Sling 4 HW

SERIAL NO : ____________

REGISTRATION : ____________

DC-POH-001-X-G-2.1

PILOT OPERATING HANDBOOK

DATE: JANUARY 2026

REVISION 2.1

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 4 High Wing**
Manufacturer:	**Sling Aircraft (Pty) Ltd**
Airplane Serial Number:	**……………………………….**
Date of Construction:	**……………………………….**
Registration:	**……………………………….**
Issue Date of POH:	**2026/01/30**

Please advise Sling Aircraft upon change of ownership of this aircraft.

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

NOTICE

This manual is written for the standard Rotax 915 iS or 916 iS powered Sling 4 High Wing, as manufactured on premises by Sling Aircraft (Pty) Ltd.

Aircraft which differ from the production standard, in whatever way, are not addressed in this manual, except to the extent said aircraft corresponds with the production standard.

NOTICE

This manual, although written to accommodate all regions' regulations, may contain specific references to South African regulations. Therefore, the manual can be regarded as a manual consistent with RSA regulations only.

Compliance Statement

The FAR Standards used for the design, construction, testing and continued airworthiness for the Sling 4 High Wing (HW) are:

- FAA FAR, Part 23 – Airworthiness Standards: Normal, Utility, Aerobatic and Commuter Category Aeroplanes

Quality Assurance records are stored with the manufacturer in South Africa, at the address below:

Sling Aircraft (Pty) Ltd.
Hangar 8, Tedderfield Air Park, Johannesburg South, Eikenhof, 1872, South Africa
PO Box 308, Eikenhof, 1872, South Africa
Tel: +27 11 948 9898
sales@slingaircraft.com

Continued Operational Safety Monitoring

Manufacturer Responsibilities:

Sling Aircraft has a procedure in place to monitor the safety of the fleet and to alert pilots of any potential safety issues. The owner of a Light-Sport Aircraft is responsible for making sure they receive pertinent safety information and comply with bulletins. The owner of a Light-Sport Aircraft is also responsible for alerting the manufacturer of any potential flight safety issues they may encounter.

Owner/Operator Responsibilities:

- Each owner/operator of a Sling 4 HW shall read and comply with the maintenance and continued airworthiness information, together with all instructions provided by the manufacturer.
- Each owner/operator of a Sling 4 HW shall be responsible for providing the manufacturer with current contact information, where the manufacturer may send the owner/operator supplemental notification bulletins/letters.
- The owner/operator of a Sling 4 HW shall be responsible for notifying the manufacturer of any flight safety issues or significant service difficulty, upon discovery.
- The owner/operator of a Sling 4 HW shall be responsible for complying with all manufacturer issued notices of corrective action and with all applicable aviation authority regulations, with regards to maintaining the airworthiness of the aircraft.
- The owner of a Sling 4 HW shall ensure that any necessary corrective action is completed as specified in a bulletin/letter/notice, or by the next scheduled annual inspection.
- Should an owner/operator not comply with any mandatory service requirements, the Sling 4 HW shall be considered not in compliance with applicable ASTM standards and may be subject to regulatory action by the presiding aviation authority in the respective region.

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	Sign
0.0	Initial Issue	Initial Issue	2021/05/07	G. Pitman	[illegible]
0.1	1, 3, 4, 7, 9	All	2021/08/26	G. Pitman	[illegible]
0.2	1.3, 1.4, 5.4, 6, 7.2.5, 7.2.10	See List of Manual Revisions	2021/11/05	G. Pitman	[illegible]
0.3	1.3, 1.4, 7.2, 7.8, 7.13, 8.5, 8.6	See List of Manual Revisions	2023/02/07	G. Pitman	[illegible]
0.4	6	6-2, 6-4	2023/02/08	G. Pitman	[illegible]
0.5	1.4.7, 9.7	1-7,9-24 - 9-25	2023/02/23	G. Pitman	[illegible]
1	2.6, 7.13, 8.8	See List of Manual Revisions	2023/08/08	G. Pitman	[illegible]
2.0	1.4, 2.2, 2.3, 2.8, 4.2, 4.4, 4.5, 4.6, 6.4 to 6.8, 8.2 and 8.8	See List of Manual Revisions	2025/01/28	A. Pitman	[illegible]

2.1	1.4, 2.14, 7.13, 8, 9	See List of Manual Revisions	2026/01/30	[illegible]	[illegible]

List of Manual Revisions

Page	Page Status	Latest Revision
i	Original	0
ii	Original	0
iii	Original	0
iv	Original	0
v	Original	0
vi	Original	0
vii	Original	0
viii	Original	0
ix	Original	0
1-0	Revised	0.1
1-1	Revised	0.1
1-2	Revised	0.1
1-3	Revised	0.3
1-4	Revised	0.3
1-5	Revised	0.1
1-6	Revised	2.1
1-7	Revised	0.3
1-8	Revised	2.1
1-9	Revised	2.0
1-10	Revised	0.1
1-11	Revised	0.1
1-12	Revised	0.1
1-13	Revised	0.1
1-14	Revised	0.1
1-15	Revised	0.1
2-0	Original	0
2-1	Revised	2.0
2-2	Revised	2.0
2-3	Original	0
2-4	Revised	2.0
2-5	Original	0
2-6	Revised	1

Page	Page Status	Latest Revision
2-7	Original	0
2-8	Original	0
2-9	Original	0
2-10	Revised	2.1
2-11	Original	0
2-12	Original	0
2-13	Original	0
2.14	Original	0
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3-1	Revised	0.1
3-2	Original	0
3-3	Original	0
3-4	Original	0
3-5	Original	0
3-6	Original	0
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3-16	Original	0
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3-18	Original	0
3-19	Original	0
4-0	Original	0
4-1	Revised	2.0
4-2	Original	0
4-3	Original	0

Page	Page Status	Latest Revision
4-4	Original	0
4-5	Original	0
4-6	Original	0
4-7	Original	0
4-8	Original	0
4-9	Original	0
4-10	Original	0
4-11	Revised	2.0
4-12	Original	0
4-13	Original	0
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4-18	Original	0
4-19	Original	0
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4-21	Original	0
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5-2	Revised	0.1
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5-4	Revised	0.1
5-5	Revised	0.1
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6-1	Revised	0.2
6-2	Revised	0.4
6-3	Revised	2.0
6-4	Revised	2.0
6-5	Revised	2.0
6-6	Revised	0.2
6-7	Revised	2.0

