use of the EFIS and EFIS back-up battery system

Use and set-up of the EFIS features are extensively described in the documentation supplied with the unit and will not be dealt with in this handbook. Refer to the supplied EFIS documentation.

The EFIS is operated during flight with the EFIS back-up battery selection switch (labeled EFIS BKUP) on at all times. This will ensure automatic switch-over of the EFIS to the EFIS back-up battery in the event that power is lost to the main bus.
In the event of a charge system failure:

- Switch the EFIS main switch off. This will allow the EFIS to switch over to (and be powered from) the EFIS back-up battery supply (provided that the EFIS battery back-up switch is on and the EFIS back-up battery contains adequate charge). Leaving the EFIS main switch on will cause the EFIS to be powered from the main battery (via the main bus), contributing (unnecessarily) to the discharge of the main battery.

WARNING
Users should desist from entering the EFIS setup pages during flight as changes to the setup may result in incorrect readings and/or warnings resulting in safety degradation.

- Set the EFIS screen brightness to the minimum acceptable for readability (to reduce current drain on the back-up battery).

7.11 Flap and elevator trim systems

The aircraft is equipped with electric flaps and an electric elevator trim system. The flap motor is located in the cabin centre console. The two wing flaps are interconnected via a torque tube, which is driven at a single point by the flap motor. Bar a failure in the linkage system, this prevents the flaps from being deployed (driven) to asymmetrical positions. Pilot control of the flap system is via a four-position rotary knob (electronic controller) located on the instrument panel. Refer to paragraphs 7.2 and the instrument panel layout in paragraph 7.10.

The flap controller is powered from the main bus. The flap controller in turn powers the flap motor, via a circuit breaker located on the instrument panel (refer to paragraph 7.17.2).

The trim motor is located in the port elevator and drives a trim tab (via a pushrod system) located on the elevator trailing edge. Pilot control is via buttons located on the control stick(s). Refer to paragraph 7.2 for button allocation.

In 914 UL and 912 ULS equipped aircraft the trim system is powered (via a circuit breaker located on the instrument panel) directly from the charge system output (refer to paragraph 7.17.1) and / or from the battery / main bus (provided the charge relay is energized / not failed). In 912 iS equipped aircraft the trim system is powered from the main bus (refer to the wiring diagrams in the applicable supplement at the end of this manual).

WARNING

The flap system becomes non-operational with loss of power to the main bus. The elevator trim remains operational with loss of power to the main bus, provided that the charge system remains operational.

On 912 iS equipped aircraft, he elevator trim becomes non-operational with loss of power to the main bus.

7.12 Minimum instruments and equipment required for flight:

The following minimum instrumentation and equipment is required for day VFR flight:

- Altimeter.
- Airspeed indicator.
- Compass.
- Fuel gauges.
- Oil pressure indicator.
- Oil temperature indicator.
- Cylinder head temperature indicator.
- Outside air temperature indicator.
- Tachometer.
- Chronometer.
- First aid kit (compliant with national legislation).
- Fire extinguisher.

NOTE
Additional equipment may be required to fulfill national or specific requirements and may be fitted.

WARNING
Notwithstanding that installed equipment may include GPS and other advanced flight and navigational aids, such equipment may not be used as the sole information source for purposes of navigation or flight, except where specifically permitted by law. The aircraft instrumentation is not certified and applicable regulations should be complied with at all times.

7.13 Engine

The Rotax 912 ULS engine is a 4-stroke, 4-cylinder, horizontally opposed, spark ignition engine with one central camshaft-push-rod-OHV. The engine features liquid cooled cylinder heads with air cooled cylinders. It utilizes dry sump forced lubrication and has a dual contactless capacitor discharge magneto type ignition system. The engine is fitted with an electric starter, AC generator (alternator) and mechanical fuel pump. A back-up electrical fuel pump is fitted. Propeller drive is via reduction gear with integrated shock absorber. The engine will continue to run after an alternator and / or battery failure.

See the manufacturer documentation and applicable supplements to this Pilot operating Handbook for applicable information should the airplane be fitted with a Rotax 914 UL, a Rotax 912 iS, a Rotax 915 iS or a Rotax 916 iS engine.

7.14 Cooling system (914 UL / 912 ULS / 912 iS)

Cylinders are air cooled.

Cylinder heads are liquid cooled via a closed-circuit system with an expansion tank. A camshaft driven coolant pump circulates coolant from a radiator through the cylinder heads, then through an expansion bottle and back to the radiator.

The expansion tank is closed by a pressure cap. At temperature rise of the coolant an excess pressure valve in the expansion tank opens and coolant flows (via a hose) at atmospheric pressure to an overflow bottle mounted on the firewall. When cooling down the coolant in the overflow bottle is sucked back into the cooling circuit.

Refer to the latest revision / edition of the applicable Rotax engine operator and maintenance manuals.

Coolant type (912 ULS)

For aircraft fitted with the 914 UL or 912 iS engine refer to the applicable supplement at the end of this manual.

Either water-free propylene glycol based coolant concentrate or the conventional ethylene glycol based coolant and distilled water mixture (1:1 mix) can be used. Refer to the latest edition / revision of the ROTAX 912 ULS operator / maintenance manuals and to the latest revision of Rotax service instruction SI-912-016.

WARNING

Waterless coolant (propylene glycol based) may not be mixed with conventional (ethylene glycol/water) coolant or with additives! Non-observance can lead to damage to the cooling system and engine.

Coolant liquid volume

Coolant volume is approximately 2.5 litres (0.66 US gallons).

7.15 Throttle and Choke

Refer to the applicable supplement at the end of this manual for additional information regarding the throttle lever on aircraft equipped with the 914 UL engine.

Engine power is controlled by means of a hand operated throttle lever situated on the cabin centre console. Refer to paragraph 7.9. Forward movement of the throttle lever increases engine power output and backward movement decreases engine power output.

A choke knob (914 UL and 912 ULS equipped aircraft only) is positioned in the left centre of the instrument panel. Refer to paragraph 7.10. Pulling out the choke knob activates the choke mechanism.

Both controls (throttle and choke) are mechanically connected via cables to activators (levers) on the carburetors (914 UL and 912 ULS engines)

7.16 Carburetor pre-heating/anti-ice

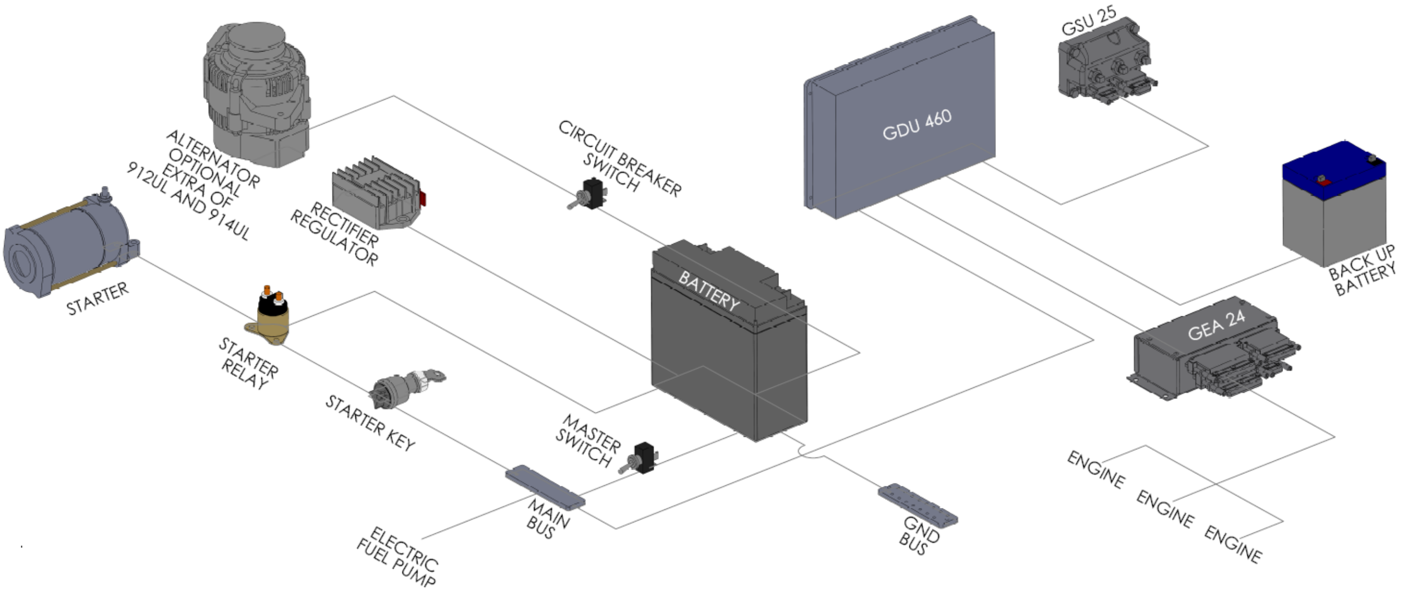
N/A.

7.17 Electrical System

Refer to the applicable supplement at the end of this manual for aircraft equipped with a 912 iS or a 914 UL engine.

Included are wiring diagrams for those parts of the aircraft's electrical system which are relevant / can aid the pilot's understanding of the aircraft's systems and their use with respect to the operational procedures described in this manual. Refer to paragraphs 7.17.1, 7.17.2 and 7.17.3.

The drawing below provides an overview of the electrical system (912 ULS equipped aircraft).



For information about the particular engine's integral electrical system (alternator, ignition etc.) refer to the applicable Rotax 912 ULS / 914 UL / 912 iS engine documents.

Charge system

For aircraft fitted with the 912 iS engine refer to the applicable supplement at the end of this manual.

For aircraft fitted with the 914 UL engine refer to the charge system electrical diagram in the applicable supplement at the end of this manual. The charge system wiring / operation for the 914 UL equipped aircraft is similar to that of the 912 ULS equipped aircraft and the following description applies.

Refer to paragraph 7.17.1. The alternating current (AC) output of the engine driven alternator is routed to a rectifier / regulator where it is converted (rectified) and regulated, to provide direct current (DC) output available to the aircraft systems (e.g. to charge the main battery). Charge system output is approximately 13.5 to 14 V DC (from 1000 ±250 rpm and higher).

The charge system output is connected to the battery. Refer to paragraph 7.17.1. The main bus is connected to the battery via the master switch, power is also supplied to the main bus via the starter relay and key.

Alternator failure indication

For alternator failure indication / indicators on 912 iS equipped aircraft fitted with the 912 iS engine please refer to the applicable supplement at the end of this manual.

For aircraft fitted with 912 ULS or 914 UL engines the electrical system incorporates an AC generator (alternator) / charge warning light (labeled CHARGE) located on the upper left side of the instrument panel (refer to paragraph 7.10). The light should illuminate if there is an AC generator (alternator) failure. The main bus / system voltage (indication on EFIS) could show a reduced reading.

Main battery

The 12 V main battery is mounted on the engine side of the firewall.

Main bus

Refer to the applicable supplement at the end of this manual for aircraft fitted with a 914 UL engine or 912 iS engine.

When power to the main bus is unavailable / fails the following equipment becomes non-operational:

1. Auxiliary (electric) fuel pump (912 ULS).
2. Flaps.
3. Autopilot (i.e. the autopilot servos).
4. Propeller (if applicable).
5. Radio.
6. Transponder (if fitted).
7. Cabin light(s).
8. Strobe, navigation and taxi lights.
9 EFIS (unless powered by the EFIS battery back-up circuit)

With regard to the above:

1. The EFIS and related equipment (GEA 24, GSU 25) can be operated via the EFIS back-up battery circuit, provided that the circuit is switched on and the EFIS back-up battery contains adequate charge.
2. The propeller controller (if applicable) and propeller pitch actuator motor (if applicable) are not powered and the propeller (if applicable) essentially becomes a fixed pitch propeller at the last pitch setting it was commanded to (by the propeller controller).

EFIS back-up battery / circuit

The 12 V EFIS back-up battery is mounted on the cabin side of the firewall, under the instrument panel. The EFIS battery back-up circuit can be operated independently from the main bus (i.e. with power to the main bus unavailable). Refer to paragraphs 7.17.2 and 7.17.3.

Master switch

The master switch connects the electrical system/main bus to the 12 V main battery and charge (regulator/rectifier output) system (via the charge system relay). Refer to paragraph 7.17.2.

Ignition/magneto and starter switches

Ignition/magneto switches and starter switch are incorporated into a key switch mounted on the instrument panel. Refer to paragraphs 7.17.1 and 7.17.2.

Both ignition/magneto switches should be ON (key in BOTH position) to operate the engine.

See the applicable supplement at the end of this manual with regard to the

NOTE

The engine (912 ULS / 912 iS / 914 UL) ignition system is independent of the aircraft electrical system (except for starter motor operation) and will operate even with the master switch and / or any circuit breaker(s) off. 914 UL and 912 iS engines require adequate power supply to at least one electrical fuel pump to remain operational (to prevent fuel starvation).

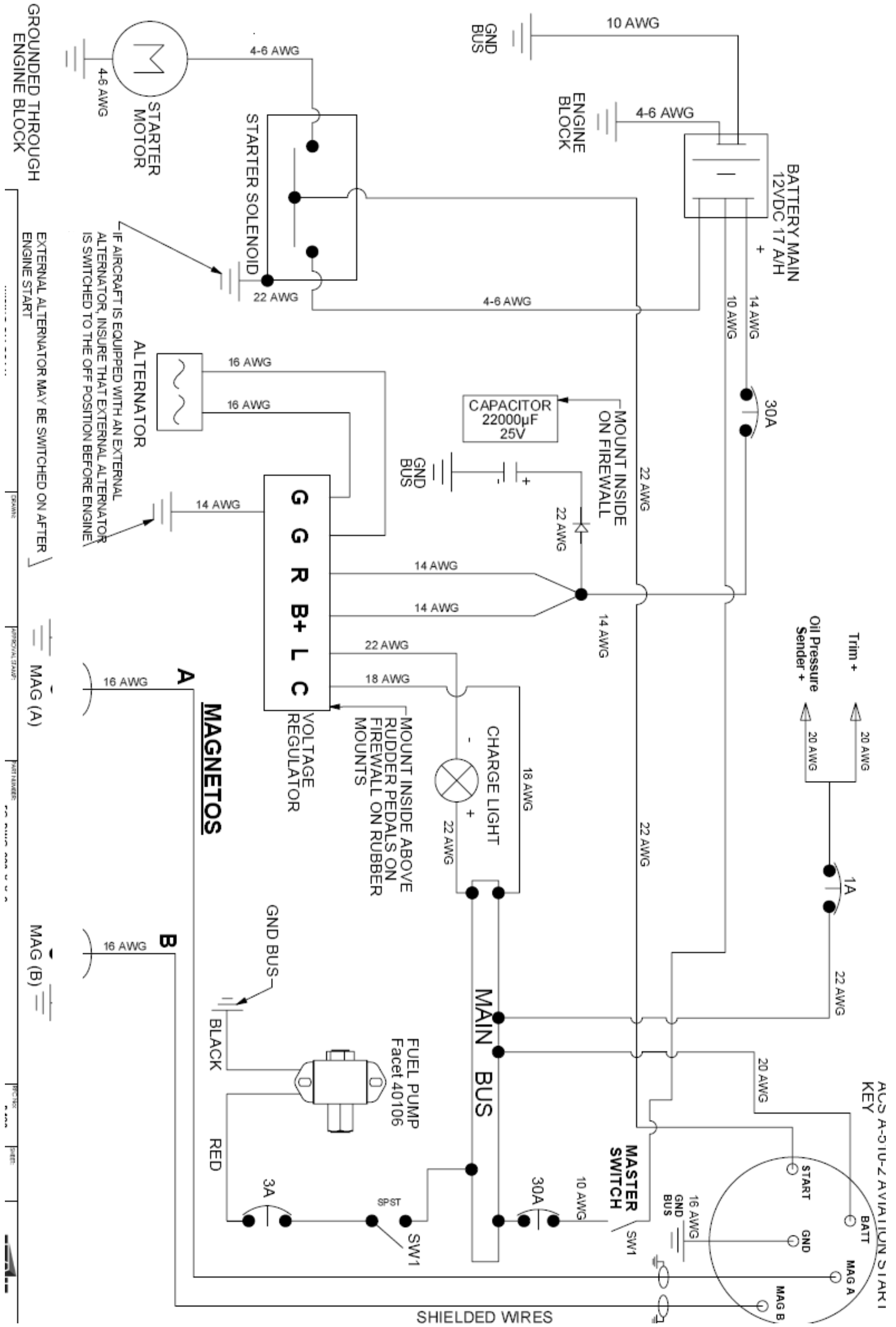
Avionics / equipment switches

Refer to paragraph 7.17.2. Lever type switches are switched UP for activation (i.e. ON). Optional equipment, switches and / or fuses are subject to change or installed as requested. Refer to the Aircraft Equipment List.