Page	Page Status	Latest Revision
6-8	Revised	2.0
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7-1	Original	0
7-2	Original	0
7-3	Original	0
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7-10	Original	0
7-11	Original	0
7-12	Original	0
7-13	Revised	0.3
7-14	Revised	0.3
7-15	Revised	0.1
7-16	Original	0
7-17	Original	0
7-18	Revised	0.1
7-19	Revised	0.1
7-20	Revised	0.1
7-21	Revised	0.1
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7-23	Revised	0.1
7-24	Revised	0.1
7-25	Revised	0.1
7-27	Revised	0.1
7-28	Revised	1
7-29	Revised	1
7-30	Revised	1
7-31	Revised	2.1
7-32	Original	0
7-33	Original	0

Page	Page Status	Latest Revision
7-34	Original	0
7-35	Removed	2.1
7-36	Removed	2.1
7-37	Removed	2.1
7-38	Removed	2.1
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7-40	Removed	2.1
7-41	Removed	2.1
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8-1	Original	0
8-2	Original	0
8-3	Revised	2.0
8-4	Revised	0.2
8-5	Revised	0.3
8-6	Revised	0.2
8-7	Revised	0.2
8-8	Revised	0.2
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8-15	Removed	2.1
8-16	Removed	2.1
8-17	Removed	2.1
8-19	Removed	2.1
8-20	Removed	2.1
8-21	Removed	2.1
8-22	Removed	2.1
8-23	Removed	2.1
8-24	Removed	2.1
8-25	Removed	2.1
8-26	Removed	2.1

Page	Page Status	Latest Revision
8-27	Removed	2.1
8-28	Removed	2.1
8-29	Removed	2.1
8-30	Removed	2.1
8-31	Removed	2.1
9-0	Added	2.1
9-1	Added	2.1
9-2	Added	2.1
9-3	Added	2.1
9-4	Added	2.1
9-5	Added	2.1
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9-21	Added	2.1
9-22	Added	2.1
9-23	Added	2.1
9-24	Added	2.1
9-25	Added	2.1
9-26	Added	2.1
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9-28	Revised	2.1

Page	Page Status	Latest Revision
9-29	Added	2.1
9-30	Added	2.1
9-31	Added	2.1
9-32	Added	2.1
9-33	Added	2.1
9-34	Added	2.1
9-35	Added	2.1
9-36	Added	2.1

Page	Page Status	Latest Revision

Table of Contents

1 General Information

1.1 Introduction to Airplane

The Sling 4 HW is a four-seater *(two pairs of side-by-side seats)*, aluminium and composite aircraft. The aircraft's aluminium components are of a semi-monocoque construction. It has a single engine with a cantilever main wing above the fuselage. The aircraft has two undercarriage configurations, being either a tricycle or tail dragger. The tail draggers' specifications, for components that differ from the tricycle model, can be found in Section 8.

The Sling 4 HW makes use of the Rotax 915 iS aviation power plant, that outputs 141hp, combined with the Airmaster AP40 variable pitch propeller. Alternatively, the Sling 4 HW may be outfitted with a Rotax 916 iS power plant, that outputs 160hp, combined with a MTV-6/190-69 propeller.

The Sling 4 HW is a utility aircraft, that is both nimble and capable, with up to 520 kg of useful load. It is not intended for aerobatic operation.

The aircraft design is based upon the FAA FAR 23 certification standards and has a maximum all up weight of 1,120 kg (2,469.17 lb). Notwithstanding that the aircraft design is based upon the FAA FAR 23 certification standards, the aircraft has not been proven to comply with all the provisions of the standard.

This Pilot Operating Handbook has been prepared to provide pilots with information for the safe operation of the aircraft.

1.2 Warnings, Cautions and Notes

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

WARNING

Warning – Indicates that non-observation of the corresponding procedure leads to serious and immediate degradation of flight safety.

CAUTION

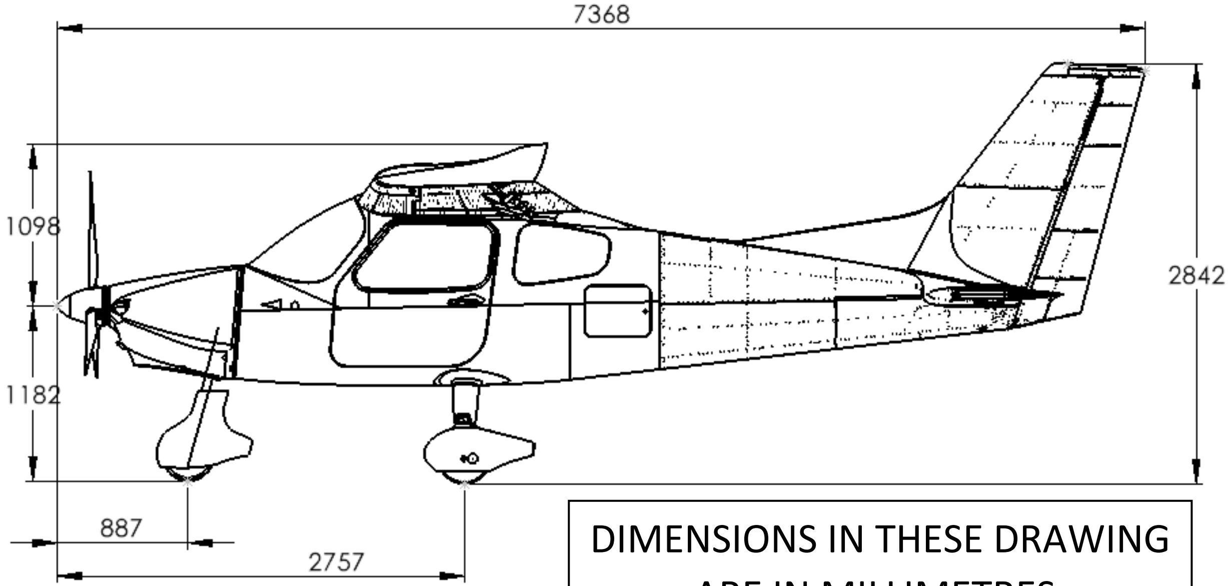
Caution – Indicates that non-observation of the corresponding procedure leads to minor and possible long-term degradation of flight safety.

NOTE

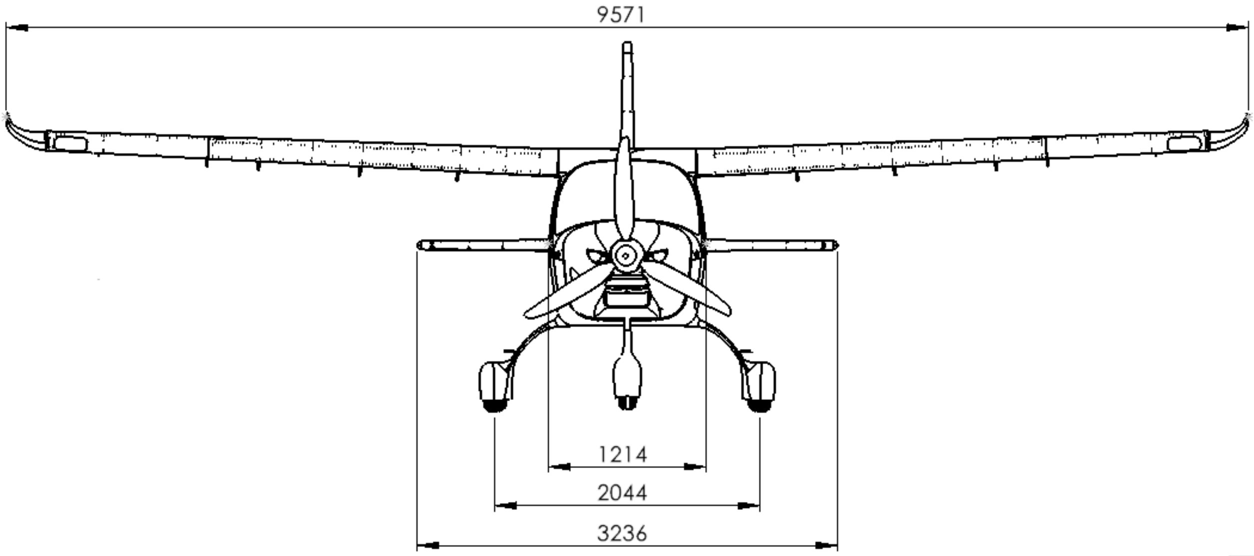
Note – Draws special attention to any item that is not related to safety but is still important or unusual.

1.3 Aircraft 3-View Drawing

1.3.1 Sling 4 HW Tricycle Model

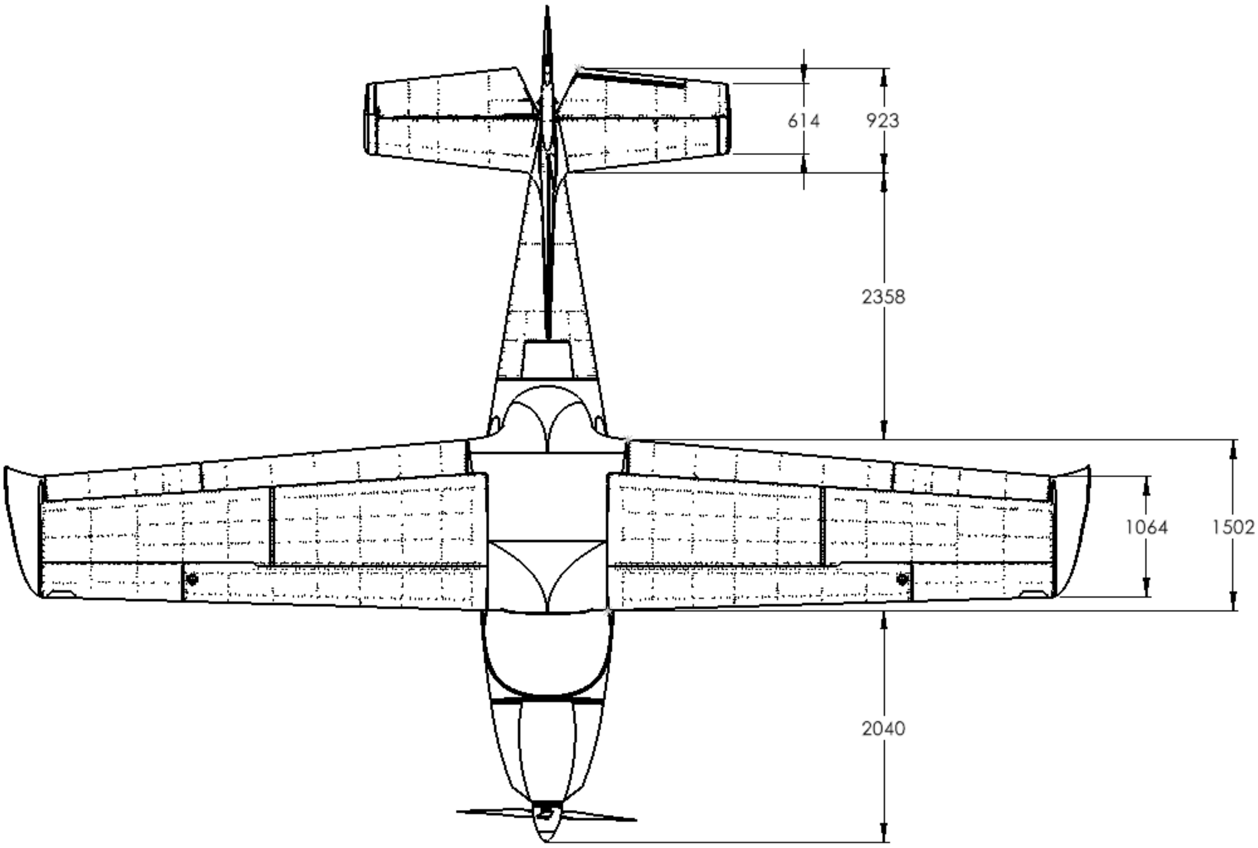


DIMENSIONS IN THESE DRAWING ARE IN MILLIMETRES.



CAUTION

Do not use these values for weight and balance, as they are overall dimensions for illustration purposes and do not use the prescribed reference plane.



DIMENSIONS IN THIS DRAWING ARE IN MILLIMETRES.

1.4 Data for Sling 4 HW Aircraft and Systems

1.4.1 Wing

Parameter	Value
Wingspan	9.57 m / 31ft. 39in.
Mean Aerodynamic Chord	1,340 mm / 52.76 in.
Wing Surface Area	11.83 m^2 / 127.34 ft^2
Wing Loading	94.67 kg/m^2 / 19.39 lbs/ft^2
Aspect Ratio	7.67
Taper Ratio	0.678
Dihedral	2.5°

1.4.2 Fuselage

Parameter	Value
Fuselage Length	6.25 m / 20ft. 50in.
Overall Length	7.21 m / 23ft. 65in.
Fuselage Width	1.2 m / 47.24 in.
Fuselage Height	1.4 m / 55.12 in.