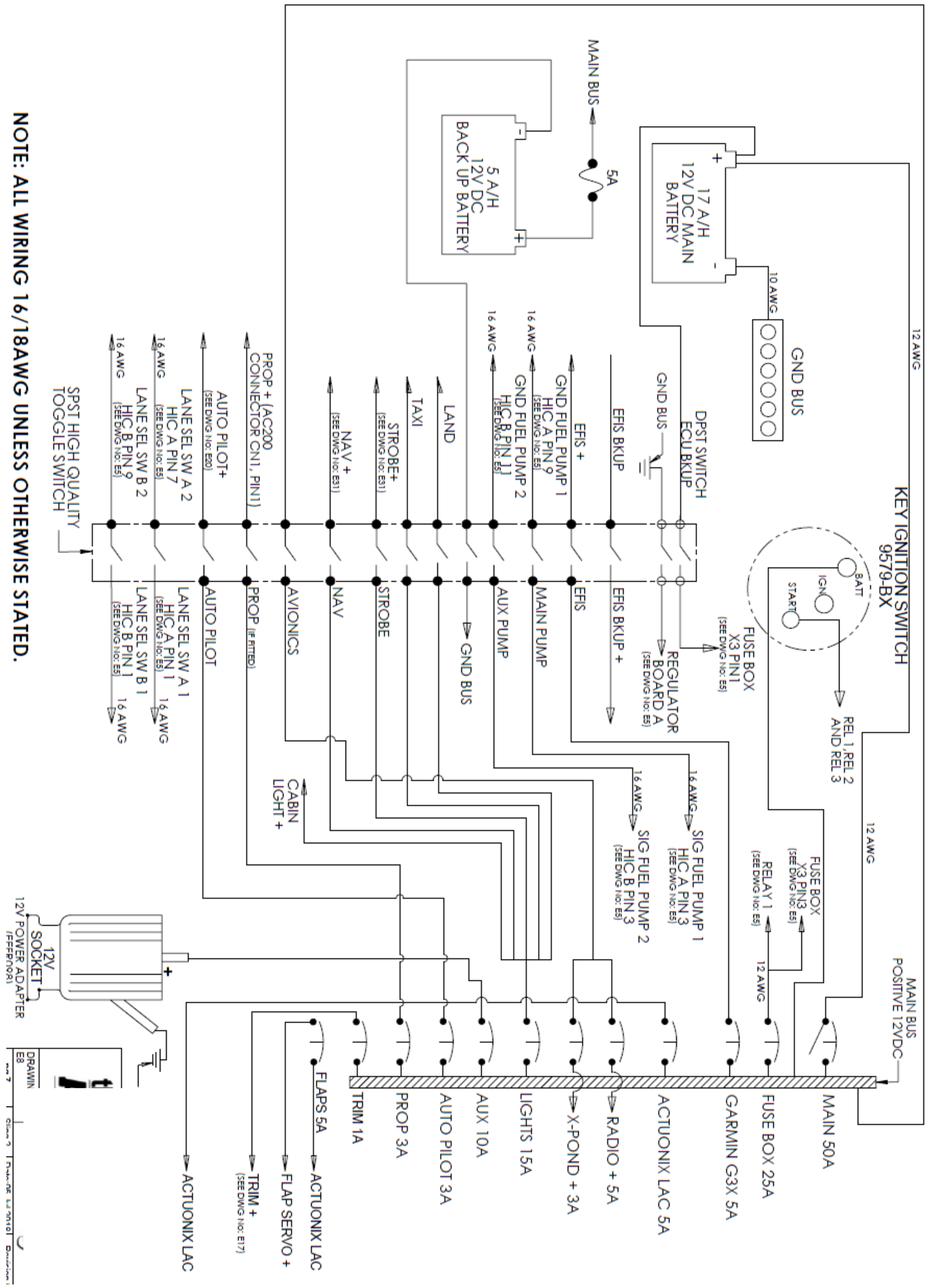
Circuit breakers

Circuit breakers are push-to-reset (i.e. push in) for restoring / supplying electrical power to their corresponding electrical circuits. Refer to paragraphs 7.17.1 and 7.17.2. Circuit breakers are located on the instrument panel. Refer to paragraph 7.10.

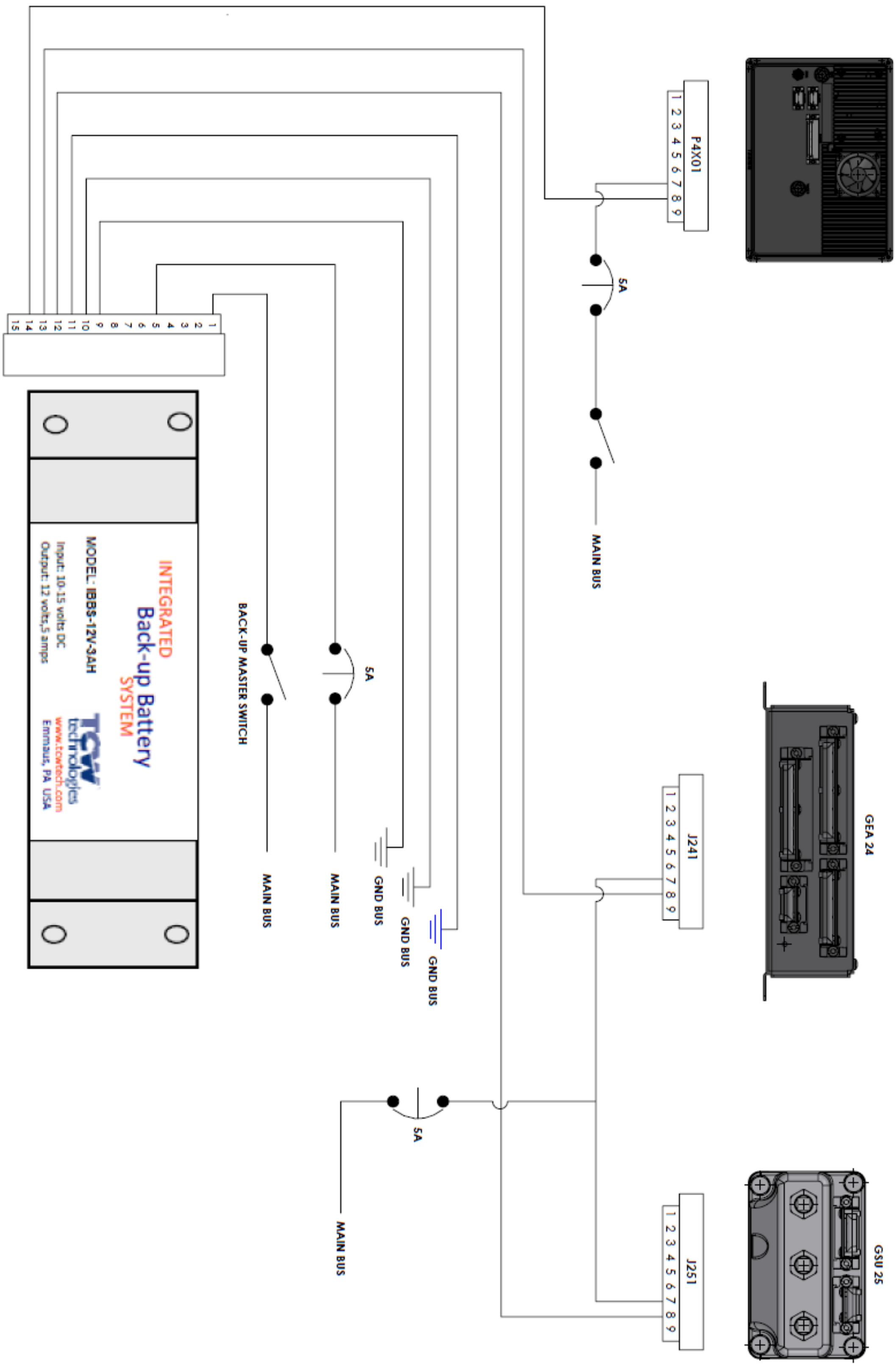
7.17.1 Charge system / start system / electric fuel pump wiring diagram (912 ULS)



7.17.2 Switches and circuit breakers diagram (912 ULS)



7.17.3 EFIS back-up circuit / battery back-up wiring diagram



7.18 Propeller

The propeller is a Warp Drive, 72-inch, composite, ground adjustable, 3 blade composite propeller, a Whirlwind, 70-inch, composite, ground adjustable, 3-blade propeller or an Airmaster AP332/AP330, 72-inch, composite, electric constant speed, 3-blade propeller.

NOTE

For technical data refer to documentation supplied by the propeller manufacturer.

See the manufacturer documentation and applicable supplements to this Pilot operating Handbook for applicable information should the airplane be fitted with the Airmaster AP332/AP330, the Airmaster AP430/431, the DUC Inconel® FLASH, the DUC FlashBlack-3-R, the MTV-6-A/190-69 or the MTV-6-R/190-69 propeller.

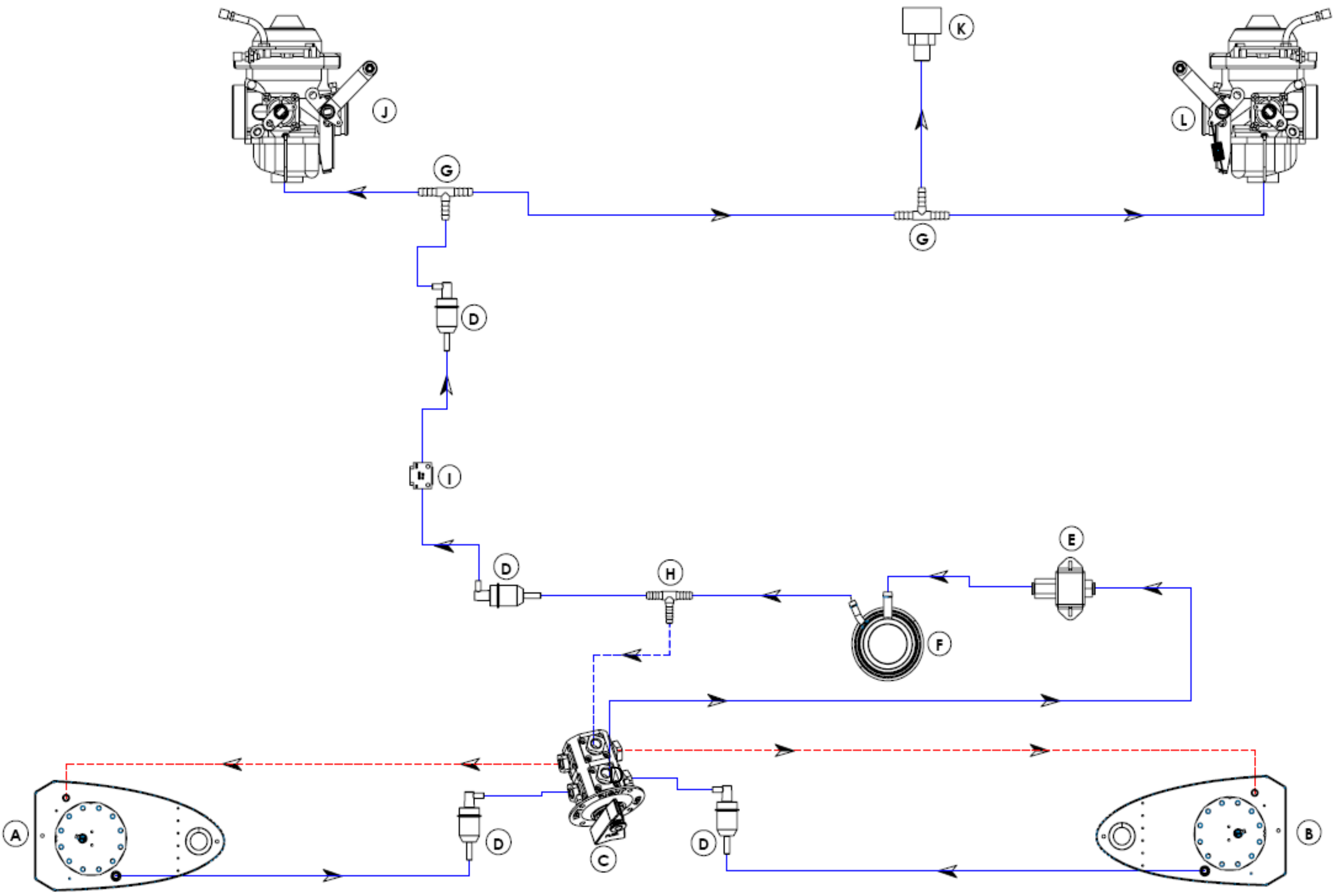
7.19 Fuel system

The airplane has a fuel tank located in the inside leading edge of each wing. Each tank is equipped with a vent (underneath wing) and finger screen (on tank outlet). A drain valve is located at the lowest point of each tank. Tank outlets lead to a fuel selector valve situated on the central console in the cockpit. Fuel return lines return excess fuel supplied by the fuel pump to the fuel tank in use. The system is configured as in the diagram below.

Volume of wing tanks: 2 x 75 litres (2 x 19.8 US gal), (73 litres / 19.2 US gal useable per tank).

WARNING

The fuel lift pipe in each fuel tank is situated adjacent to the lower inside wall of the tank. The aircraft should at no time be subjected to a sustained side slip towards a near empty fuel tank which is in use (i.e. wing with near empty tank down) as, despite the baffling, this may have the consequence that the fuel runs towards the outer edge of the tank exposing the fuel lift pipe to suck air, thereby starving the engine of fuel leading to engine failure. This poses a particular threat when at low altitude, typically prior to landing.



A	Port (left) fuel tank	G	8mm Barbed T-piece
B	Starboard (right) fuel tank	H	8mm T-Piece with Jet
C	Fuel selector (LEFT, RIGHT, OFF)	I	Fuel flow sensor
D	Fuel filter (90° bend)	J	Left carburettor
E	Electric fuel pump	K	Fuel pressure sensor
F	Mechanical fuel pump	L	Right carburettor

Fuel system (912 ULS)

NOTICE

Use only the correct fuel for the specific climate zones.

There is a risk of vapor lock formation if winter fuel is used for summer operation. So, use summer blend fuels only in summer and winter blend fuels must only be used in winter conditions.

RECOMMENDATION

In particularly hot ambient weather (higher than 25 degrees Celsius), it is recommended that either pure AVGAS or an AVGAS/MOGAS mixture having at least 50% AVGAS be used in order to reduce the possibility of percolation or vapor lock forming in the fuel system of aircraft.

7.20 Lubrication system

For aircraft fitted with the 914 UL or 912 iS engines please refer to the applicable supplements at the end of this manual.

912 ULS

The engine is provided with a dry sump forced lubrication system with a camshaft driven main pump with an integrated pressure regulator and oil pressure sensor. The main pump delivers oil from the oil reservoir, through an oil cooler (radiator) and oil filter to points of lubrication.

Surplus oil emerging from the points of lubrication gathers at the bottom of the crankcase from where it is forced back to the oil reservoir by piston blow-by gasses.

Oil temperature is sensed by a sensor located on the oil pump housing.

The lubrication circuit is vented at the oil reservoir. The oil reservoir is mounted on the firewall.

Refer to the latest revision / edition of the Rotax 912 ULS engine operator and maintenance manuals.

The lubrication system volume is approximately 3.5 litres (7.4 pints).

Oil type (912 ULS / 912 iS / 914 UL)

Automotive grade API SG (or higher) type oil, preferably synthetic or semi-synthetic**.**

Refer to the latest revision of the applicable Rotax engine and operator manuals and the latest revision of the applicable Rotax service bulletins.

7.21 Autopilot system

The autopilot system is integrated into / with the EFIS unit.

Please refer to the latest revisions of the Garmin G3X Installation manual for detailed instructions on autopilot operation and functionality.

The EFIS / autopilot inputs data from an electronic compass and AHRS, and controls two servos (one for pitch and one for roll) linked to the aircraft control system.

Power to the servos is controlled via a switch labeled AUTOPILOT, located on the instrument panel (refer to paragraph 7.17.2). This switch must be on for the autopilot / EFIS outputs to have any effect on aircraft attitude.

The autopilot can be engaged in several ways:

- The autopilot engage / disengage button on the control stick(s) (refer to paragraph 7.2).
- Via the EFIS keypad.

The autopilot can be disengaged in several ways:

- The autopilot engage / disengage button on the control stick(s) (refer to paragraph 7.2).
- Via the EFIS keypad.
- A servo reports (to the autopilot / EFIS) a slipping clutch or torque overdrive for 1 second, <u>i.e. the pilot overrides the autopilot via mechanical force on the control stick</u>.
- Removing power to the autopilot servos (switching off the AUTOPILOT switch), effectively removing the EFIS / autopilot's control / actuation of the servo motors.

7.22 Position, anti-collision, taxi and landing lights

The aircraft is equipped with a landing light and taxi light in each wing leading edge. Each pair of landing lights is activated by a switch (labeled LAND) on the instrument panel, likewise each pair of taxi lights is activated by a switch (labeled TAXI) on the instrument panel.

Combination navigation / position lights (red, green and white) and anti-collision lights (white) are fitted to the wing tips, in the standard configuration (red left, green right). A combination position / anti-collision light (white) is fitted on top of the rudder.

The white lights on the wingtips and rudder are dual function lights that can either be on continuously (position light), flash (anti-collision / strobe light) or flash at a higher brightness level superimposed on continuous operation (i.e. combination position and anti-collision / strobe light).

Position and anti-collision light function is dependent on switch selection:

SWITCH		RED AND GREEN WINGTIP LIGHTS	WHITE WINGTIP LIGHTS	WHITE LIGHT ON RUDDER
NAV	STROBE			
ON	OFF	On (continuous illumination)	On (continuous illumination)	Off
OFF	ON	Off	On (flashing)	On (flashing)
ON	ON	On (continuous illumination)	On (continuous illumination) and flashing (with higher intensity) superimposed on continuous illumination.	On (continuous illumination) and flashing (with higher intensity) superimposed on continuous illumination.

8 AIRPLANE GROUND HANDLING AND SERVICING

8.1 Introduction

This section contains factory-recommended procedures for proper ground handling and servicing of the aircraft. It also identifies certain inspection and maintenance requirements, which should be followed at all times. Full details for servicing and maintenance appear in the aircraft maintenance manual. This document does not replace the maintenance manual. Reference should always be made to the maintenance manual.

8.2 Servicing fuel, oil and coolant

Refer to the appropriate chapters in the Rotax engine maintenance and operator manuals and the Sling 2 Aircraft Maintenance Manual.

8.3 Towing and tie-down / mooring instructions

Towing

If you wish to move the aircraft on the ground other than under its own power, it is best to pull the aircraft forwards or push it backwards by hand holding one or more propeller blades, close to the spinner. The rear fuselage may be pushed down directly above a bulkhead or the horizontal stabilizer may be pushed down close to the root, directly over the front spar at the point where it attaches to a rib, in order to lift the nose of the aircraft for maneuvering purposes. It is best to press down on both points at once to spread the load. It is also acceptable to push the aircraft carefully backwards by putting pressure on the wing leading edges close to the root, directly on a nose rib, or on the horizontal stabilizer leading edge next to the root over a rib.

CAUTION

Avoid excessive pressure on the aircraft airframe - especially at or near control surfaces. The skins are very thin and minimum pressure should be placed on them. Maintain all safety precautions, especially in the propeller area.

Tow Bar

The aircraft can be towed by making use of a tow bar that is hooked to the nose wheel of the aircraft. The aircraft can be steered by rotating the nose wheel through the tow bar. The nose wheel is fully rotated once the pedal control stops have been engaged. For installation of the tow bar refer to the Sling 2 Maintenance Manual.

WARNING

When steering the aircraft with the tow bar, care should be taken to not rotate the nose wheel too violently or too far. This could cause the rudder pedal stops to slip.

The aircraft should be tied down when parked outside a hangar. Mooring is necessary to protect the aircraft against possible damage caused by wind and gusts.

For this reason, the aircraft is equipped with mooring eyes located on the lower surfaces of the wings and (one) under the tail.

Mooring procedure:

1. Verify: Fuel selector shut off, circuit breakers and Master switch switched off.
2. Verify: Magnetos switched off.
3. Secure the control column(s) (using for example a safety harness).
4. Close air vent.
5. Close and lock canopy.
6. Moor the aircraft to the ground by means of a mooring rope passed through the mooring eyes located on the lower surfaces of the wings and below the rear fuselage.

NOTE

In the case of long term parking, especially during winter, it is recommended to cover the cockpit canopy, or possibly the whole aircraft, by means of a suitable tarpaulin attached to the airframe.

8.4 Parking

It is advisable to park the aircraft inside a hangar, or alternatively inside any other suitable space (garage), with stable temperature, good ventilation, low humidity and a dust-free environment.

When parking for an extended period, cover the cockpit canopy, and possibly the whole aircraft, by means of a suitable tarpaulin.

8.5 Jacking

Since the empty weight of the aircraft is relatively low, two persons are usually able to lift the aircraft.

It is possible to lift the aircraft in the following manner:

- By pushing the fuselage rear section down above a bulkhead, the fuselage front section may be raised and then supported under the firewall. The same effect can be achieved by pressing down on the horizontal stabilizer as described under **Towing**.
- By lifting the rear fuselage under a bulkhead, the rear fuselage may be raised and then supported under that bulkhead. The support should comprise a large, flat surface area to avoid damage to the under-fuselage skin. The wings should also be gently supported to prevent the aircraft from rolling.
- To lift a wing, push from underneath the wing **only** at the main spar area and again using a support that has a large surface area. Do not lift up a wing by handling the wing tip.
- A single wheel can be lifted by jacking carefully under the end of the wheel strut.

8.6 Road transport

The aircraft may be transported after loading on a suitable trailer. It is necessary to remove the wings before road transport. The aircraft and dismantled wings should be attached securely to protect against possible damage.

8.7 Cleaning and care

Use efficient cleaning detergents to clean the aircraft surface. Oil spots on the aircraft surface (except for the canopy!) may be cleaned with petrol / gasoline.

The canopy may only be cleaned by washing it with a sufficient quantity of lukewarm water and an adequate quantity of detergents. Use either a soft, clean cloth sponge or deerskin. Then use suitable polishers to clean the canopy.

Upholstery and covers may be removed from the cockpit, brushed and washed in lukewarm water with an adequate quantity of detergents. Dry the upholstery thoroughly before insertion into the cockpit.

CAUTION
Never clean the canopy under dry conditions and **never** use petrol or chemical solvents.

CAUTION
In the case of long term parking, cover the canopy to protect the cockpit interior from direct sunlight.

8.8 Assembly and Disassembly

Refer to the aircraft maintenance manual and the aircraft construction manual for assembly and disassembly instructions.

8.9 Aircraft inspection / servicing periods

Periods of checks and contingent maintenance depend upon operating conditions and overall condition of the aircraft.

Inspections and servicing should be carried out according to (at least) the following periods:

After the first	25 flight hours,
thereafter after every	100 flight hours or annually, whichever is soonest, and as stipulated in the latest revision of the applicable engine manufacturer and propeller manufacturer documentation.

Refer to the engine operator’s manual for engine maintenance.

Maintain the propeller according to the manual supplied with the unit.

Comprehensive aircraft maintenance procedures are set out in the aircraft maintenance manual.

8.10 Aircraft modifications and repairs

It is recommended that you contact the aircraft manufacturer prior to making any modifications to the aircraft, to ensure that the airworthiness of the aircraft is not affected. Always use only original spare parts produced by the aircraft (or engine/propeller) manufacturer, as the case may be.

If the aircraft weight is affected by a modification, a new mass and balance calculation is necessary. This should be completed comprehensively, and new data / figures should be recorded in all relevant documentation.

9 SUPPLEMENTARY INFORMATION

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

List of inserted supplements

Date	Suppl. No.	Title of inserted supplement
04/06/12	01/2010	Airplanes fitted with a Rotax 914 UL engine
04/06/12	02/2010	Airplanes fitted with a Magnum 601 Ballistic Parachute recovery system
04/06/12	03/2010	Airplanes fitted with an Airmaster AP332/AP330 Propeller
19/10/12	04/2012	Airplanes fitted with a Rotax 912 iS engine
08/12/17	06/2017	Airplanes fitted with a tow hitch release mechanism.
05/06/19	06/2019	Front luggage compartment.
	02/2025	Airplanes fitted with a DUC 3-Blade Inconel Flash Propeller.
25/08/2025	08/2025	Airplanes fitted with a Rotax 915 iS engine.
25/08/2025	08/2025	Airplanes fitted with a Rotax 916 iS engine.

9.1 SUPPLEMENT 01/2010 – AIRPLANES FITTED WITH A ROTAX 914 UL ENGINE

This Supplement provides information relating to the operation of a Sling 2 aircraft fitted with a Rotax 914 UL engine.

This supplement must be contained in the Pilot Operating Handbook during operation of the airplane.

Information contained in this supplement adds to or replaces information from the standard Sling 2 Pilot Operating Handbook in regard only to the specific sections addressed herein. Limitations, procedures and information not addressed in this supplement remain as set out in the Sling 2 Pilot Operating Handbook.

Technical data on the Rotax 914 UL engine given in this supplement / manual is provided for information purposes and is subject to latest information / documentation as provided by the engine manufacturer.

The Rotax 914 UL engine is a 4-stroke, 4-cylinder, horizontally opposed, turbocharged spark ignition engine with one central camshaft-push-rod-OHV. The engine features liquid cooled cylinder heads with air cooled cylinders. It utilizes dry sump forced lubrication and has a dual contactless capacitor discharge ignition system. The engine is fitted with an electric starter, AC generator (alternator) and an electrical fuel pump. A back-up electrical fuel pump is also fitted. Propeller drive is via reduction gear with integrated shock absorber.

The engine will continue to run after an alternator / charge system failure, until the battery voltage is low (approximately 30 minutes if all ancillary equipment is switched off and provided that the battery is fully charged at the time of alternator / charge system failure). The engine will cease running due to fuel starvation (due to electrical pump(s) stopping) when the battery is depleted.

9.1.1 ROTAX 914 UL ENGINE OPERATING AND SPEED LIMITS

Always refer to latest edition / revision of the engine Operators Manual for latest information regarding operating limitations.

ENGINE START AND OPERATION TEMPERATURE LIMITS (914 UL)	
Maximum	50 °C (122 °F) (ambient temperature)
Minimum	-25 °C (-13 °F) (oil temperature)

ENGINE LOAD FACTOR (ACCELERATION) LIMITS	
Maximum	5 seconds at maximum -0.5 g.

ENGINE OPERATING AND SPEED LIMITS				
Engine Model:			ROTAX 914 UL	
Engine Manufacturer:			BRP-Rotax GmbH & Co KG	
Power		Maximum take-off	85.76 kW (115 hp) at 5800 rpm, maximum 5 minutes	
		Maximum continuous	74.6 kW (100 hp) at 5500 rpm	
Engine RPM		Maximum take-off	5800 rpm (maximum 5 minutes)	
		Maximum continuous	5500 rpm	
		Idle	1 400 rpm (minimum)	
Temperature	EGT	Maximum	950 °C (1742 °F)	
	Cylinder head	Minimum	50 °C (122 °F)	
		Maximum	135 °C (275 °F).	
		Normal	90 to 110 °C (194 to 230 °F)	
	Oil	Minimum	50 °C (122 °F)	
		Maximum	130 °C (266 °F)	
		Normal	90 to 110 °C (194 to 230 °F)	
	Coolant	Minimum	50 °C (122 °F)	
		Maximum	120 °C (248 °F)	
		Normal	80 to 100 °C (175 to 210 °F)	
Pressure	Oil	minimum	0.8 Bar (12 psi) – below 3500 rpm	
		Maximum	7 bar (102 psi) - permissible for short period on cold engine start	
		Normal	2 to 5 bar (29 to 73 psi) - above 3500 rpm	
	Fuel	Minimum	1.15 bar (16.7 psi)	
		Maximum	1.85 bar (26.8 psi)	
	Manifold	Maximum take-off	1.35 bar (19.58 psi)	**NOTE** Overshoot of manifold pressure is allowed but has to stabilize within limits within 2 seconds.
		Maximum continuous	1.2 bar (17.4 psi)	

9.1.2 ROTAX 914 UL OPERATING FLUIDS

FUEL (914 UL) **Minimum RON 95 / Minimum AKI 91**			
Grade	**MOGAS**		DIN EN 228 Super, DIN EN 228 Super Plus, ASTM D4814.
	AVGAS	**Leaded**	AVGAS 100LL ASTM D910.
		Unleaded	UL91 ASTM D7547.

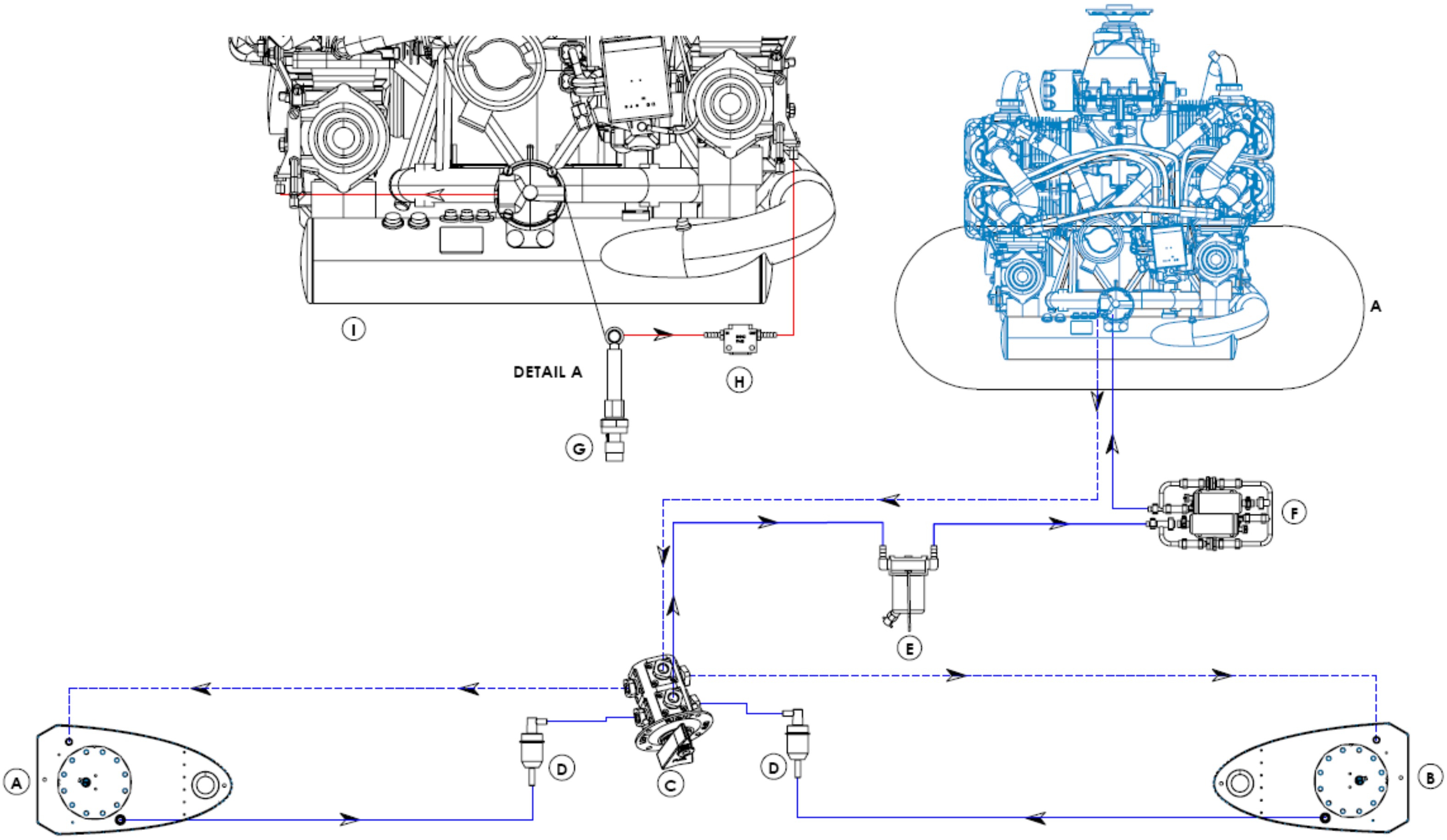
ENGINE OIL (914 UL)	
Grade	Shell AeroShell Oil Sport Plus 4 with specification RON 424. XPS Full Synthetic Aviation Engine Oil with specification RON 451. (Refer to the latest revision of the engine operator's manual for more)
Oil Viscosity	SAE 10W-40 and SAE 5W-50

COOLANT (914 UL)		
Grade / type	Waterless coolant based on propylene glycol applicable for engine S/N without suffix -01.	**DO NOT MIX THESE TWO**

	Conventional coolant based on ethylene glycol with 50% water content.	**TYPES OF COOLANT.**

Refer to latest revision of Rotax operator / maintenance manuals and latest revision of Rotax service instruction SI-914-019 with regard to selection of operating fluids.

9.1.3 ROTAX 914 UL FUEL SYSTEM



A	Left fuel tank	F	TAF fuel pump system
B	Right fuel tank	G	Garmin fuel pressure sensor
C	Fuel selector (LEFT, RIGHT, OFF)	H	Fuel flow sensor
D	90° Fuel filter	I	914 UL Engine
E	Gascolator		
———	8mm Fuel hose SAE J30R7		
- - - - -	8mm Fuel hose SAE J30R7 return		
———	Existing Rotax engine pipes		

Fuel feed is through two electric pumps. Each pump has a parallel installed check valve (NRV).

The fuel feed from the fuel pumps enters a fuel pressure controller mounted on the engine, where after it splits into two separate branches, one for each carburettor. A fuel pressure sensor is connected to one fuel pipe branch. A fuel flow sensor is connected in the one fuel pipe branch. The sensors are connected to the EFIS via the RDAC unit.

Fuel return lines return excess fuel supplied by the fuel pump(s) to the fuel tank in use.

Main fuel pump

The main fuel pump is connected to the main bus. The pump cannot be operated when power to the main bus is unavailable.

Auxiliary fuel pump

The auxiliary fuel pump is connected to the output of the charge system rectifier and via the charge relay to the main battery and main bus (as long as the main bus is powered (i.e. the master switch is on) and the charge relay is energised).

If the charge system fails the auxiliary fuel pump can be operated via power from the main bus, provided that the charge relay remains energised / is not failed, the master switch is on and there is no failure of the power supply to the main bus.

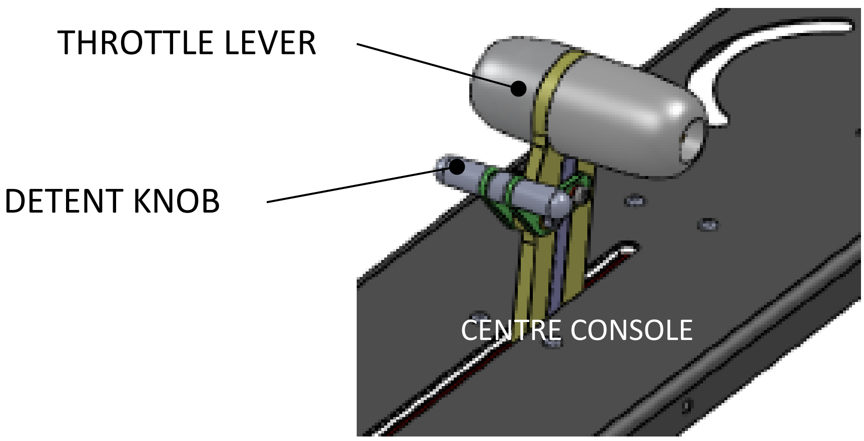
If power to the main bus is unavailable, or the charge relay fails, the charge system is disconnected from the main bus and battery. In this case the auxiliary pump can be operated from the output of the charge system / rectifier, provided that the charge system remains operational.

9.1.4 SUPPLEMENTARY INFORMATION - OPERATIONAL USE OF THE FUEL SYSTEM

> **WARNING**
> At least one fuel pump must be operational at all times during flight for the engine to be operational! With no pump operational engine stoppage will occur due to fuel starvation.

9.1.5 SUPPLEMENTARY INFORMATION - THROTTLE

The throttle lever incorporates a detent mechanism which stops the lever at the 100% throttle selection position. Moving the throttle lever past the 100% throttle selection requires the manipulation of a detent control / enabling knob located on the throttle lever. Operation of the throttle is related to turbocharger / boost control. Refer to **SUPPLEMENTARY INFORMATION – TURBOCHARGER CONTROL UNIT (TCU)** in this supplement.