1.4.3 Empennage

Parameter	Value
Horizontal Stabilizer Span	3.04 m / 9.97 ft.
Horizontal Stabilizer Surface Area	1.17 m^2 / 12.60 ft^2
Horizontal Stabilizer Angle of Incidence	-0.4°
Elevator Surface Area	1.27 m^2 / 13.67 ft^2
Vertical Stabilizer Span	1.53 m / 5.02 ft.
Vertical Stabilizer Surface Area	0.98 m^2 / 10.55 ft^2
Rudder Surface Area	0.60 m^2 / 6.46 ft^2

1.4.4 Landing Gear

Parameter / Item	Value
Wheel Track	2.05 m / 6 ft. 7 in.
Wheelbase	1.87 m /6 ft. 14 in.
Brake Type	Hydraulic
Main Gear Tyres	15x6.00-6; 6-ply (2.2 bar / 32 psi)
Nose Wheel Tyres	5.00-5; 6-ply (1.8 bar / 26 psi)

1.4.5 Control Surface Travel Limits

Parameter	Value
Ailerons	26° up / 22° down (±2°)
Elevator	32° up / 22° down (±2°)
Trim Tab	5° up / 20° down (±5°)
Rudder	18° left / right (-2° / +15°)
Flaps	0° up / 33° down (±3°)

1.4.6 Engine

Parameter / Item	Value
Manufacturer	BRP-Rotax GmbH & Co KG
Model	915 iS or 916 iS[1]
Type	4-cylinder, turbo charged, horizontally opposed, with an overall displacement of 1 352cc, mixed cooling, fuel injection, integrated reduction gearbox with torque damper (see 7.9 Engine).
Maximum Power (915 iS)	104 kW (139.5 hp) at 5,800 rpm (max. 5 minutes) 99 kW (133 hp) at 5,500 rpm (continuous)
Maximum Power (916 iS)	117 kW (160 hp) at 5,800 rpm (max. 5 minutes) 101 kW (137 hp) at 5,500 rpm (continuous)
Gearbox Ratio	2.54 Reduction *(from engine to propeller)*

[1] For 916 iS engine information please see relevant supplement provided in this document.

1.4.7 Propeller

Parameter / Item	Value
Manufacturers	Airmaster AP430CTF-WWR72B AP430CTF-SNR70E MT[2] MTV-6/190-69 DUC FlashBlack-3-R
Number of Blades	3 4, (only for DUC propeller)
Diameter	AP430CTF-SNR70E 70"/ 1.78m AP430CTF-WWR72B 72" / 1.83m MTV-6/190-69 75" / 1.90m FlashBlack-3-R 75" / 1.90m
Material/Type	Composite

1.4.8 Fuel

Parameter / Item		Value
Fuel Grade: Anti-Knock		Minimum RON 95
Fuel Grade: MOGAS		EN 228 Super EN 228 Super Plus
Fuel Grade: AVGAS		AVGAS 100 LL (ASTM D910)
Fuel Tanks		Two main wing tanks integrated within the wing leading edge. Two long range tanks *(optional)* integrated within the leading edge of the wing, towards the tip.
Standard Fuel Tanks	Tank Capacity	99 litres / 26.2 gallons *(x2)*
	Tank Useable Capacity	97 litres / 25.6 gallons *(x2)*
	Total Capacity	198 litres / 52.3 gallons
	Total Useable Capacity	194 litres / 51.2 gallons
Long Range Fuel	Tank Capacity	25 litres / 6.6 gallons *(x2)*
	Tank Useable Capacity	24 litres / 6.3 gallons *(x2)*

[2] For operation of the MTV-6, please see relevant supplement provided in this document.

	Total Capacity	248 litres / 65.5 gallons
	Total Useable Capacity	242 litres / 63.9 gallons

1.4.9 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. 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
Oil Capacity	Approx. 3.5 litres (3.7 Quarts / 7.4 pints) from dry.

1.4.10 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.
Coolant Capacity	Approx. 2.5 litres (2.64 quarts / 5.28 pints)

1.4.11 Brake System

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

1.4.12 Maximum Weights

Parameter	Value

Maximum Take-off Weight	1,120 kg (2,469.17 lb.)[3]
Maximum Landing Weight	1,120 kg (2,469.17 lb.)[3]
Maximum Total Baggage Weight *(Main Area + Golf Club Extension)*	35 kg (77 lb.)
Maximum Baggage Weight *(Main Baggage Area)*	35 kg (77 lb.)
Maximum Baggage Weight *(Golf Club Extension)*	3 kg (6.6 lb.)

1.4.13 Standard Weights

Parameter	Value
Using a 915 iS engine and Airmaster prop.	
Standard Configuration Empty Weight	600 kg (1,323 lb.)
Maximum Useful Load	520 kg (1146.40lb.)
Using a 916 iS engine and MT prop.	
Standard Configuration Empty Weight	605 kg (1,334 lb.)
Maximum Useful Load	515 kg (1135.38 lb.)

1.4.14 Specific Loadings

Parameter	Value
Wing Loading *(MAUW)*	94.67 kg/m^2 (19.39 lb/ft^2)
Power Loading *(MAUW) 915 iS*	10.77 kg/kW (17.71 lb/hp)
Power Loading *(MAUW) 916 iS*	9.57 kg/kW (15.73 lb/hp)

1.5 Terminology, Symbols and Conversion Factors

1.5.1 General Terminology

Acronym	Description
AC	Alternating Current
AHRS	Attitude and Heading Reference System

[3] A minimum of 100l of fuel is required when the aircraft is loaded to its maximum all-up weight.

Acronym	Description
AKI	Anti-Knock Index
ALT	Altimeter
API	American Petroleum Institute
ASI	Airspeed Indicator
AVGAS	Aviation Gasoline
COM	Communication (Radio)
EFIS	Electronic Flight Information System
FAA	Federal Aviation Authority
FAR	Federal Aviation Regulations
GLS	GPS Landing System
GmbH	Gesellschaft mit beschränkter Haftung *(company with limited liability)*
GPS	Global Positioning System
HW	High Wing
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
LE	Leading Edge
LED	Light Emitting Diode
MOGAS	Automobile (car) Gasoline
MON	Motor Octane Number
NGL	Normal Ground Line
NRV	Non-Return Valve
POH	Pilot Operating Handbook
PTT	Push-To-Talk (Button)
RSA	Republic of South Africa
RON	Research Octane Number
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VSI	Vertical Speed Indicator