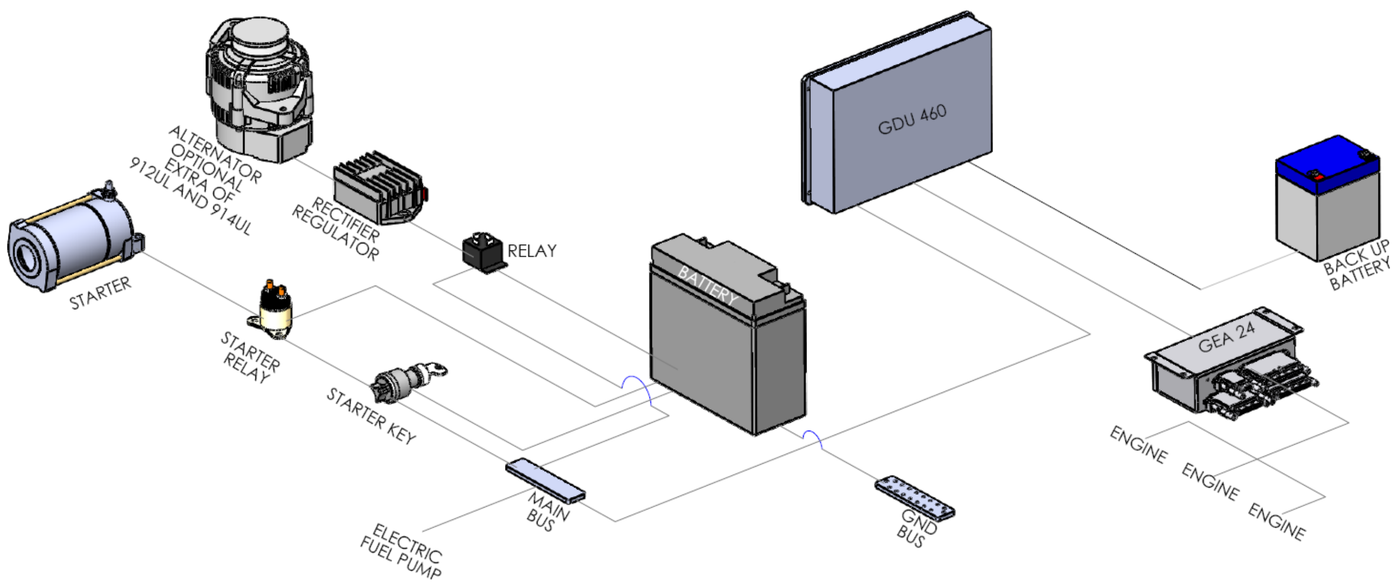


9.1.6 SUPPLEMENTARY INFORMATION – ELECTRICAL EQUIPMENT SELECTION / CONTROL SWITCHES

SWITCH / LABEL	FUNCTION	POSITION
MASTER / STARTER KEY SWITCH	Power disconnected from main bus	OFF
	Main bus connected to power	ON
	Engage starter motor	START
EFIS	Switch power (from main bus) to EFIS system on / off.	UP (ON) DOWN (OFF)
EFIS BKUP	Connects EFIS system to EFIS back-up battery supply.	
MAIN PUMP	Switch main fuel pump in / off.	
AUX PUMP	Switch auxiliary fuel pump on / off.	
LAND	Switch landing lights on / off.	
TAXI	Switch taxi lights on / off.	
NAV	Select position (navigation) lights.	
STROBE	Select anti-collision (strobe) lights.	
AVIONICS	Switch power to radio and transponder (if fitted) on / off.	
PROP (if fitted)	Switch power to propeller motor and controller on / off.	
AUTOPILOT	Switch power to autopilot servos on / off.	
MASTER	Switch power to main bus on / off.	
MAG A	Select Magneto A	
MAG B	Select Magneto B	

9.1.7 SUPPLEMENTARY INFORMATION – ELECTRICAL SYSTEM OVERVIEW

The drawing below provides an overview of the electrical system (914 UL equipped aircraft).



9.1.8 SUPPLEMENTARY INFORMATION – MAIN BUS

When power to the main bus is unavailable / fails the following equipment, <u>in addition</u> to those listed (and applicable) in paragraph 7.17 under **Main bus**, becomes non-operational:

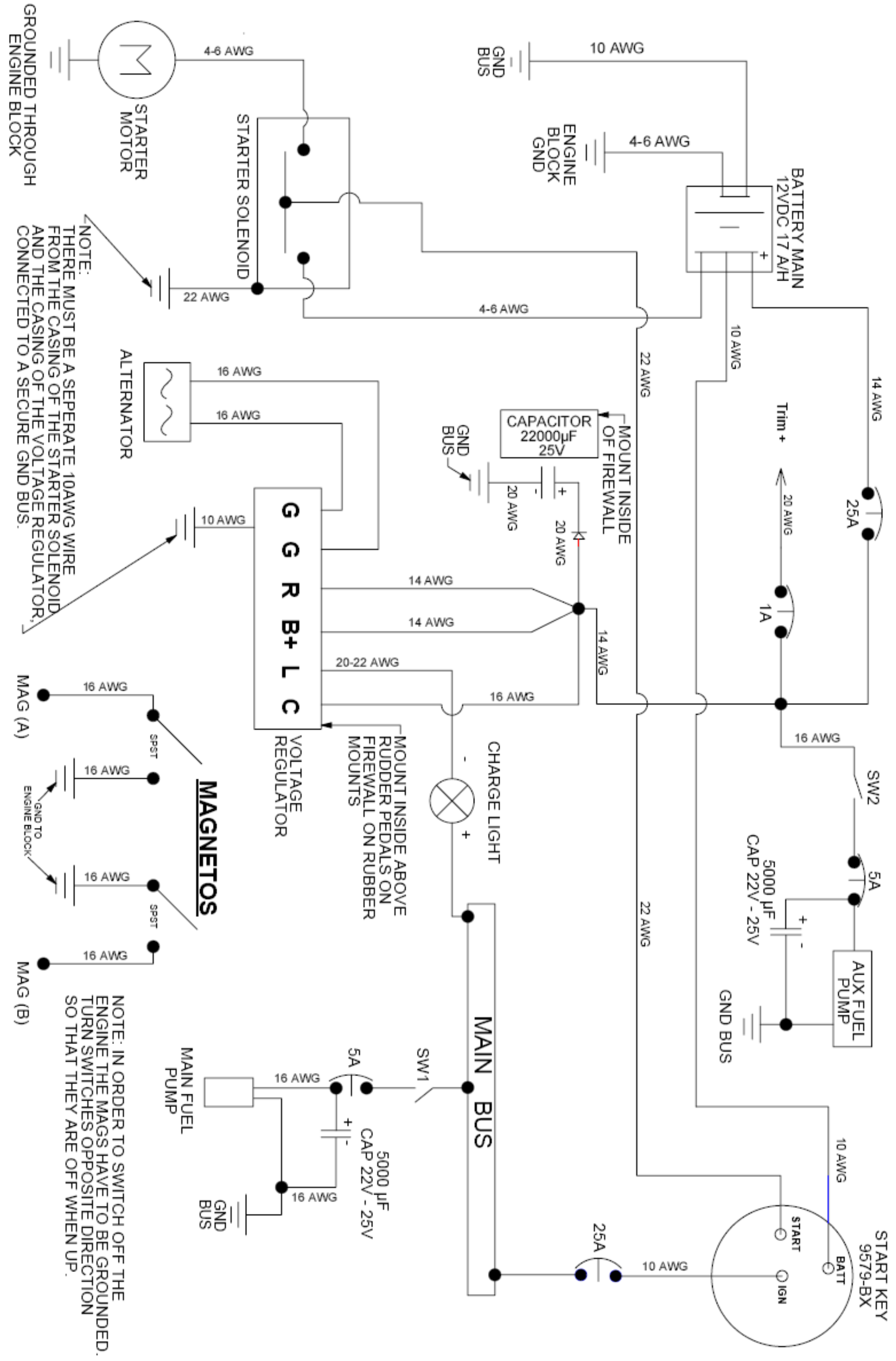
1. Main fuel pump.
2. TCU (Turbocharger Control Unit) / waste gate servo.

With regard to the above:

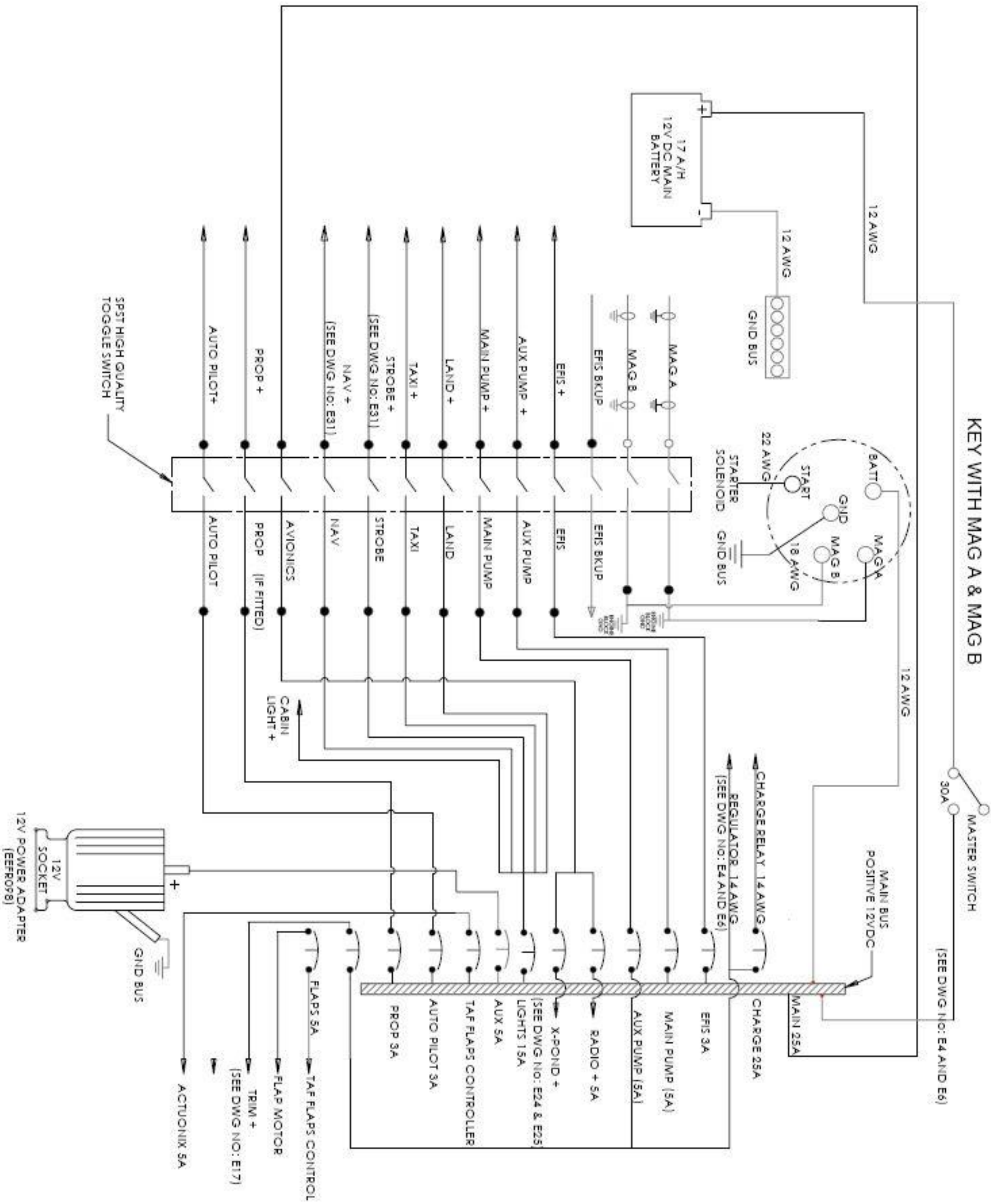
1. The auxiliary fuel pump can be operated via the charge system output, provided that the alternator / charge system remains operational.

2. With loss of power to the TCU, the waste gate servo is not powered and will remain in its last commanded position. Boost pressure control is not available and limited flight operation is applicable. Refer to **SUPPLEMENTARY INFORMATION – MAIN BUS POWER FAILURE** in this supplement.

CHARGE AND START SYSTEM WIRING DIAGRAM (914 UL)



SWITCHES AND CIRCUIT BREAKERS WIRING DIAGRAM (914 UL)



9.1.9 LUBRICATION SYSTEM

The engine is provided with a dry sump forced lubrication system with a camshaft driven main pump with integrated pressure regulator and additional suction pump. The main pump delivers oil from the oil reservoir, through an oil cooler (radiator) and oil filter to points of lubrication.

Surplus oil emerging from the points of lubrication gathers at the bottom of the crankcase from where it is forced back to the oil reservoir by a piston blow-by gas.

Oil temperature is sensed by a sensor located on the oil pump housing.

The lubrication circuit is vented at the oil reservoir. The oil reservoir is located on the firewall.

The turbocharger is supplied with oil via a separate oil line from the main pump. Return oil from the turbocharger is collected in a stainless-steel sump and is sucked back to the suction pump and then pumped back to the oil reservoir via a return line.

Refer to the latest revision / edition of the Rotax 914 UL engine operator and maintenance manuals.

The lubrication system volume is approximately 3.5 litres (7.4 pints).

9.1.10 SUPPLEMENTARY INFORMATION – TURBOCHARGER CONTROL UNIT (TCU)

The applicable sections in the Rotax 914 UL operator's manual should be carefully read conjunction with this section.

A throttle arm position sensor is mounted on one carburetor. The sensor measures (throttle) position linearly from 0% to 115%, corresponding to engine idle and engine full (100%) power respectively. The TCU (Turbocharger Control Unit) utilizes throttle position in conjunction with aircraft ambient pressure, airbox pressure, engine rpm and airbox temperature to actuate an electronically controlled flap (waste gate) to regulate the speed of the turbocharger / boost pressure in the engine airbox.

The TCU starts adding full boost from the 108% throttle position onward.

The throttle lever (in cabin) is equipped with a detent at the 100% throttle lever position. A lever on the throttle lever is activated to move the throttle lever past the detent position to allow movement up to the 115% throttle position. Note that 115% throttle position equates to 100% engine power (full take-off power).

Relationship between throttle position and engine power		
Throttle position	Engine power	
115%	100%	**Maximum 5 minutes!** (take-off power)
100%	85%	Maximum continuous power

NOTE

Throttle position from 108% to 110% result in a rapid rise in boost pressure. Avoid constant throttle settings in this range, as it may result in boost pressure control fluctuations (surging). To avoid unstable boost pressure the throttle should be moved smoothly through this range to full power (115% throttle position), or on a power reduction, to maximum continuous power (100% throttle position)

The TCU controls two indicator lights mounted on the instrument panel. When supply voltage is supplied to the TCU (master switch is switched on) the TCU is subjected to a self-test. Both the BOOST and CAUTION lights should illuminate for 1 to 2 seconds and then turn off. <u>If not, this indicative of a deficiency and the engine should not be taken into operation before the problem has not been identified and rectified</u>.

TCU LIGHT INDICATIONS			
POSSIBLE CAUSE	Maximum admissible boost pressure exceeded.	Full throttle (115%) operation exceeded maximum duration of 5 minutes.	Sensor failure, wiring failure, TCU failure, possible airbox leak.
BOOST LIGHT INDICATION	Illuminates steadily.	Blinks.	
CAUTION LIGHT INDICATION			Blinks.
NOTE	<u>Boost pressure will not be reduced automatically.</u> Limited operation as boost control may be unavailable or insufficient.	<u>Boost pressure will not be reduced automatically.</u>	Limited operation as boost control may be unavailable or insufficient.
ACTION	Use throttle lever to reduce boost pressure manually to within operating limits.	Use throttle lever to reduce boost pressure manually to within operating limits (at least maximum continuous values). The BOOST light resets when the throttle setting is below the 108% position for a minimum of 5 minutes.	Use throttle lever to reduce boost pressure manually to within operating limits.

When supply voltage to the TCU fails the waste gate servo (and thus the waste gate flap) will remain in its last commanded position. Boost pressure regulation is not available and limited flight operation is applicable.

9.1.11 SUPPLEMENTARY INFORMATION – FUEL CONSUMPTION

Take off performance (5 800 RPM)	33.0 l/hr	(8.7 US gal/hr)
Max continuous power (5 500 RPM)	27.2 l/hr	(7.2 US gal/hr)
75% continuous power (cruise)	20.4 l/hr	(5.4 US gal/hr)

Refer to the fuel consumption graphs and tables in the latest edition / revision of the Rotax 914 UL operator manual for up to date information.

9.1.12 SUPPLEMENTARY INFORMATION – ALTERNATOR / CHARGE SYSTEM FAILURE

Alternator failure is evidenced by the illumination of the (red) alternator / charge warning light. **Procedure as in paragraph 3.6.4**.

WARNING

The engine will continue to run after an alternator / charge system failure, until the battery voltage is low (approximately 30 minutes if all ancillary equipment is switched off and provided that the battery is fully charged at the time of alternator / charge system failure). The engine will cease running due to fuel starvation (due to stoppage of the fuel pump(s)) when the battery is depleted.

NOTE

As per the procedure in **paragraph 3.6.4** the auxiliary fuel pump is switched off / verified to be off to conserve battery charge. If required, the auxiliary pump can still be operated from the main bus provided that the master switch is on, there is no failure of power supply to the main bus and the charge relay remains energized / is not failed.

9.1.13 SUPPLEMENTARY INFORMATION – EMERGENCY AND ABNORMAL PROCEDURES - ENGINE IRREGULARITIES IN FLIGHT

Turbocharger Control Unit (TCU) lights indication

Refer to the table (**TCU LIGHT INDICATIONS**) relating TCU indicator light mode of indication to probable causes and suggested pilot action in **SUPPLEMENTARY INFORMATION – TURBOCHARGER CONTROL UNIT (TCU).**

NOTE

Refer to the applicable parts (**Caution Lamps**) of the section on **Abnormal Operation** in the Rotax 914 UL engine operator manual.

Sudden drop in boost pressure

Possible causes may be the turbocharger fracturing or the waste gate not closing.

Fractured turbocharger: A loud bang may be heard as a result of and indicating turbocharger fracture. Flight with reduced performance may be possible. Monitor oil pressure. Land as soon as possible.

Waste gate not closing: The TCU CAUTION light may be flashing, indicating equipment failure. Limited flight operation (waste gate not responding).

Sudden increase in boost pressure

A possible cause might be that the waste gate is fully closed. The TCU CAUTION light may be flashing, indicating equipment failure. The BOOST lamp will illuminate steadily when admissible boost pressure is exceeded.

Immediately reduce engine speed / rpm until boost pressure is within limits.

NOTE
Refer to the applicable parts of the section on **Abnormal Operation** in the Rotax 914 UL engine operator manual.

9.1.14 SUPPLEMENTARY INFORMATION – MAIN BUS POWER FAILURE

Refer to **SUPPLEMENTARY INFORMATION – MAIN BUS** in this supplement, for an overview of equipment affected by loss of power to the main bus.

1. Auxiliary fuel pump - on
2. Use the throttle lever to set / control engine speed and boost pressure to within operating limits (at least maximum continuous values).
3. Rest of procedure as in paragraph 3.6.5.

CAUTION
Power loss to the main bus will result in the main fuel pump stopping and the starter motor becoming unavailable / non-operational. If the engine is allowed to run dry and stop before switching over to the auxiliary fuel pump the engine will have to be restarted via airstream driven propeller rotation (windmilling).

The TCU and waste gate servo is not powered and automatic boost pressure control is not available.

9.1.15 SUPPLEMENTARY INFORMATION – PERFORMANCE

1. It should be noted that the performance of the aircraft will be altered through use of a 914 UL engine (instead of a 912 ULS engine). In particular:

1.1. V_h will be increased from 116 KIAS to 125 KIAS.
1.2. The aircraft service ceiling will increase to 15 000 ft.
1.3. Take-off run on concrete and grass will be 80 m (262.5 ft) and 100 m (328.1 ft) respectively.
1.4 Take-off distance (over 15 m (50 ft)) on concrete and grass will be 140 m (459.3 ft) and 160 m (524.9) respectively.
1.5. Rate of climb at 0, 3 000, 6 000 and 9 000 ft ISA will increase to 1 000, 900, 800 and 720 fpm respectively.
1.6. Cruise speeds will not be altered substantially, unless higher power settings are used.

2. Reference should be made to the latest revision / edition of the Operators Manual of the Rotax 914UL engine for engine operating speeds and limits. Reference should also be made to the Operators Manual of the Rotax 914 UL engine for operational guidelines and instructions. These should be incorporated into the normal or emergency procedures as applicable.

3. Reference should also be made to the latest revision of Rotax service instruction SI-914-019 with regard to the use and selection of operating fluids (fuel, oil and coolant).

9.1.16 SUPPLEMENTARY INFORMATION – ENGINE START

When system voltage is applied (Master switch is switched on) both TCU lights should illuminate for approximately 1 to 2 seconds (TCU self-test) and then extinguish. If not, it indicates a deficiency (refer to Rotax 914 maintenance manuals).

WARNING
Do not take the engine into operation before having rectified the cause of the deficiency.

Procedure as in 4.5.2.

9.2 SUPPLEMENT 02/2010 – AIRPLANES FITTED WITH A MAGNUM 601 BALLISTIC PARACHUTE

This supplement must be contained in the Pilot Operating Handbook during operation of the airplane.

Information contained in this Supplement adds to or replaces information from the standards Pilot Operating Handbook in regard only to the specific sections addressed herein. Limitations, procedures and information not addressed in this Supplement remain as set out in the Pilots Operating Handbook.

This supplement provides information necessary for the operation of an aircraft fitted with a Magnum 601 ballistic parachute.

1. The Sling 2 is designed specifically for convenient fitment of a Magnum 601 ballistic parachute recovery system. The system is designed to enable the pilot or passenger to deploy the parachute in case of emergency in such a manner that the aircraft structure is carried under the parachute to the ground, on the basis that the occupants will not be injured, and the aircraft structure suffers minimum damage.

2. Use of a ballistic parachute system involves inherent risks and the system should be properly understood by the pilot prior to use.

9.2.1 BALLISTIC PARACHUTE OPERATIONAL PARAMETERS

PARAMETER	
Limit speed	320 km h^{-1} / 198.84 mph / 172.77 kt
Deployment time (limit speed)	3 s.
Maximum supported mass	759 kg / 1673.31 lb.
Descend rate (maximum mass)	7 $m.s^{-1}$.

9.2.2 BALLISTIC PARACHUTE DEPLOYMENT

1. Observe ballistic parachute operational parameters.
2. Throttle - idle
3. Magneto / ignition switches – off
4. Electric fuel pump(s) - off
5. Fuel selector lever – off
6. Deploy the parachute by pulling the T-shaped activation handle (situated in the centre front) positively.
7. Master and avionics switch - as dictated by radio communication requirements - off before impact with ground.
8. Other electrical equipment switches - off

9.3 SUPPLEMENT 03/2010 – AIRPLANES FITTED WITH AN AIRMASTER AP332/AP330 PROPELLER

This supplement must be contained in the Pilot Operating Handbook during operation of the airplane.

Information contained in this supplement adds to or replaces information from the standard Pilot Operating Handbook in regard only to the specific sections addressed herein. Limitations, procedures and information not addressed in this supplement remain as set out in the Pilots Operating Handbook.

This supplement provides information necessary for the operation of an aircraft fitted with an Airmaster AP332/AP330 variable pitch (constant speed) propeller.

Propeller control is via an electronic control unit mounted on the instrument panel.

Power to the propeller / propeller controller is provided via the main bus and activated by a switch labeled PROP, located on the instrument panel. Refer to paragraph 7.17.2 (for 912 ULS equipped aircraft) or to the wiring diagrams under **SWITCHES AND CIRCUIT** breakers in the applicable supplements (for 914 UL and 912 equipped aircraft).

1. Fitment of an AP332/AP330 propeller to the aircraft will substantially improve aircraft performance relative to use of a fixed pitch propeller. General improvement will be witnessed, where the aircraft is fitted with a Rotax 912 ULS or 912 iS engine, in relation to:

1.1. V_h, which will be increased from 116 KIAS to 120 KIAS.

1.2. The aircraft service ceiling will increase to 14 000 ft.
1.3. Take-off distance on concrete and grass will be 100 m (328.1 ft) and 120 m (393.7 ft) respectively.
1.4 Take-off distance (over 15 m (50 ft)) on concrete and grass will be 160 m (524.93 ft) and 180 m (590.55) respectively.
1.5. Rates of climb at 0, 3 000, 6 000 and 9 000 ft ISA will increase to 900, 800, 700 and 600 fpm respectively.
1.6. Cruise speeds will not be altered substantially, unless higher power settings are used.
1.7. Fuel consumption will not be changed unless higher power settings are used.

2. Reference should be made to the Operators Manual for the Airmaster AP332/AP330 Propeller operational guidelines and instructions. These should be incorporated into the normal and emergency procedures for the aircraft as applicable.

9.3.1 SUPPLEMENTARY INFORMATION – PROPELLER CONTROL FAILURE

The propeller / propeller controller can fail in a variety of modes / ways. The pilot(s) should completely familiarize him or herself with the parts of the Airmaster propeller operator’s manual which deals with **Emergency Operation** and **Failure Modes**.

The following immediate actions should be taken in the event of any propeller control failure:

1. If required, immediately reduce throttle to avoid exceeding engine speed limitations.

2. Select manual mode (MAN).
3. If manual control of the propeller pitch is still available:
   - Set propeller pitch and engine throttle to give desired power and engine speed combination.

CAUTION

Selection of too fine a propeller pitch for the engine throttle setting will result in an over-speed situation.

Selection of too coarse a propeller pitch may result in the engine being unable to maintain the desired engine speed, even at full throttle.

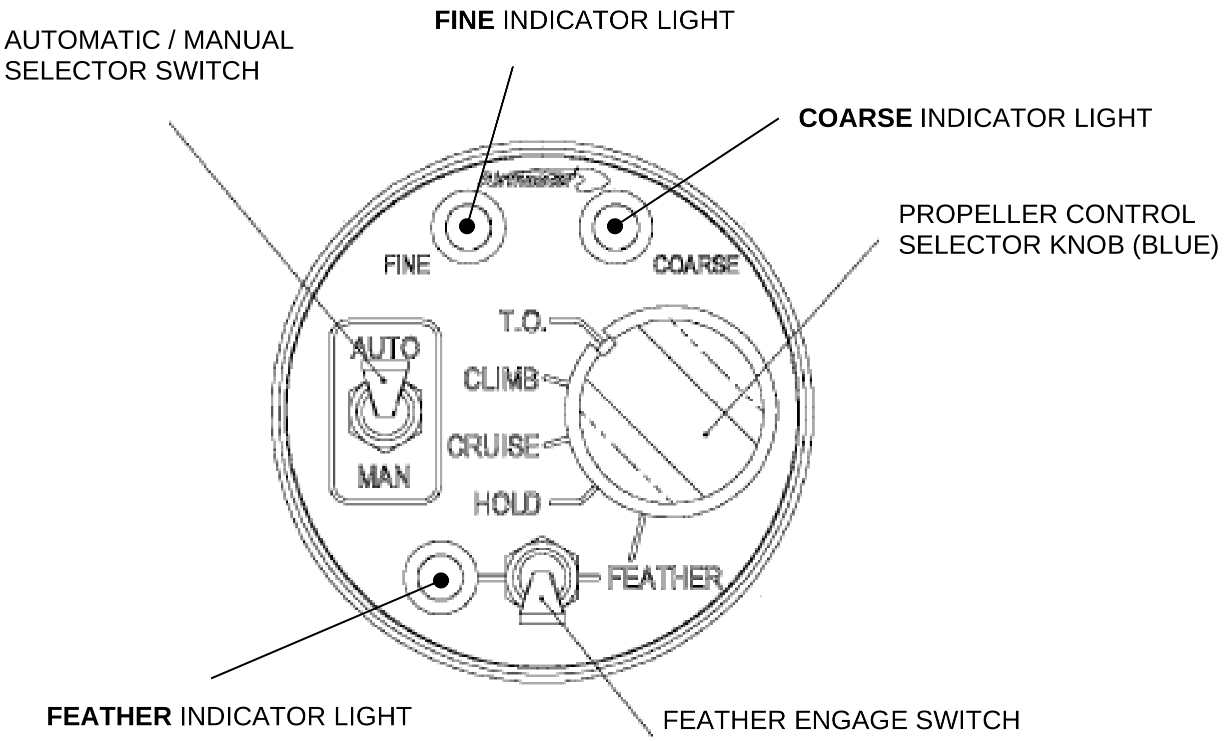
4. If manual control of the propeller pitch is not available:

   - If propeller control failed with the propeller pitch set inside the flight range, continued flight is possible, but with caution. Use the engine throttle to control engine / propeller speed, as with a fixed pitch propeller.
   - Propeller switch - off

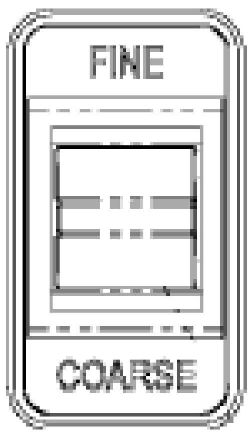
CAUTION

If failure occurred with propeller pitch set at any other pitch than the fine pitch limit, full power from the engine / propeller combination may not be available at low speeds. **Consideration should be given to this during approach and landing.**

9.3.2 SUPPLEMENTARY INFORMATION – PILOT CONTROLS - PROPELLER



PROPELLER CONTROLLER



MANUAL PROPELLER CONTROL SWITCH

Pilot operable controls related to the constant speed propeller system are the following:

- Power switch (labelled PROP), located on the instrument panel. This switch activates / deactivates the power supply to the propeller controller unit and to the propeller motor.

- Automatic / Manual Selector switch, located on the propeller controller. This switch selects between propeller automatic (AUTO) and manual (MAN) control modes:

  - Automatic mode (AUTO) operation includes constant speed governing in pre-set (take-off, climb, and cruise) and hold modes, and feathering.

  - In manual mode (MAN) the Manual Propeller Control switch provides direct control over propeller pitch, allowing the propeller to be used as an in-flight adjustable variable pitch propeller.

- Propeller Control Selector knob. This rotary (blue) knob has no function when manual mode (MAN) is selected on the Automatic / Manual Selector switch. With automatic (AUTO) mode selected, the knob is used to select between the various pre-set propeller modes:

    - **TO**. This selection is used for take-off and landing.

    - **CLIMB**. Used for climbing and any other operations where continuous higher power settings are required.

    - **CRUISE**. This selection is used for normal cruise operation.

    - **HOLD**. Provides constant speed propeller governing at a pilot selected speed.

- Feather Engage switch. With automatic (AUTO) mode selected on the Automatic / Manual Selector switch and the Propeller Control Selector knob set to FEATHER, engaging this switch will initiate automatic feathering of the propeller.

- Manual Propeller Control switch, located separately from the propeller controller unit on the instrument panel. The Manual Propeller Control switch provides for:

    - Direct control of the propeller pitch when manual mode (MAN) is selected with the Automatic / Manual Selector switch. Moving the switch up changes propeller pitch in the fine direction. The

Fine indicator light should indicate orange during the operation. Moving the switch down changes propeller pitch in the coarse direction. The Coarse indicator light should indicate orange during the operation.

- With the Automatic / Manual Selector switch set to AUTO and the Propeller Control Selector knob selected to HOLD mode, the Manual Propeller Control switch is used to set a pilot selected propeller governing speed.

Actuate the switch to change propeller pitch in the direction desired. When the desired speed (rpm) is reached, release the switch. The engine/propeller speed will be governed to that speed. Finally, set the desired power with the throttle.

NOTE

When power is initially applied to the propeller controller, the speed setting at which the HOLD mode will govern the propeller is set equal to the pre-set CRUISE mode governing speed, until altered by pilot selection.

Information conveyed to the pilot(s) by the propeller system is provided by three lights located on the propeller controller, namely the Coarse indicator light, Fine indicator light and Feather indicator light. The following table lists the various propeller status indications provided by said lights in automatic (AUTO) mode and, where applicable, manual (MAN) mode:

PROPELLER STATUS	**INDICATOR LIGHT**		
	FINE	**COARSE**	**FEATHER**
Pitch decreasing	Orange		
Pitch increasing		Orange	
Pitch increasing in feather			Orange
No speed signal	Orange flashing		
Fine pitch limit	Green		
Coarse pitch limit		Green	
Feather pitch limit			Green
Driving at fine pitch limit	Green flashing		
Driving at coarse pitch limit		Green flashing	
Driving at feather pitch limit			Green flashing
Over-current while pitch decreasing	Red		
Over-current while pitch increasing		Red	
Over-current while pitch increasing in feather			Red
Open circuit failure	Red flashing	Red flashing	Red flashing
Controller software fault	Rapid red flashing	Rapid red flashing	Rapid red flashing

9.4 SUPPLEMENT 04/2012 – AIRPLANES FITTED WITH A ROTAX 912 iS ENGINE

This supplement provides information relating to the operation of an aircraft fitted with a Rotax 912 iS engine.

This supplement must be contained in the Pilot Operating Handbook during operation of the airplane.

Information contained in this Supplement adds to or replaces information from the standard Pilot Operating Handbook in regard only to the specific sections addressed herein. Limitations, procedures and information not addressed in this Supplement remain as set out in the Pilots Operating Handbook.

Technical data on the Rotax 912 iS engine given in this supplement / manual is provided for information purposes and is subject to latest information / documentation as provided by the engine manufacturer.

The Rotax 912iS is a fuel injected and electronically controlled variant of the Rotax 912 ULS engine. It has the same power rating as the Rotax 912 ULS engine and airplane performance with the two engines is accordingly materially similar, save for fuel economy which, particularly in the cruise, may be materially better in the case of the 912 iS engine.

Notwithstanding this, however, there are minor differences between the engines at starting and shutdown and in the case of certain engine related emergency procedures. The instructions in this supplement are the minimum required for the pilot to competently operate the 912 iS engine during normal flight conditions. It is the responsibility of the pilot to fully familiarize himself with the engine Operators Manual supplied by Rotax GmbH, a copy of which is supplied with each aircraft.

9.4.1 ROTAX 912 iS ENGINE OPERATING AND SPEED LIMITS

Always refer to latest edition / revision of the engine Operators Manual for latest information regarding operating limitations.

ENGINE START AND OPERATION TEMPERATURE LIMITS (912 iS)	
Maximum (in flight)	60 °C (140 °F) (manifold temperature)
Maximum (at start)	50 °C (122 °F) (ambient temperature)
Minimum (at start)	-20 °C (-4 °F) (oil temperature)

ENGINE LOAD FACTOR (ACCELERATION) LIMITS	
Maximum	5 seconds at maximum -0.5 g.

ENGINE OPERATING AND SPEED LIMITS (912 iS)		
Engine Model:		ROTAX 912 iS
Engine Manufacturer:		BRP-Rotax GmbH & Co KG
Power	Max take-off	73.5 kW (98.6 hp) at 5800 rpm (maximum 5 minutes)
	Max continuous	69 kW (92.5 hp) at 5500 rpm
Engine	Max take-off	5800 rpm, maximum 5 minutes
	Max continuous	5500 rpm
	Idle	1 400 (minimum)
EGT	Maximum	950 °C (1742 °F)
Cylinder head temperature	Minimum	N/A
	Maximum	150 °C (302 °F)
	Normal	75 to 110°C (167 to 230 °F)
Oil temperature	Minimum	50 °C (122 °F)
	Maximum	130 °C (266 °F)
	Normal	90 to 110 °C (194 to 230 °F)
Oil pressure	Minimum	0.8 bar (12 psi) – below 3500 rpm
	Maximum	7 bar (102 psi) – permissible for a short period on cold engine start
	Normal	2 to 5 bar (29 to 73 psi) – above 3500 rpm
Coolant temperature	Maximum	120 °C (248 °F)
Fuel pressure	Minimum	2.8 bar (42 psi)
	Maximum	3.2 bar (45 psi)