1.5.2 *Speed and Performance Terminology*

Acronym	Description
IAS	Indicated Airspeed.
KCAS	Calibrated Airspeed – the indicated airspeed corrected for position and instrument error, expressed in knots.
KIAS	Indicated Airspeed – the speed shown on the airspeed indicator, expressed in knots.
KTAS	True Airspeed – the airspeed of the aircraft relative to the undisturbed air through which it passes.
TAS	True Airspeed.
V_A	Manoeuvring speed.
V_{BG}	Best Glide Speed – the speed *(at MAUW)* which results in the greatest gliding distance for loss in unit altitude.
V_{FE}	Maximum Flap Extended Speed – the highest speed permissible with wing flaps deployed.
V_H	Maximum Speed – the maximum speed in level flight at maximum continuous power.
V_{LOF}	Lift-off Speed – the speed at which the aircraft generally lifts off from the ground during take-off.
V_{NE}	Never Exceed Speed – the speed that may not be exceeded at any time.
V_{NO}	Maximum Structural Cruising Speed – the speed that should not be exceeded, except in smooth air, and then only with caution.
V_{REF}	Reference Landing Speed – the indicated airspeed, at 15 m (50 ft) above threshold, which is not less than $1.3V_{SO}$.
V_{ROT}	Rotation Speed – 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 – the speed at which the aircraft stalls, at *MAUW*, engine idling, flaps fully retracted.
V_{SO}	Stall Speed – the speed at which the aircraft stalls in the landing configuration, at *MAUW*, engine idling, flaps fully down.
V_X	Best Angle of Climb Speed – 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 – the speed (at MAUW, flaps fully retracted) which results in the greatest altitude gain over a given time period.

1.5.3 Meteorological Terminology

Acronym	Description
ISA	International Standard Atmosphere
QNH	The local pressure setting that if set on the subscale of an altimeter, the altimeter will indicate local altitude above mean sea level.
QFE	The local airfield pressure setting that if set on the subscale of an altimeter, the altimeter will indicate local altitude above the airfield.
QNE	The barometric pressure used for the standard altimeter setting (1013 hPa / 29.92 in. Hg)

1.5.4 Engine Terminology

Acronym	Description
CHT	Cylinder Head Temperature.
EGT	Exhaust Gas Temperature.
OHV	Overhead Valve.
RPM	Revolutions Per Minute.
Coolant Temperature	Temperature of the coolant as it leaves the cooling jacket of cylinder head 4.

1.5.5 Airplane Performance and Flight Planning Terminology

Terminology	Description
Crosswind Component	The velocity of the crosswind component during take-off and landing.
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 (50 ft) obstacle (in the air) to the end of the landing run.
Take-off Run	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). This term refers to the length of runway that is suitable and available for the ground run of the aircraft when taking off.

Take-off Distance	The take-off distance measured from the actual start of the ground run to clearance of a 15 m (50 ft) obstacle (in the air).
Useable Fuel	The fuel available for flight planning.

1.5.6 Weight and Balance Terminology/Symbols

Terminology	Description
Arm	The horizontal distance from the reference datum to the centre of gravity (CG) of an item.
CG	Centre of Gravity, being the point at which the airplane would balance if suspended. A value given as distance from the reference datum or as a percentage of MAC, which has minimum and maximum permissible values.
Datum	The reference datum is an imaginary vertical plane from which all horizontal distances are measured for weight and balance purposes. The Sling 4 HW datum is the forward, flat propeller mounting flange on the Rotax engine.
Empty Weight	The weight of the airplane with engine fluids at operating levels.
MAC	Mean Aerodynamic Chord. The average chord value of the main wing.
MAUW	Maximum All Up Weight or Maximum Take-Off Weight. Maximum permissible weight approved for take-off/flight
Maximum Landing Weight	The maximum weight approved for the landing touch down.
Moment	The product of the weight of an item multiplied by its arm.
W_R	Weight reading from scale under right main wheel during aircraft weighing.
W_L	Weight reading from scale under left main wheel during aircraft weighing.
W_N	Weight reading from scale under nose main wheel during aircraft weighing.
W_E	Aircraft empty weight.
W_T	Aircraft total 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.

1.5.7 Useful Conversion Factors

Imperial		***Metric***	
pound	*1*	0.4536	kilogram
pound per square inch	*1*	6.895	kilopascal
inch	*1*	25.4	millimetres
foot	*1*	0.3048	metres
statute mile	*1*	1.609	kilometres
nautical mile	*1*	1.852	kilometres
millibar	*1*	1	hectopascal
		0.1	kilopascal
imperial gallon	*1*	4.546	litres
US gallon	*1*	3.785	litres
US quart	*1*	0.946	litres
cubic foot	*1*	28.317	litres
°F		$(1.8 \times °C) + 32$	
$(°F - 32) \times \left({}^{5}/_{9}\right)$		°C	

1.6 Supporting Documents

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

1. Latest revision of the Operators Manual for the Rotax® 915 iS A Series or the Rotax® 916 iS.

2. Latest revision of the Operators Manual for the Airmaster AP3 and AP4 Series Constant Speed Propeller or the MT[2]

3. Latest revision of the Rotax® service instruction entitled "Selection of Suitable Operating Fluids."

4. Latest revision of the Operators Manual for the Garmin G3X.

5. *Latest revision* of the Operators Manual for the relevant COM radio, transponder and any other relevant equipment fitted.

6. *Latest revision* of the Operators Manual for the Stratos 07 Magnum ballistic parachute, 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 where applicable.

2 Limitations

2.1 Introduction

This section includes operating limitations, instrument markings and placards necessary for the safe operation of the Sling 4 HW, its engine, systems and equipment.