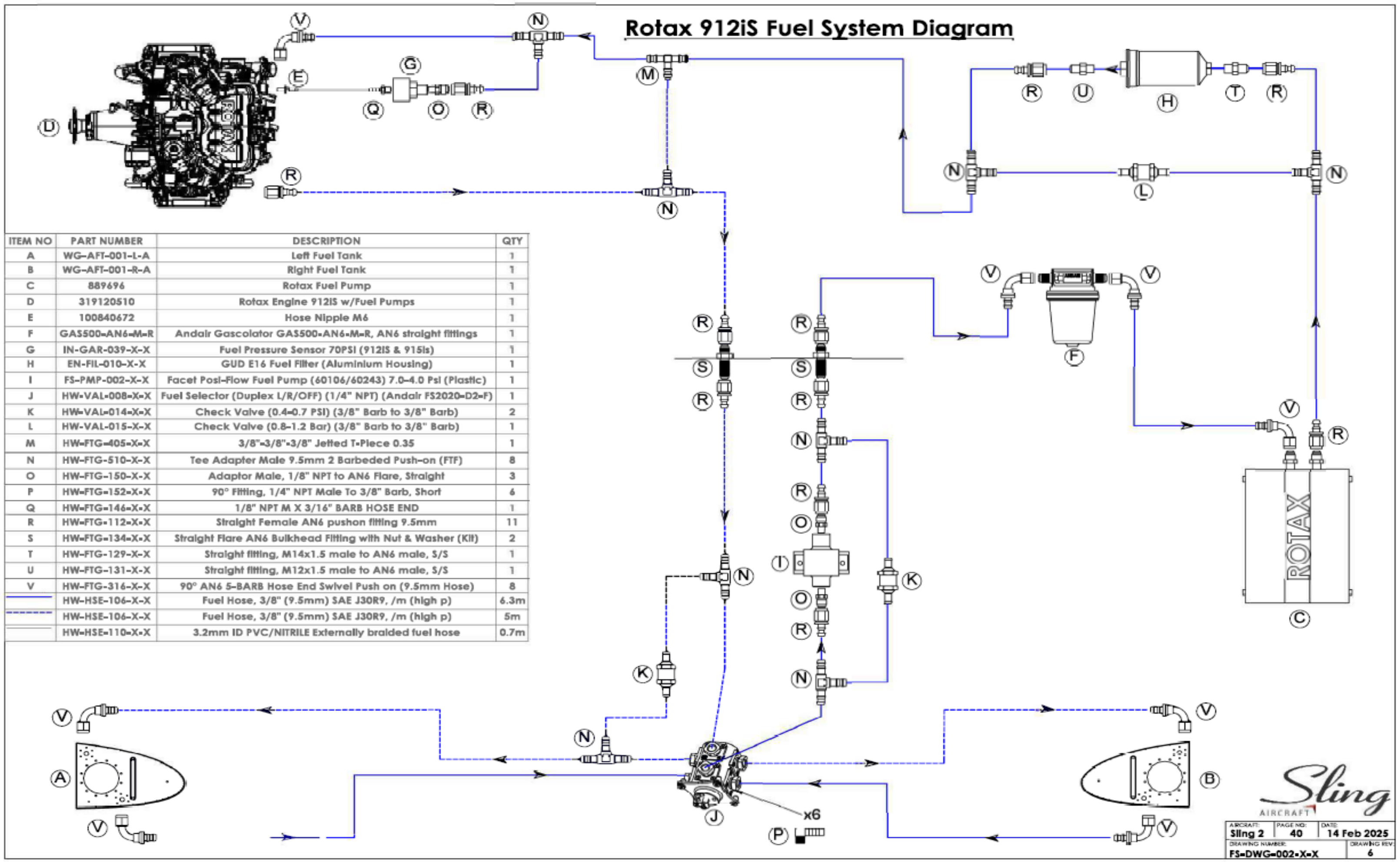
<table>
<tr><td colspan="4">FUEL (912 iS)
Minimum RON 95 / Minimum AKI 91</td></tr>
<tr><td rowspan="2">Grade</td><td colspan="2">MOGAS</td><td>DIN EN 228 Super, DIN EN 228 Super Plus.</td></tr>
<tr><td>AVGAS</td><td>Leaded</td><td>AVGAS 100LL ASTM D910.</td></tr>
</table>

NOTE: AVGAS 100LL places greater stress on the valve seats due to its lead content and forms increased deposits in the combustion chamber and lead sediments in the oil system. Thus, it should only be used in case of problems with vapour lock and when other types of gasoline are unavailable.

<table>
<tr><td colspan="3">ENGINE OIL (912 iS)</td></tr>
<tr><td>Grade</td><td colspan="2">Shell AeroShell Oil Sport Plus 4 with specification RON 424.
XPS Full Synthetic Aviation Engine Oil with specification RON 451.
(Refer to the latest revision of the engine operator’s manual for more)</td></tr>
<tr><td>Oil Viscosity</td><td colspan="2">SAE 10W-40 and SAE 5W-50</td></tr>
<tr><td colspan="3">COOLANT (912 iS)</td></tr>
<tr><td>Grade / type</td><td>Conventional coolant based on ethylene glycol with 50% water content.</td><td>WATER FREE COOLANT NOT PERMITTED FOR USE WITH 912 iS</td></tr>
</table>

Refer to latest revision of Rotax operator / maintenance manuals and latest revision of Rotax service instruction SI-912i-001 with regard to selection of operating fluids.

9.4.2 ROTAX 912 iS FUEL SYSTEM



ITEM NO	PART NUMBER	DESCRIPTION	QTY
A	WG-AFT-001-L-A	Left Fuel Tank	1
B	WG-AFT-001-R-A	Right Fuel Tank	1
C	889696	Rotax Fuel Pump	1
D	319120510	Rotax Engine 912IS w/Fuel Pumps	1
E	100840672	Hose Nipple M6	1
F	GAS500-AN6-M-R	Andair Gascolator GAS500-AN6-M-R, AN6 straight fittings	1
G	IN-GAR-039-X-X	Fuel Pressure Sensor 70PSI (912IS & 915Is)	1
H	EN-FIL-010-X-X	GUD E16 Fuel Filter (Aluminium Housing)	1
I	FS-PMP-002-X-X	Facet Posi-Flow Fuel Pump (60106/60243) 7.0-4.0 Psi (Plastic)	1
J	HW-VAL-008-X-X	Fuel Selector (Duplex L/R/OFF) (1/4" NPT) (Andair FS2020-D2-F)	1
K	HW-VAL-014-X-X	Check Valve (0.4-0.7 PSI) (3/8" Barb to 3/8" Barb)	2
L	HW-VAL-015-X-X	Check Valve (0.8-1.2 Bar) (3/8" Barb to 3/8" Barb)	1
M	HW-FTG-405-X-X	3/8"-3/8"-3/8" Jetted T-Piece 0.35	1
N	HW-FTG-510-X-X	Tee Adapter Male 9.5mm 2 Barbeded Push-on (FTF)	8
O	HW-FTG-150-X-X	Adaptor Male, 1/8" NPT to AN6 Flare, Straight	3
P	HW-FTG-152-X-X	90° Fitting, 1/4" NPT Male To 3/8" Barb, Short	6
Q	HW-FTG-146-X-X	1/8" NPT M X 3/16" BARB HOSE END	1
R	HW-FTG-112-X-X	Straight Female AN6 pushon fitting 9.5mm	11
S	HW-FTG-134-X-X	Straight Flare AN6 Bulkhead Fitting with Nut & Washer (Kit)	2
T	HW-FTG-129-X-X	Straight fitting, M14x1.5 male to AN6 male, S/S	1
U	HW-FTG-131-X-X	Straight fitting, M12x1.5 male to AN6 male, S/S	1
V	HW-FTG-316-X-X	90° AN6 5-BARB Hose End Swivel Push on (9.5mm Hose)	8
	HW-HSE-106-X-X	Fuel Hose, 3/8" (9.5mm) SAE J30R9, /m (high p)	6.3m
	HW-HSE-106-X-X	Fuel Hose, 3/8" (9.5mm) SAE J30R9, /m (high p)	5m
	HW-HSE-110-X-X	3.2mm ID PVC/NITRILE Externally braided fuel hose	0.7m

Fuel feed is through two electric pumps. Each pump has a parallel installed check valve (NRV).

A fuel pressure sensor is connected to the fuel supply line. Fuel pressure is displayed on the EFIS.

Fuel return lines return excess fuel supplied by the fuel pump(s) to the fuel tank in use.

Main and auxiliary fuel pumps

The main and auxiliary fuel pumps are powered via the EMS / ECU. As long as power is available to the EMS / ECU (via Alternator A, Alternator B (in event of Alternator A failure) or via the main battery (the EMS / ECU battery back-up switch is on)) any one, or both of the fuel pumps can be selected / operational, irrespective of the main bus power status.

9.4.3 SUPPLEMENTARY INFORMATION – OPERATIONAL USE OF THE FUEL SYSTEM

WARNING
At least one fuel pump must be operational at all times during flight for the engine to be operational! With no pump operational engine stoppage will occur due to fuel starvation.

9.4.4 ELECTRICAL SYSTEM

The engine is equipped with two 3-phase ac generators (alternators). One alternator (Alternator A) supplies power to the EMS/ ECU and the other (Alternator B) is available to the aircraft systems / to charge the battery. The output of the charge system is connected to the main bus via a circuit breaker (labeled FUSEBOX) located on the instrument panel.

The main battery is connected to the main bus (and thus the charge system) via the Master switch. The back-up battery supply to the EMS/ECU is sourced directly from the battery and routed to the EMS/ECU via an activation switch (labeled ECU BKUP) located on the instrument panel.

Until the engine reaches idling speed the EMS requires a 12 V supply from the aircraft system (i.e. the main battery). When Alternator A fails the EMS/ECU is automatically switched over to Alternator B. Note that in this event Alternator B output is not (or only partially) available to the aircraft systems and that no (or reduced) main battery charging can occur. Subsequent failure of Alternator B will result in engine stoppage. In that event power (EMS / ECU back-up voltage) can be supplied to the EMS system via the aircraft system (battery) voltage (i.e. EMS battery back-up switch is switched on) and the engine restarted.

The engine can run (provided EMS/ECU back-up switch in on) after an Alternator A and Alternator B failure (i.e. both failed), until the battery voltage is low (approximately 30 minutes if all ancillary equipment is switched off and provided that the battery is fully charged at time of (the last remaining) alternator failure). The engine will cease running due to fuel starvation (due to the ECU/EMS/electrical pump(s) stopping) when the battery is depleted.

CAUTION

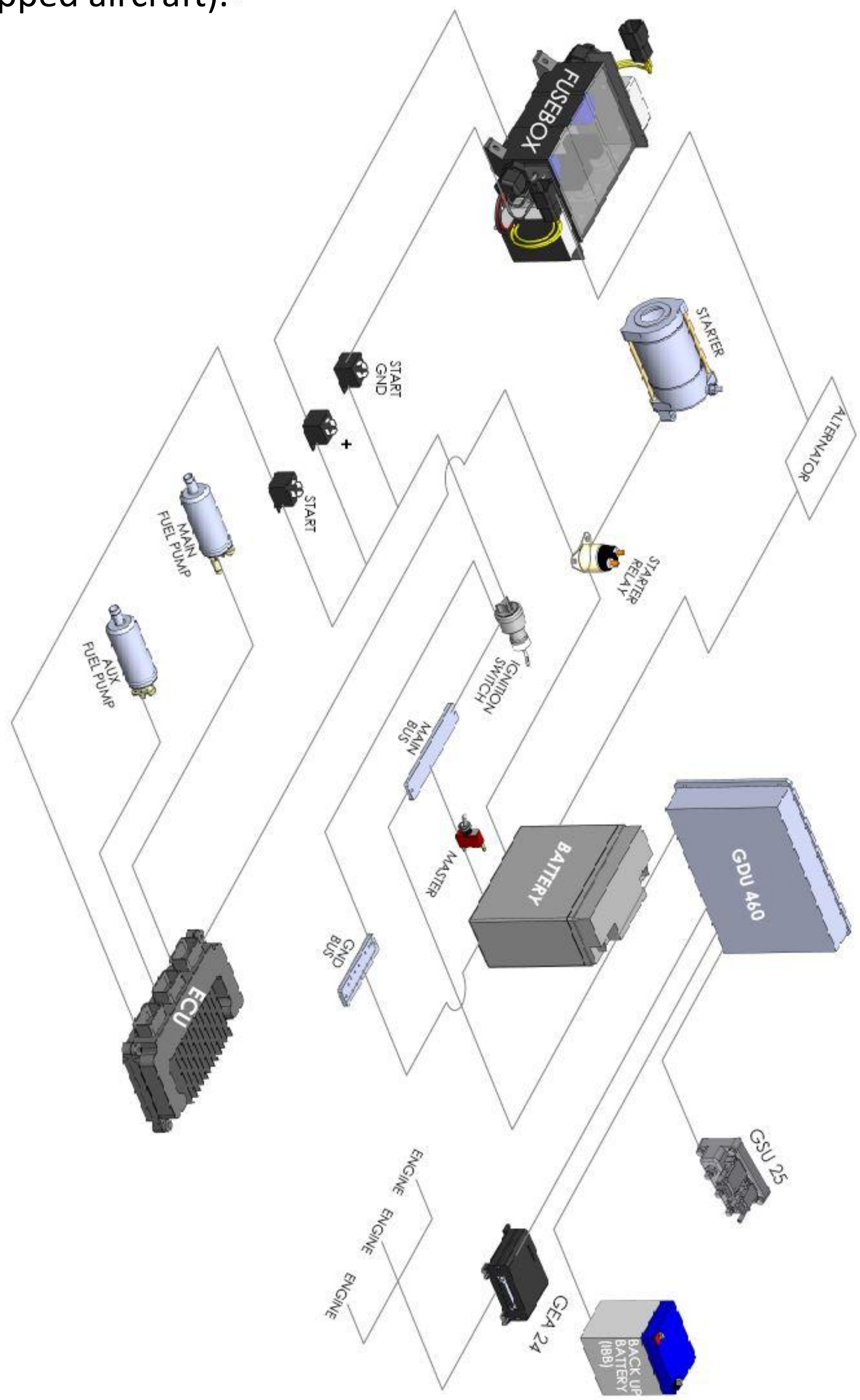
The EMS / ECU battery back-up switch should not be in the ON position during flight, except when both Alternator A and Alternator B have failed.

9.4.5 SUPPLEMENTARY INFORMATION – ELECTRICAL EQUIPMENT SELECTION / CONTROL SWITCHES

SWITCH / LABEL	FUNCTION	POSITION
MASTER / STARTER KEY SWITCH	Power disconnected from main bus	OFF
	Main bus connected to power	ON
	Engage starter motor	START
EFIS	Switch power (from main bus) to EFIS system on / off.	UP (ON) DOWN (OFF)
EFIS BKUP	Connects EFIS system to EFIS back-up battery supply.	
MAIN PUMP	Switch main fuel pump on / off.	
AUX PUMP	Switch auxiliary fuel pump on / off.	
LAND	Switch landing lights on / off.	
TAXI	Switch taxi lights on / off.	
NAV	Select position (navigation) lights.	
STROBE	Select anti-collision (strobe) lights.	
AVIONICS	Switch power to radio and transponder (if fitted) on / off.	
ECU BKUP	Connects the EMS / ECU to the main battery (to provide back-up power).	
AUTOPILOT	Switch power to autopilot servos on / off.	
MASTER	Switch power to main bus on / off.	
LANE A	Select Lane A magneto / ignition source.	
LANE B	Select Lane B magneto / ignition source.	

9.4.6 SUPPLEMENTARY INFORMATION – ELECTRICAL SYSTEM OVERVIEW

The drawing below provides an overview of the electrical system (912 iS equipped aircraft).



9.4.7 SUPPLEMENTARY INFORMATION – MASTER AND STARTER SWITCH(ES)

The Master switch in 912 iS equipped aircraft provides the following functionality:

- Connects / disconnects the main battery to the main bus.

The Ignition switch in 912 iS equipped aircraft provides the following functionality:

- Activates the starter

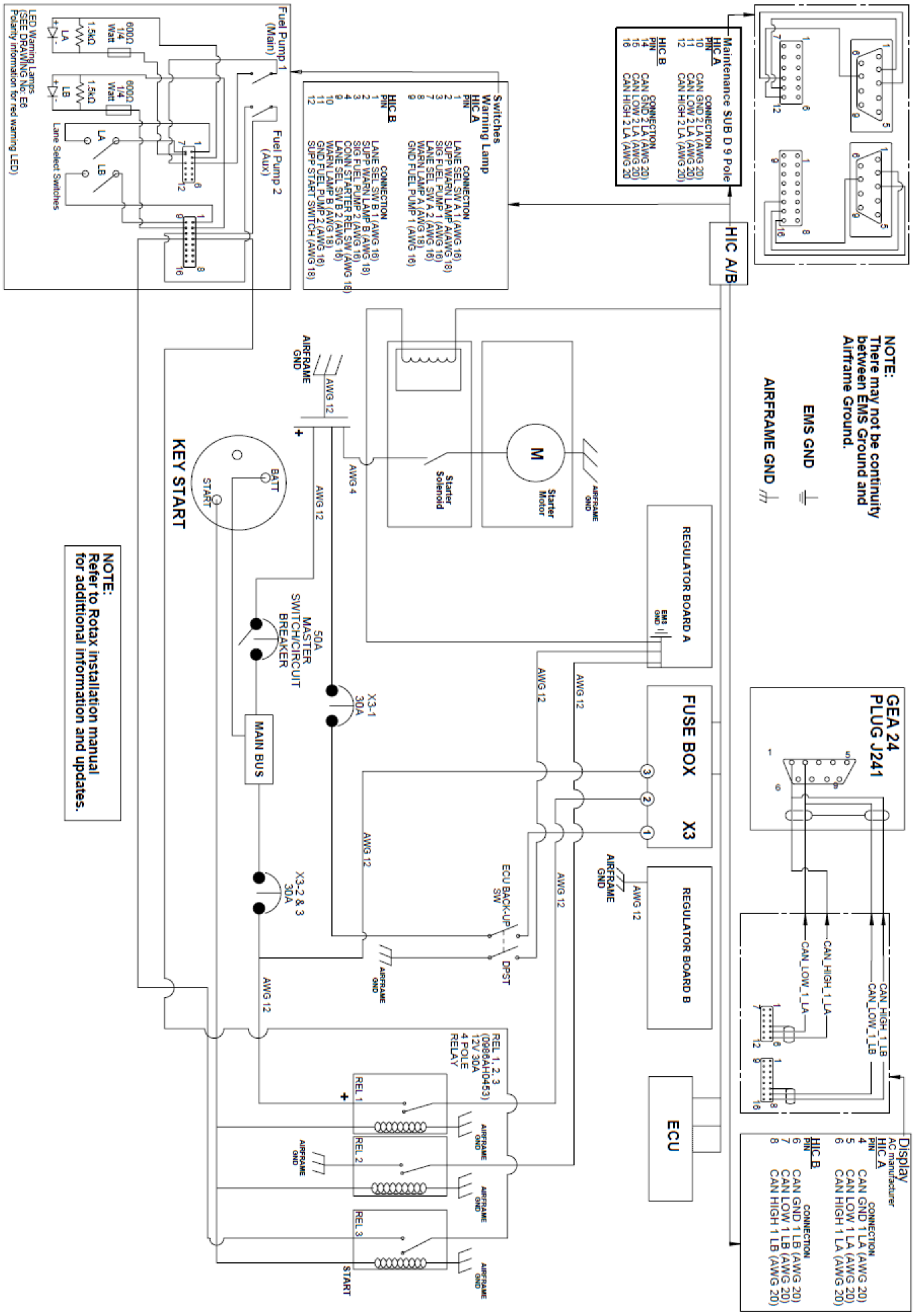
Note that in the case of 912 iS powered aircraft the charge system output is directly connected to the main battery which connects to the main bus (via a master switch.

This implies that, with the Ignition switch turned off:

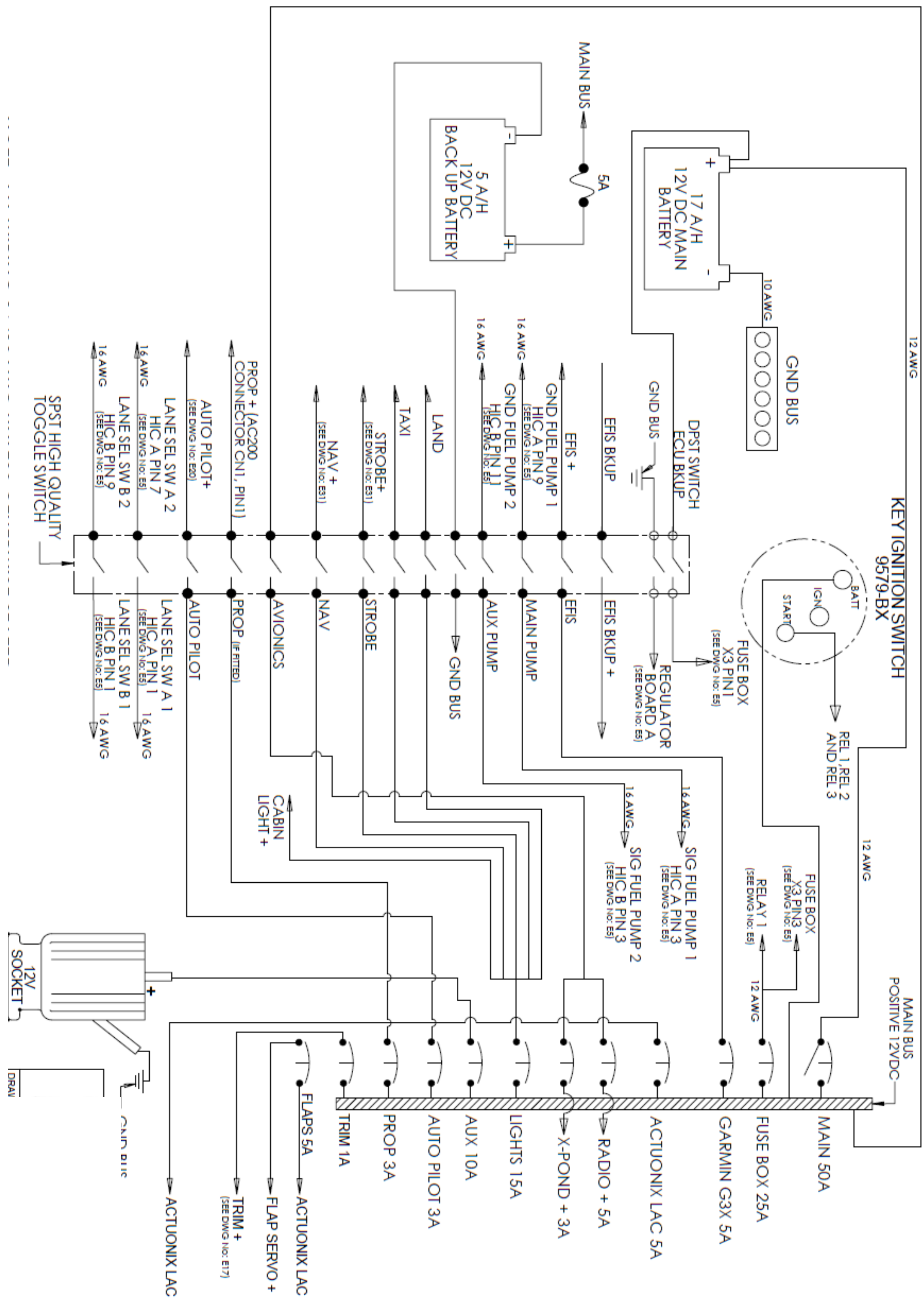
- The main bus remains powered, provided that the charge system is operational. In the case where Alternator B is used to power the EMS / ECU (i.e. Alternator A failed), power may not be available the main bus, or reduced power may be available. Also see **SUPPLEMENTARY INFORMATION – ALTERNATOR FAILURE** and **SUPPLEMENTARY INFORMATION – MAIN BUS POWER FAILURE** in this supplement.

- The battery is disconnected from the main bus and charge system output.

ROTAX 912 iS WIRING DIAGRAM



ROTAX 912 iS SWITCHES AND CIRCUIT BREAKERS WIRING DIAGRAM



9.4.8 ROTAX 912 iS LUBRICATION SYSTEM

The engine is provided with a dry sump forced lubrication system with a camshaft driven pump with an integrated pressure regulator. The pump delivers oil from the oil reservoir, through an oil cooler (radiator) and oil filter to points of lubrication.

Surplus oil emerging from the points of lubrication gathers at the bottom of the crankcase from where it is forced back to the oil reservoir by piston blow-by gasses.

Oil temperature is sensed by a sensor located on the crankcase.

The lubrication circuit is vented at the oil reservoir. The oil reservoir is mounted on the firewall.

Refer to the latest revision / edition of the Rotax 912 iS engine operator and maintenance manuals.

The lubrication system volume is approximately 3.5 litres (7.4 pints).

9.4.9 SUPPLEMENTARY INFORMATION – FUEL CONSUMPTION

Take off performance (5 800 RPM)	26.1 l/hr	(6.9 US gal/hr)
Max continuous power (5 500 RPM)	23.6 l/hr	(6.2 US gal/hr)
75% continuous power (cruise)	16.5 l/hr	(4.35 US gal/hr)

Refer to the fuel consumption graphs and tables in the latest edition / revision of the Rotax 912 iS operator manual for up to date information.

9.4.10 SUPPLEMENTARY INFORMATION – ALTERNATOR FAILURE

ALTERNATOR A FAILURE (ALTERNATOR B OPERATIVE)

When Alternator A fails (with alternator B still operative) the EMS/ECU is automatically switched over to Alternator B. Note that in this event Alternator B output is not (or only partially) available to the aircraft systems / to charge the main battery. **Procedure as in paragraph 3.6.4.**

Alternator A failure is evidenced by the steady illumination of the Lane A (red) warning light. The main bus / system voltage (indication on EFIS) could show a reduced reading.

WARNING

The engine will continue to run after an Alternator A failure (with Alternator B still operative), as the EMS /ECU is then powered by Alternator B. However, since no charging of the battery occurs in this circumstance all non-critical electrical equipment should be switched off to conserve battery charge (as the battery would be needed to supply power to the EMS/ECU/fuel pump(s) if Alternator B subsequently fails).

ALTERNATOR B FAILURE (ALTERNATOR A OPERATIVE)

When Alternator B (with Alternator A still operative) fails no main battery charging can occur. In this case the EMS / ECU remains powered via Alternator A. **Procedure as in paragraph 3.6.4.**

Alternator B failure could be indicated by a drop in the main bus voltage (displayed on EFIS).

> **WARNING**
> The engine will continue to run after an Alternator B failure (with Alternator A still operative), as the EMS /ECU is still powered by Alternator A. However, since no charging of the battery occurs in this circumstance all non-critical electrical equipment should be switched off to conserve battery charge (as the battery would be needed to supply power to the EMS/ECU/fuel pump(s) if Alternator A subsequently fails).

ALTERNATOR A AND ALTERNATOR B FAILURE

This will result in engine stoppage (since no power is available to the EMS/ ECU/fuel pump(s)). In this case the EMS / ECU must be powered from the main battery (by switching on the EMS / ECU battery back-up switch) and the engine restarted.

1. EMS battery back-up switch - on
2. Restart engine.
3. Follow procedure in paragraph 3.6.4

WARNING

The engine can run (with the EMS / ECU powered from the main battery) after an Alternator A and B failure, until the battery voltage is low (approximately 30 minutes, if all ancillary equipment is switched off and provided that the battery is fully charged at the time of (the last remaining) alternator failure). The engine will cease running due to fuel starvation (due to electrical pump(s)/EMS/ECU stopping) when the battery is depleted.

9.4.11 SUPPLEMENTARY INFORMATION – MAIN BUS

When power to the main bus is unavailable / fails the following equipment, <u>in addition</u> to those listed (and applicable) in paragraph 7.17 under **Main bus**, becomes non-operational:

1. Elevator trim.

9.4.12 SUPPLEMENTARY INFORMATION - ENGINE START

1. Master switch - on
2. EFIS back-up battery - on, verify EFIS on and back-up battery voltage.
3. Propeller switch (if applicable) - on
4. Propeller (if applicable) - AUTO
5. Magneto / ignition switches (Lane A and B) - on (both)
6. EMS battery back-up switch - on

Once power (EMS battery back-up) is supplied the Lane A and Lane B warning lights should illuminate for approximately 5 seconds and then extinguish. If either or both lights flash or fails to illuminate it is indicative of a deficiency.

WARNING
Do not take the engine into operation before having rectified the cause of the deficiency.

7. Fuel selector - select emptiest tank (if not empty)
8. Throttle - set to idle position
9. Fuel pumps (both) - on

10. Propeller area - clear of people and obstructions.
11. Starter - activate (for maximum 10 seconds)

Immediately after start-up:

12. Throttle - adjust for smooth running (approximately 2000 rpm).
13. Oil pressure - increase within 10 seconds.
14. Warm up engine at 2000 rpm for one minute.
15. Increase engine rpm (approximately 3000 rpm) until the main bus / system voltage indicates 13.8 to 14. 4 V (i.e. Alternator B came online).
16. Reduce engine rpm to 2500 rpm and continue warm up until oil temperature is 50 °C (122 °F).
17. EMS battery back-up switch - off

At an engine start with low oil temperature continue to watch the oil pressure as it could drop again due to the increased resistance in the suction line.

Verify all engine instrument readings.

CAUTION

The starter should be activated for a maximum of 10 seconds, followed by a (at least) 2-minute pause to allow the starter to cool.

Verify the oil pressure, which should increase within 10 seconds. Increase of engine rpm is only permitted if oil pressure is steady above 3 bar (44 psi).

To avoid shock loading, start the engine with the throttle lever set for idling or 5% open at maximum, then wait 3 seconds to reach constant engine speed before accelerating the engine.

9.4.13 Supplementary information - Prior to take off

Only one ignition circuit (lane) may be switched on and off at a time.

Verify the Lane A and Lane B ignition circuits at 4 000 rpm. No rpm drop should occur when Lane B is switched off. An rpm drop of less than 180 rpm is permissible when Lane A is switched off.

9.5 SUPPLEMENT 05/2017 - OPERATION OF SLING 2 AIRCRAFT FITTED WITH A GLIDER AND BANNER TOW HOOK MECHANISM WITH QUICK RELEASE

The Sling 2 aircraft is approved for the optional fitment of a glider tow hook which may be used for purposes of glider tugging and/or banner towing. The aircraft manufacturer has designed, tested and approved the fitment of a Tost E22 series glider hook with a maximum load capacity of 700kg. This mechanism has been extensively tested in a Sling 2 aircraft with a 914 UL engine and Airmaster AP332/AP330 constant speed propeller.

This supplement provides information relating to the operation of the Sling 2 aircraft fitted with the Tost E22 glider hook mechanism with quick release when used for glider and banner towing.

This supplement must be contained in the Pilot Operating Handbook during operation of the aircraft with such mechanism fitted.

Information contained in this supplement adds to or replaces information from the standard Sling 2 Pilot Operating Handbook in regard only to the specific sections addressed herein. Limitations, procedures and information not addressed in this supplement remain as set out in the Sling 2 Pilot Operating Handbook.

NOTE: Glider and/or banner towing and use of the tow hitch should be undertaken only by appropriately rated pilots with the required endorsement in their pilot logbook and license. Special care is required when performing tugging and towing operations which, by their nature, present a number of risks and challenges to the pilot.

This supplement is NOT intended to address all operational considerations applicable to the tugging of gliders or the towing of banners in aircraft. Pilots are expected to be familiar with all normal procedures applicable to such operations and are expected to comply with all safety, operating and emergency procedures which would ordinarily be applicable in such circumstances. This supplement is intended only to provide abbreviated material to the pilot who is familiar with tugging and towing operations as well as the Sling 2 aircraft type, who wishes to understand in what manner the operation of the Sling 2 for tugging and towing operations may differ from normal Sling 2 operations, or in what manner the operation of the Sling or tugging and towing operations may differ from tugging and towing operations in other aircraft types.

9.5.1 Specifications:

Tow hook weight	1 kg
Tug and tow operating speeds	50-90 KIAS, as required
Maximum tugged glider weight	700 kg
Max. permissible cable Load	10.7 kN (1090 kg)
Max. permissible release lever force	140 N (14 Kg)
Max. release lever restoring force	50 N (5 Kg)

Note: The addition of the tow hitch does affect the CG of the aircraft. The CG of the aircraft moves towards the rear of the aircraft. The CG range mentioned in Section 6 of this document continues to apply and following fitment of a tug mechanism the empty CG of the aircraft should be measured and appropriately recorded.

9.5.2 Flight performance:

There is no noticeable change in flight performance between an aircraft fitted with the tow hook mechanism and without. The change in overall mass is considered insignificant and the change in dimensions in the aircraft has no noticeable effect on performance.

A Sling 2 aircraft fitted with a glider tow mechanism can accordingly be safely flown by a pilot without a tow rating or experience, provided that it is not used for any tug or towing activities.

9.5.3 Installation of hook and release mechanism

The glider tow hook is fitted to an aluminum structure attached to the lower rear fuselage. Since the rearward extent of the hook attachment mechanism is forward of the rearmost extent of the rudder, there is no change in overall aircraft length. The installation does, however, extend closer to the ground than fuselage without the mechanism, and the tie down point is accordingly marginally extended with fitment of the tow hook, so that in the event of a tail strike the tie down point it strikes the ground before the tow hook mechanism itself. This is in order to protect the tow hook mechanism in the case of a tail-strike. A tail-strike with tow mechanism installed will accordingly occur at a slightly lower angle than without the mechanism. This is not, however, considered to be of any significance.

The tow hook installation design provides for the fitment of a red release handle immediately beneath the lower edge of the instrument panel and between the pilot's knees. The release handle is connected to a cable that runs from the panel, along the centre of the fuselage to the lever on the release mechanism. When the handle is pulled, the release mechanism will be activated.

Handle for release mechanism, mounted to front panel

Direction handle is pulled in order to activate the release mechanism.

Pilots using the aircraft for glider tugging and banner towing purposes should familiarize themselves with the tension in the release lever spring and accordingly the force required to activate the release prior to operation. Very little difference in force is required to activate the release when there is a load on the hook and when there is none.

9.5.4 Operations and precautions:

Operational instruction on glider tugging and banner towing is considered beyond the scope of this POH. The following considerations, however, should at all times be borne in mind –

- Glider tugging and banner towing are inherently unpredictable and high risk activities. They should be performed only by experienced persons operating in accordance with clear guidelines and in accordance with good aviation practices.
- Engine and airframe monitoring is especially critical during glider tug and banner tow operations as additional stress is placed upon the aircraft. Operate at all times within the limits applicable to the engine, airframe and propeller and, if this is not possible in any particular configuration or at any particular time, discontinue operations immediately.
- Pilots should at all times operate in accordance with the provisions of the Tost E22 series Operating Manual and good aviation practice.
- The lighter the aircraft during any tugging or towing operation the better the performance is likely to be.
- The responsibility of ensuring that the aircraft performance and parameters in any tug or tow configuration are satisfactory and manageable is entirely the pilot’s. Tug and tow operations are by their nature complex systems and the aircraft manufacturer takes no responsibility for aircraft performance and behavior when used for such purposes.
- The manufacturer’s approval of the Sling 2 aircraft for glider tugging and banner towing purposes assumes an aircraft fitted with-
    - the manufacturer’s design attachment mechanism housing a Tost E22 series tow hook with quick release mechanism;

  - a Rotax 914 UL engine;
  - an Airmaster AP322 propeller.
- Although the aerodynamic responses of the aircraft are likely to be similar where other hook, engine and propeller combinations are used, each pilot flying such a combination is responsible for ensuring that the aircraft performance is sufficient for the operational requirements and that applicable limitations are met at all times.
- It is assumed that at all times pilots and support crew will comply with good aviation practices applicable to the kinds of operations engaged in. Provided that these guidelines are followed, testing has demonstrated that the Sling 2 aircraft in the configuration referred to in this supplement 05/2017 may be safely operated for purposes of –
  - Tugging gliders of a weight of up to 700kg
  - Towing banners of a size of up to 20m x 30m.

9.6 SUPPLEMENT 06/2019 – FRONT LUGGAGE COMPARTMENT

The parachute compartment of a Sling 2 may be used as a luggage compartment if a ballistic parachute is not installed. The front luggage compartment is situated between the firewall and the windscreen. The maximum luggage capacity of the aircraft remains 35kg (Section 2.8), but the centre of gravity of the aircraft moves forward if the front luggage compartment is used.