2.2 Airspeed Limitations

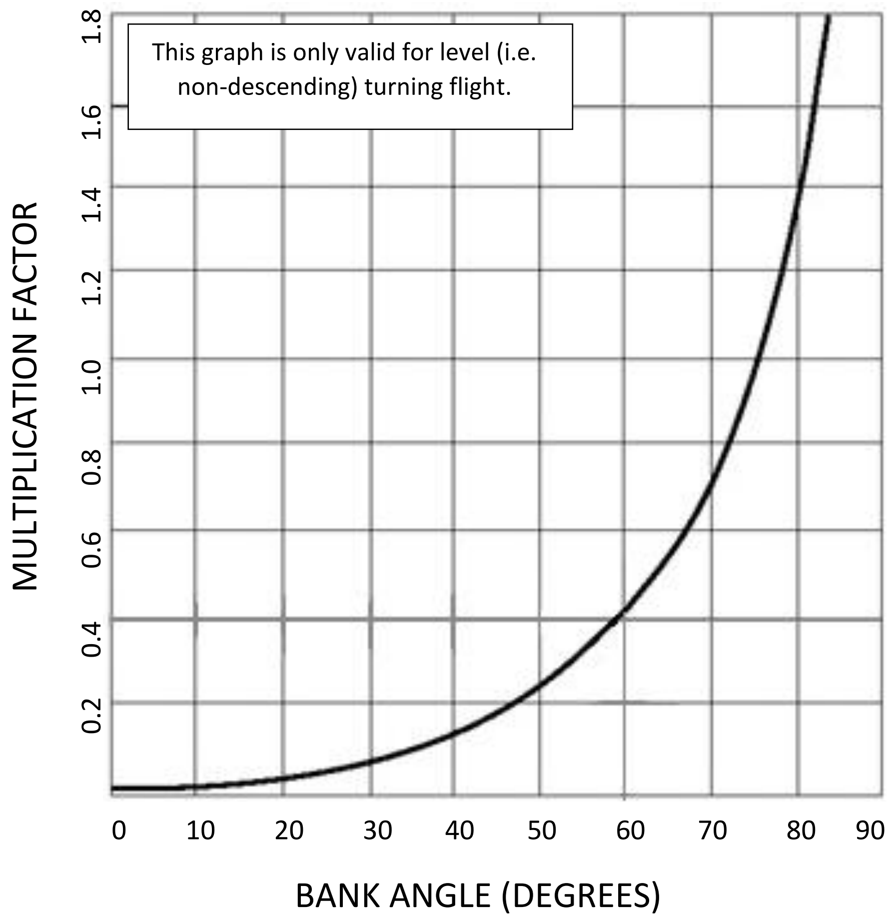
Speed		KIAS	Remarks
V_{NE}	Never Exceed Speed	155	Never exceed this speed in any operation.
V_{NO}	Maximum Structural Cruising Speed	135	Never exceed this speed unless in smooth air and then only with caution.
V_A	Manoeuvring Speed	110	Do not make full or abrupt control movements above this speed, as 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	140	Never exceed this speed in level flight, at MAUW.
V_S	Stall Speed	60	The aircraft will stall at this speed with flaps fully retracted, at MAUW in the most forward CG configuration and engine idling.
V_{S0}	Stall Speed in Landing Configuration	53	The aircraft will stall at this speed with full flap, at MAUW in the most forward CG configuration and engine idling.

2.3 Airspeed Indicator Markings

Marking	KIAS	Significance
White Arc	53-85	Flap Operating Range Lower Limit - V_{S0} (At MAUW) Upper Limit - V_{fe} (Max. flap extend speed)
Green Arc	60-135	Normal Operating Range Lower Limit - V_S (At MAUW) Upper Limit - V_{NO} (Max. Structural Speed)
Yellow Arc	135-155	Manoeuvres must be conducted with caution and only in smooth air.
Red Line	155	Maximum speed for all operations.

2.4 Stall Speed Adjustment for Turning Flight

Stall speeds listed earlier in this section are for straight and level flight, at a load factor of 1g. Speeds should be adjusted for turning flight or increased load factor.



$$V_T = V + (V \times Multiplication\ Factor)$$

- 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*)

Item	Value
Maximum demonstrated crosswind component for take-off and landing	15 kts

2.6 Service Ceiling

Item	Value
Service Ceiling	23,000 ft. / 7,010m

2.7 Load Factors

Item	Value
Maximum positive limit load factor	+3.8 g
Maximum negative limit load factor	-1.5 g

2.8 Weights

Parameter	Value
Maximum Take-off Weight	1,120 kg (2,469.17 lb.)
Maximum Landing Weight	1,120 kg (2,469.17 lb.)
Maximum Baggage Weight *(Main Baggage Area)*	35 kg (77 lb.)
Maximum Baggage Weight *(Golf Club Extension)*	3 kg (10 lb.)

2.9 Centre of Gravity Range

Item	Value
Datum	Centre of front face of engine propeller flange *(without propeller extension).*
Reference *(Longitudinal Levelling)*	Lower ledge of the door *(with door open).*
Reference *(Transverse Levelling)*	Floor panel between pilot seat and peddles.
Forward Limit	1.969 m / 6.460 ft. (18% MAC) aft of datum
Rear Limit	2.170 m / 7.119 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 more information.

2.10 Prohibited Manoeuvres

The Sling 4 HW is approved for normal manoeuvres, including the following:

- Steep turns not exceeding 60°
- 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 (110 KIAS – manoeuvring speed).

2.11 Flight Crew

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

2.12 Passengers

Maximum 4 people allowed on board the aircraft *(including the pilot and **in accordance with CG limitations**).*

2.13 Kinds of Operation

2.13.1 Normal VFR Operation

The Sling 4 HW, in standard configuration, is only approved for day VFR operation with visual contact with terrain.

Minimum equipment is as follows:

Equipment
Altimeter, with encoding transponder
Airspeed Indicator
Magnetic Heading 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 Local Authority)*
Fire Extinguisher

2.13.2 Night Operation

Subject to the legal requirements applicable in the country of registration, the Sling 4 HW fitted with the following additional equipment may also be operated at night; provided that operations are at all times conducted in VMC.

Equipment
Red Beacon / Strobe Lights
Navigation Lights
Landing Light(s). *(Two separate lights or a single light with two independent filaments)*
Instrument Panel Lighting

2.13.3 IFR Operation

Provided that the aircraft is appropriately equipped, the aircraft may safely be flown under IFR. Depending on the practical and legal requirements of the judicial region the aircraft will be operated in, the aircraft may also be flown in IMC conditions, in accordance with IFR. It is the responsibility of the aircraft operator to ensure that all legal and safety requirements are met, together with the installation of the required systems and instrumentation for IFR *(and IMC*) flight.

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 airplane instrumentation is not certified, and applicable regulations should be complied with at all times.

NOTE

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

2.14 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.

2.14.1 Engine Start and Operation Temperature Limits

Item	Value
Start – Maximum (Ambient Temperature)	50 °C / 122 °F
Start – Minimum (Oil Temperature)	-20 °C / -4 °F
In Flight – Maximum	60 °C / 140 °F

2.14.2 Engine Load Factor Limits (Acceleration)

Item	Value
Maximum	5 seconds at maximum - 0.5g

2.14.3 Engine Operational and Speed Limits

Parameter		Value
Engine Model		ROTAX 915 iS
Engine Manufacturer		BRP-Rotax GmbH & Co KG
Power	Maximum take-off	104 kW / 139.5 hp at 5,800 rpm, max. 5 minutes
	Maximum continuous	99 kW / 133 hp at 5,500 rpm
RPM	Maximum take-off	5,800 rpm, max. 5 minutes
	Maximum continuous	5,500 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	Maximum	120 °C (248 °F)
Oil pressure	Minimum	0.8 bar (11.6 psi) – below 3,500 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 3,500 rpm
Fuel Pressure	Minimum	2.5 bar (36 psi)[4]
	Maximum	3.5 bar (51 psi)[5]
Manifold Pressure	Maximum Continuous	1,730 hPa / 51 in. Hg
	Maximum Take-off	60 hPa / 1.77 in. Hg

NOTE

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

[4] Minimum Acceptable Fuel Pressure exceedance (max. 3 sec) = 2.5 bar (36 psi)
[5] Maximum Acceptable Fuel Pressure exceedance (max. 3 sec) = 3.5 bar (51 psi)

2.15 Other Limitations

- No smoking is allowed on-board the airplane.
- VFR only flights are permitted unless the operator has equipped the aircraft correctly for IFR flight.

WARNING

Intentional flights under icing conditions are prohibited!

2.16 Flight in Precipitation

Flying though rain should be avoided but can be done with no additional actions required. Airplane handling and performance will not be substantially affected. However, VMC should be maintained unless flight is under IFR and the aircraft is correctly equipped.

2.17 Limitation Placards

The following limitation warning placards must be placed in the aircraft and positioned in plain view of the pilot and passenger.

2.17.1 Instrument Panel

Standard Sling 4 High Wing
OPERATE UNDER VMC ONLY MAXIMUM PERMISSIBLE AIRSPEED 155 KIAS MAXIMUM PERMISSIBLE RPM 5,800 RPM FOR 5 MINUTES MAXIMUM CONTINUOUS RPM 5,500 MAXIMUM PERMISSIBLE MASS 1,120 KG/2,469.17 LB

2.17.2 Visible to Pilot and Passenger

Standard Sling 4 High Wing
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

2.17.3 Adjacent to Fuel Filler Cap

Standard Sling 4 High Wing
AVGAS **OR** **MOGAS** **99 LITRES**

2.17.4 Inboard Upper Wing Flap Surface

All Sling 4 High Wing s
NO STEP

2.17.5 Fireproof Metal Plate Attached to Aircraft

Standard Sling 4 High Wing
ZU-### **CONSTRUCTOR – SLING AIRCRAFT** **MODEL – SLING 4 HIGH WING** **SERIAL NO – ###** **ENGINE ROTAX ### – ### HP** **MANUFACTURED - ###**

Note:

- ### represents the information applicable to the specific aircraft.
- The registration number (on above plate) is specific to the country of registration. The format shown above is the South African standard.

2.17.6 *Exterior of Baggage Door*

All Sling 4 High Wing s
MAX TOTAL BAGGAGE WEIGHT – 35 kg / 77 lb.

2.17.7 *Other Placards*

The aircraft must be placarded to show the following:

- All Fuses / Circuit Breakers
- Ignition Switches / Lanes
- Starter
- Trim: NOSE UP and NOSE DOWN
- Flaps: UP, STAGES *(1,2,3),* DOWN
- All Other Switches
- Door handle OPEN and CLOSED position
- Ballistic parachute deployment handle, if equipped.

3 Emergency Procedures

3.1 Introduction

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

Emergencies caused by aircraft or engine malfunction are extremely rare if the appropriate procedures are followed, such as pre-flight inspections and general maintenance. Should an emergency arise however, the basic guidelines described in this section should be followed accordingly to mitigate the consequences of the emergency.

In case of an emergency, the pilot should remember the following priorities, in order of importance:

1. **FLY THE AIRCRAFT** – Keep control and continue flying.
2. **ANALYSE** – Analyse the situation as a whole, keeping an open mind.
3. **PROCEDURES** – Apply applicable procedures.
4. **COMMUNICATE** – Inform ATC / local traffic of the situation, if time permits.

3.2 Speeds for Emergency Operations

<table>
<tr><th colspan="2">Speed</th><th>KIAS</th><th>Remarks</th></tr>
<tr><td>V_{BG}</td><td>Best Glide Speed</td><td>80</td><td>This speed (MAUW, flaps up) results in the best gliding distance, along the ground.
Horizontal distance travelled (in still air) is approximately:
<table>
<tr><th>Propeller -</th><th>Feathered</th><th>Windmilling</th></tr>
<tr><td>Descent (Vertical)</td><td>305m
1,000ft</td><td>305m
1,000ft</td></tr>
<tr><td>Glide (Horizontal)</td><td>4,445m
13,200ft</td><td>3,721m
12,200ft</td></tr>
<tr><td>Ratio</td><td>13.2:1</td><td>12.2:1</td></tr>
</table></td></tr>
<tr><td>-</td><td>Speed for in-flight engine start</td><td>> 90</td><td>Recommended speed.</td></tr>
</table>

3.3 Engine Related Emergencies

3.3.1 Engine Failure During Take-off

1. Throttle .... IDLE
2. Brakes... APPLY

   with aircraft under control –
3. Ignition Lanes .... OFF *(A & B)*
4. Master .... OFF
5. Fuel Selector................................. OFF
6. Fuel Pump(s) .... BOTH OFF *(MAIN & AUX)*
7. Feed pump .... OFF

3.3.2 Engine Failure Immediately After Take-Off

1. Airspeed .... 80 KIAS
2. Landing Area .... LOCATE *(CLEAR GROUND)*
3. Flaps .... AS NEEDED
4. Fuel Pump(s) .... BOTH OFF *(MAIN & AUX)*
5. Fuel Selector................................. OFF

   before touch-down –
6. Ignition Lanes .... OFF *(A & B)*
7. Feed Pump .... OFF
8. Master .... OFF

WARNING

Flaps and elevator trim will not operate with the master switch off as they are powered by the main bus. Make final flap and trim selection before turning master switch off.

3.3.3 Engine Failure During Flight

1. Airspeed .... 80 KIAS
2. Landing Area .... LOCATE (*CLEAR GROUND*)
3. Air Start .... COMMENCE

*If engine restart is **successful** –*

4. Continue.. PROCEED WITH CAUTION
5. Land... AS SOON AS POSSIBLE

*If engine restart **fails** –*

6. Land... FORCED LANDING *(REFER TO 3.4.1)*

3.3.4 Air-Start

1. ECU Backup Switch .... ON
2. Fuel Pumps..................................... BOTH ON *(MAIN AND AUX)*
3. Feed Pump .... ON
4. Fuel Selector.................................. CHANGE *(UNLESS 2ND TANK DRY)*
5. Throttle .... CHECK MOVEMENT
6. Throttle .... MIDDLE POSITION
7. Master... ON
8. Ignition Lanes .... ON *(A & B)*
9. Starter .... ENGAGE

NOTE

An air-start is possible with the propeller windmilling and the ECU Backup Switch ON. If required, the starter can also be used while the propeller is windmilling.