NOTE

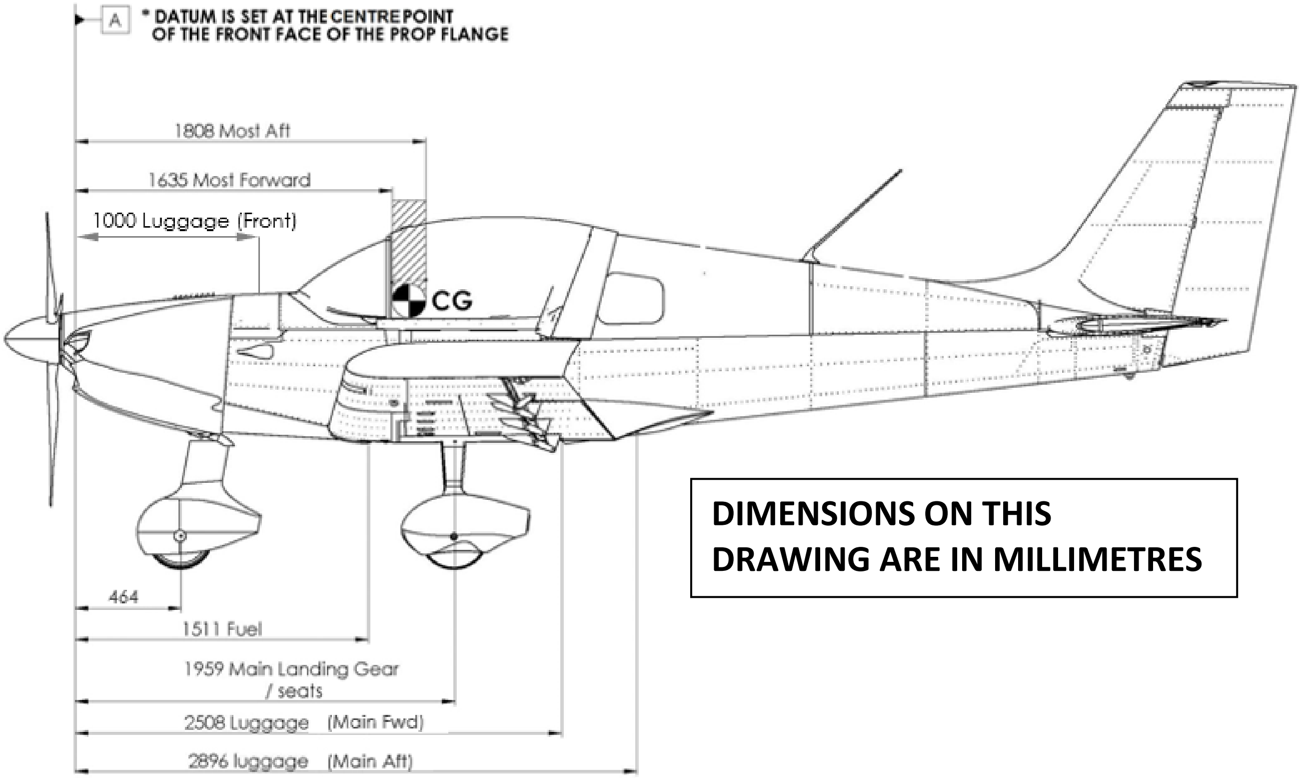
This supplement should be used in conjunction with Section 6 (Weight and Balance) of this manual.

9.6.1 Weights

Maximum total baggage weight	35 kg (77 lb).
Front luggage compartment maximum	12 kg (26.45 lb)
Main Fwd luggage compartment maximum	35 kg (77 lb).
Main Aft compartment maximum	25 kg (55 lb).

9.6.2 Center of Gravity

Parachute luggage compartment arm	1000 mm (3.281 ft)



DIMENSIONS ON THIS DRAWING ARE IN MILLIMETRES

CG range is 1 635 mm (5.364 ft) to 1 808 mm (5.931 ft) aft of the reference datum (20 to 33% of MAC).

- The leading edge of the MAC is 1 366 mm (4.482 ft) aft of the reference datum.
- The MAC is 1 339 mm (4.393 ft).

WARNING
Aircraft CG and MAUW limitations must be adhered to at all times.
Refer to Sections 2.8 and 2.9 for CG and MAUW limitations.

9.6.3 CG Determination Table

	WEIGHT [kg (lb)]	ARM [mm (ft)]	MOMENT (weight x arm) [kg.mm (lb.ft)]
PILOT & PASSENGER		1 959 (6.427)	
BAGGAGE (FRONT)		1 000 (3.281)	
BAGGAGE (MAIN FWD)		2 508 (8.228)	
BAGGAGE (MAIN AFT)		2 896(9.501)	
FUEL		1 511 (4.957)	
ADD EMPTY VALUES			
TOTAL			
	W_T =		M_T =
			CG = %MAC

9.7 SUPPLEMENT 02/2025 – AIRPLANES FITTED WITH A DUC 3-BLADE INCONEL FLASH PROPELLER

9.7.1 Introduction

This supplement must be kept with the Pilot Operating Handbook during operation of the airplane.

The information contained in this supplement adds to or replaces information from the standard Pilot Operating Handbook, with regards only to the specific sections addressed herein. Limitations, procedures and information not specifically addressed in this supplement remain as set out in the Pilot Operating Handbook.

This supplement provides information necessary for the operation of an aircraft fitted with a DUC 3-blade Inconel® FLASH fixed pitch propeller, that is ground adjustable.

9.7.2 Performance

9.7.2.1 Takeoff Distances

Weight	Altitude [ft]	Surface Type	Run Distance	Distance over 15m / 15ft Obstacle
650 kg	5 000	Concrete/Tar	210m / 689ft	400m / 1 312ft

9.7.2.2 Rate of Climb

Values relevant for maximum continuous power of 5 500 RPM –

Altitude	Best Rate of Climb Speed (V_{IE})	Rate of Climb
[ft. ISA]	*[KIAS]*	*[fpm]*
0	72	875
1 000		830
2 000		780
3 000		735
4 000		690
5 000		640
6 000		590
7 000		545
8 000		510
9 000		440
10 000		405

9.8 SUPPLEMENT 08/2025 – AIRPLANES FITTED WITH A ROTAX 915 iS ENGINE

The Rotax 915 iS engine may be fitted to the Sling 2. This engine is a 4-stroke, 4-cylinder, turbocharged, horizontally opposed, spark-ignition engine, with one central camshaft -pushrod OHV and a displacement of 1352cc (1.35L/82.5 cubic inch). The engine makes use of liquid-cooled cylinder heads with air-cooled cylinders. The lubrication system can be described as sump forced lubrication and the ignition makes use of dual contactless capacitor-discharge magneto type ignition system, that is ECU controlled. The engine is fitted with an electric starter motor, two AC alternators and two electric fuel pumps. The propeller is driven through a reduction gearbox, of ratio 2.52, and features an integrated shock absorber. The engine will continue to run after an alternator/battery failure. Please see 9.4.10.

9.8.1 Engine limitations

Instruments reflecting engine parameters should, in each case, be marked / set to reflect the minimum and maximum figures.

Always refer to the *latest edition / revision* of the engine Operators Manual for latest information regarding operating limitations

9.8.1.1 Engine Start and Operation Temperature Limits

Item	Value
Start - Maximum (Ambient Temperature)	50 °C / 122 °F
Start - Minimum (Oil Temperature)	-20 °C / -4 °F

9.8.1.2 Engine Load Factor Limits (Acceleration)

Item	Value
Maximum	5 seconds at maximum -0.5g

9.8.1.3 Oil System

Parameter / Item	Value
Oil System Type	Forced with external oil reservoir.
Oil Grade	Shell AeroShell Oil Sport Plus 4 with specification RON 424 and viscosity SAE 10W-40. XPS Full Synthetic Aviation Engine Oil with specification RON 451 and SAE 5W-50. *(Refer to the latest revision of the engine operator's manual for more)*
Oil Viscosity	SAE 10W-40 and SAE 5W-50
Oil Capacity	Approx. 3.0 litres (3.2 quarts/6.3 pints) from dry

9.8.1.4 Cooling

Parameter / Item	Value
Cooling System	*Mixed* – Air and closed-circuit pressurized liquid. Air-cooled cylinders and liquid-cooled cylinder heads.
Coolant	Conventional coolant based on ethylene glycol with 50% water content. Do not use Waterless coolant based on propylene glycol for operation of 916i Series and 915i Series. *(Refer to the latest revision of the engine operator's manual for more)*
Coolant Capacity	Approx. 1.5 litres (1.6 quarts / 3.2 pints)

9.8.1.5 Engine Operational and Speed Limits

Item		Value
Engine Model		ROTAX 915 iS
Engine Manufacturer		BRP-Rotax GmbH & Co KG
Power	Maximum take-off	104 kW / 141 hp at 5800 rpm, max. 5 minutes
	Maximum continuous	99 kW / 135 hp at 5500 rpm
	Cruise 75% Throttle	90 kW / 120 hp at 5000 rpm
RPM	Maximum take-off	5800 rpm, max. 5 minutes
	Maximum continuous	5500 rpm
	Cruise	5000 rpm – 5400 rpm
	Idle	1 800 rpm (minimum)
Oil Temperature	Minimum	50 °C (122 °F)
	Maximum	130 °C (266 °F)
	Normal	90 to 110 °C (194 to 230 °F) [(a)]
EGT	Maximum	950 °C (1742 °F)
Coolant Temperature	Minimum	-20 °C (-4 °F)
	Maximum	120 °C (248 °F)
Oil pressure	Minimum	0.8 bar (12 psi) – below 3500 rpm
	Maximum	7 bar (101.5 psi) – permissible for short period during cold engine start
	Normal	2 to 5 bar (29 to 72.5 psi) – above 3500 rpm
Fuel Pressure	Minimum	2.9 bar (42 psi)
	Maximum	3.2 bar (46 psi)
Manifold Pressure	Minimum	1.77 in. hg (60 hPa)
	Maximum	51 in. hg (1730 hPa)

NOTE

a. *Oil temperature must, once per flight day, exceed 100°C to boil off any moisture that may have collected in the oil.*

9.8.1.6 Take-off Distances

The data presented in this section has been deduced from flight tests with the aircraft and engine in good condition and using average piloting techniques. All tests were performed on the concrete/tar surface.

The performance in this section is valid for a maximum take-off weight of 700 kg (1 543.24 lb).

Propeller	Density Altitude	Run Distance	Distance over 15m / 50ft Obstacle
Airmaster AP430/431	MSL	106 m / 348 ft	233 m / 764 ft
	5,000-7,000	145 m / 475 ft	320 m / 1,050 ft
MTV-6-A/190-69	MSL	99 m / 325 ft	250 m / 820 ft
	5,000-7,000	126 m / 413 ft	348 m / 1,142 ft

9.8.1.7 Landing Distance

Surface Type	Density Altitude	Landing Distance with braking	Distance over 15m / 50ft Obstacle
Concrete/Tar	MSL	90 m / 295 ft	260 m / 855 ft
Grass	MSL	90 m / 295 ft	260 m / 855 ft

9.8.1.8 Rate of Climb

Values relevant for maximum continuous power of 5,500 RPM –

Altitude	Rate of Climb Airmaster AP430/431	Rate of Climb MTV-6-A/190-69	Best Rate of Climb Speed (V_Y)
[ft. ISA]	*[fpm]*	*[fpm]*	*[KIAS]*
0	1260	1940	74
1 000	1245	1852	
2 000	1231	1777	
3 000	1216	1690	
4 000	1202	1615	
6 000	1172	1454	
8 000	1143	1294	
10 000	1114	1128	
12 000	1085	972	
14 000	1056	817	
16 000	1026	664	
18 000	997	513	

9.8.1.9 Cruise Speeds

Due to the excess power available when a Sling 2 is outfitted with a 915 iS engine, a cruise speed of 115 KIAS can be achieved at a power setting of approximately 56%. Due to this, the pilot must pay careful attention to the airspeed and ensure that the aircraft conforms to the airspeed limitations at all times.

> **WARNING**
>
> Aircraft speed limitations must be adhered to at all times.
>
> Refer to Section 2.2 for Aircraft Airspeed Limitations.

9.8.1.10 Fuel Consumption

Engine Power		**%**	**56%**
Flight Level		**ft**	**6500**
Engine RPM		*RPM*	5,500
Fuel Burn		*LPH*	21
		GPH	5.5
150 Litre Main Tanks 39.6 US GAL	**Endurance**	*[hrs]*	7.1
	Range[a]	*[nm]*	832

> **NOTES**
>
> a. Calculated at airspeed of 115 KIAS.
>
> Range and endurance information is calculated using maximum useable fuel and includes a 45-minute reserve.

9.9 SUPPLEMENT 08/2025 – AIRPLANES FITTED WITH A ROTAX 916 iS ENGINE

The Rotax 916 iS engine may be fitted to the Sling 2. This engine is a 4-stroke, turbocharged, 4-cylinder, horizontally opposed, spark ignition engine, with one central camshaft -pushrod OHV and a displacement of 1352cc (1.35L/82.5 cubic inch). The engine makes use of liquid and air-cooled cylinders. The lubrication system can be described as sump forced lubrication and the ignition makes use of dual contactless capacitor discharge magneto type ignition system, that is ECU controlled. The engine is fitted with an electric starter motor, two AC alternators and two electric fuel pumps. The propeller is driven through a reduction gearbox, of ratio 2.54, and features an integrated shock absorber. The engine will continue to run after an alternator ***or*** battery failure. Please see 9.4.10 for more information.

Refer to the *latest revision* of the manufacturer documentation (Operators Manual / Maintenance Manual) for more information.

9.9.1 Engine limitations

Instruments reflecting engine parameters should, in each case, be marked / set to reflect the minimum and maximum figures.

Always refer to the *latest edition / revision* of the engine Operators Manual for latest information regarding operating limitations

9.9.1.1 Engine Start and Operation Temperature Limits

Item	Value
Start - Maximum (Ambient Temperature)	50 °C / 122 °F
Start - Minimum (Oil Temperature)	-20 °C / -4 °F

9.9.1.2 Engine Load Factor Limits (Acceleration)

Item	Value
Maximum	5 seconds at maximum -0.5g

9.9.1.3 Oil System

Parameter / Item	Value
Oil System Type	Forced with external oil reservoir.
Oil Grade	XPS Full Synthetic Aviation Engine Oil with specification RON 451. Do not use Aeroshell Oil Sport Plus 4 for operation of ROTAX® 916 iSc/iS A and 916 iSc/iS C24 Series. *(Refer to the latest revision of the engine operator's manual for more.)*
Oil Viscosity	SAE 5W-50
Oil Capacity	Approx. 3.5 litres (3.7 Quarts / 7.4 pints) from dry.

9.9.1.4 Cooling

Parameter / Item	Value
Cooling System	*Mixed* – Air and closed-circuit pressurized liquid. Air-cooled cylinders and liquid-cooled cylinder heads.
Coolant	Conventional coolant based on ethylene glycol with 50% water content. Do not use Waterless coolant based on propylene glycol for operation of 916i Series and 915i Series. *(Refer to the latest revision of the engine operator's manual for more)*
Coolant Capacity	Approx. 1.5 litres (1.6 quarts / 3.2 pints)

9.9.1.5 Engine Operational and Speed Limits

Parameter		Value
Engine Model		ROTAX 916 iS
Engine Manufacturer		BRP-Rotax GmbH & Co KG
Power	Maximum take-off	117kW / 160 hp at 5800 rpm, max. 5 minutes
	Maximum continuous	101 kW / 137 hp at 5500 rpm
RPM	Maximum take-off	5800 rpm, max. 5 minutes
	Maximum continuous	5500 rpm
	Idle	1 800 rpm (minimum)
Oil Temperature	Engine start minimum	-20 °C (-4 °F)
	Take-off minimum	50 °C (122 °F)
	Normal	50 to 120 °C (122 to 248 °F)
EGT	Maximum	950 °C (1742 °F)
Coolant Temperature	Maximum	120 °C (248 °F)
Oil pressure	Minimum	0.8 bar (11.6 psi) – below 3500 rpm
	Maximum	7 bar (101.5 psi) – permissible for short period during cold engine start
	Normal	2 to 5 bar (29 to 72.5 psi) – above 3500 rpm
Fuel Pressure	Minimum	2.9 bar (42 psi)
	Maximum	3.2bar (46 psi)
Manifold Pressure	Maximum	1800 hPa / 53.15 in. Hg
	Minimum	60 hPa / 1.77 in. Hg
Altitude limitations	Service ceiling	23,000 ft
	Full take off power	Up to 15,000 ft

NOTE

b. *Oil temperature must, once per flight day, exceed 100°C to boil off any moisture that may have collected in the oil.*

9.9.1.6 Take-off Distances

The data presented in this section has been deduced from flight tests with the aircraft and engine in good condition and using average piloting techniques. All tests were performed on the concrete/tar surface.

The performance in this section is valid for a maximum take-off weight of 700 kg (1 543.24 lb).

Propeller	Density Altitude	Run Distance	Distance over 15m / 50ft Obstacle
DUC Flashblack-3-R	MSL	TBC	119 m / 390 ft
	5,000-7,000	TBC	300 m / 984 ft
MTV-6-R/190-69	MSL	87 m / 285 ft	220 m / 722 ft
	5,000-7,000	111 m / 364 ft	307 m / 1,007 ft

9.9.1.7 Landing Distance

Surface Type	Density Altitude	Landing Distance with braking	Distance over 15m / 50ft Obstacle
Concrete/Tar	MSL	90 m / 295 ft	260 m / 855 ft
Grass	MSL	90 m / 295 ft	260 m / 855 ft

9.9.1.8 Rate of Climb

Values relevant for maximum continuous power of 5,500 RPM –

Altitude	**Rate of Climb DUC Flashblack-3-R**	**Rate of Climb MTV-6-R/190-69**	**Best Rate of Climb Speed (V_Y)**
[ft. ISA]	*[fpm]*	*[fpm]*	*[KIAS]*
0	1970	1969	74
1 000	1869	1880	
2 000	1781	1803	
3 000	1682	1715	
4 000	1595	1639	
6 000	1408	1475	
8 000	1224	1313	
10 000	1035	1145	
12 000	854	986	
14 000	677	829	
16 000	500	674	
18 000	326	521	

9.9.1.9 *Cruise Speeds*

Due to the excess power available when a Sling 2 is outfitted with a 916 iS engine, a cruise speed of 115 KIAS can be achieved at a power setting of approximately 56%. Due to this, the pilot must pay careful attention to the airspeed and ensure that the aircraft conforms to the airspeed limitations at all times.

WARNING

Aircraft speed limitations must be adhered to at all times.

Refer to Section 2.2 for Aircraft Airspeed Limitations.

9.9.1.10 *Fuel Consumption*

<table>
<tr><th colspan="2">Engine Power</th><th>%</th><th>56%</th></tr>
<tr><th colspan="2">Flight Level</th><th>ft</th><th>6500</th></tr>
<tr><td colspan="2">Engine RPM</td><td>RPM</td><td>5,500</td></tr>
<tr><td colspan="2" rowspan="2">Fuel Burn</td><td>LPH</td><td>21</td></tr>
<tr><td>GPH</td><td>5.5</td></tr>
<tr><td rowspan="2">150 Litre Main Tanks 39.6 US GAL</td><td>Endurance</td><td>[hrs]</td><td>7.1</td></tr>
<tr><td>Range[a]</td><td>[nm]</td><td>832</td></tr>
</table>

NOTES

b. Calculated at airspeed of 115 KIAS.

Range and endurance information is calculated using maximum useable fuel and includes a 45-minute reserve.