3.3.5 *Irregular Engine RPM*

1. Ignition Lanes .... ON *(A & B)*
2. Throttle .... VERIFY POSITION
3. ECU Backup Switch .... ON
4. Fuel Quantity .... CHECK
5. Fuel Selector .... CHANGE *(UNLESS 2ND TANK DRY)*
6. Fuel Pumps .... BOTH ON *(MAIN & AUX)*
7. Feed Pump .... ON
8. Oil - Pressure .... CHECK
9. Oil - Temperature .... CHECK
10. Coolant - Temperature .... CHECK
11. EGT - Temperature .... CHECK

    If engine continues to run rough –

12. Land .... AS SOON AS POSSIBLE

3.3.6 *Low Fuel Pressure*

1. Fuel Quantity .... CHECK
2. Fuel Selector .... CHANGE *(UNLESS 2ND TANK DRY)*
3. Fuel Pump(s) .... BOTH ON *(MAIN & AUX)*
4. Feed Pump .... ON

    *If fuel pressure **remains low** –*

5. Throttle .... DECREASE IF POSSIBLE

    *If fuel pressure **remains low** –*

6. Land .... AS SOON AS POSSIBLE

3.3.7 Low Oil Pressure

1. Oil - Temperature .... CHECK (MAX. 130 °C)

   *If oil temperature **is high or increasing** –*

2. Airspeed .... 80 KIAS[(a)]

   If oil pressure remains low or temperature remains high/increasing –

3. Land... AS SOON AS POSSIBLE[(b)]

NOTES

a. 80 KIAS is the speed at which the aircraft is most efficient.
b. Remain vigilant for an impending engine failure.

3.4 Emergency Landing Procedures

3.4.1 Emergency Landing without Engine Power

1. Airspeed .... 80 KIAS
2. Trim .... FOR BEST GLIDE
3. Landing Location .... LOCATE
4. Engine Air-start .... ATTEMPT *(IF TIME PERMITS)* [(a)]

If engine restart ***fails***

5. Fuel Pump(s) .... BOTH OFF *(MAIN & AUX)*
6. Feed Pump .... OFF
7. Fuel Selector................................... OFF
8. Throttle .... CLOSED
9. Flaps .... FULL *(PRIOR TO TOUCHDOWN)*
10. Communication .... REPORT IF TIME PERMITS
11. Passenger .... BRIEF

Immediately Before Touchdown –

12. Ignition Lanes .... OFF *(A & B)*
13. Master.. OFF

NOTES

a. Do not lose perspective of time trying to restart the engine. Restart attempts should be limited and are dependant on the altitude available. Focus should rather be given to landing location and the approach.

3.4.2 Precautionary Landing with Engine Power

1. Airspeed .... 75 KIAS
2. Flaps .... TAKE-OFF
3. Fuel Pumps .... BOTH ON *(MAIN & AUX)*
4. Feed Pump .... ON
5. Landing Area .... INSPECT *(AS PER PROCEDURE)*
6. Flaps .... FULL *(ON FINAL APPROACH)*
7. Airspeed .... 70 KIAS
8. Brakes .... APPLY

   when aircraft is under control –

9. Ignition Lanes .... OFF *(A & B)*
10. Fuel Selector .... OFF
11. Master Switch .... OFF

3.4.3 Ditching

1. Airspeed .... 65 KIAS
2. Flaps .... FULL
3. Descent .... ESTABLISH 50 ft/min
4. Direction
   i. High Wind .... INTO WIND
   ii. Light Wind .... PARALLEL TO SWELLS
5. Crew .... BRIEF
6. Doors .... OPEN
7. Touch-down Speed .... SLOWEST PRACTICAL
8. Crew .... EVACUATE
9. Life Jackets / Raft .... INFLATE

3.4.4 *Landing with a Flat Tyre/Damaged Wheel*

1. Approach .... NORMAL
2. Airspeed .... 65 KIAS
3. Airspeed at flare .... SLOWEST PRACTICAL *($\approx$ 60 KIAS)*

   If nosewheel is damaged/flat –
4. Nosewheel .... KEEP OFF GROUND FOR AS LONG AS POSSIBLE WITH ELEVATOR

3.5 Smoke and Fires

3.5.1 Engine Fire on Ground During Start

1. Starter .... RELEASE
2. Fuel Selector .... CLOSE
3. Fuel Pumps .... BOTH OFF *(MAIN & AUX)*
4. Feed Pump .... OFF
5. Throttle .... IDLE
6. Ignition Lanes .... OFF *(A & B)*
7. Master .... OFF
8. Fire Extinguisher .... RETRIEVE
9. Exit Aircraft
10. Extinguish Fire

3.5.2 Engine Fire on Ground

1. Cabin Heat .... CLOSE
2. Fuel Selector .... CLOSE
3. Fuel Pumps .... BOTH OFF *(MAIN & AUX)*
4. Feed Pump .... OFF
5. Throttle .... IDLE
6. Ignition Lanes .... OFF *(A & B)*
7. Master .... OFF
8. Fire Extinguisher .... RETRIEVE
9. Exit Aircraft
10. Extinguish Fire

3.5.3 Engine Fire during Take-off Run

1. Throttle .... IDLE
2. Cabin Heat.................................... CLOSE
3. Brakes.. APPLY UNTIL STOP
4. Fuel Selector................................. CLOSE
5. Fuel Pumps .... BOTH OFF *(MAIN & AUX)*
6. Feed Pump .... OFF
7. Ignition Lanes .... OFF *(A & B)*
8. Master.. OFF
9. Fire Extinguisher........................... RETRIEVE
10. Exit Aircraft
11. Extinguish Fire

3.5.4 Engine Fire in Flight

1. Cabin Heat..CLOSE
2. Cabin Air Vent ....OPEN
3. Throttle ....IDLE
4. Fuel Pumps.......................................BOTH OFF *(MAIN & AUX)*
5. Feed Pump ....OFF
6. Ignition Lanes ....OFF *(A & B)*
7. Master..OFF *(AFTER FLAP DEPLOYMENT)*
8. Fuel Selector.....................................CLOSE
9. Airspeed ....INCREASE TO VNE *(155 KIAS)*
10. Forced Landing ....EXECUTE (*REFER TO 3.4.1)*

3.5.5 Electrical Fire in Flight

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

1. Master .... OFF[(a)(b)]
2. Ignition Lanes .... REMAIN ON *(A & B)*
3. Electrical Switches .... OFF
4. Extinguisher .... USE *(IF POSSIBLE)*
5. Ventilate Cabin .... OPEN VENTS

*If fire **IS extinguished** –*

6. Precautionary Landing .... EXECUTE (*AS SOON AS POSSIBLE REFER TO 3.4.2)*

*If fire is **NOT extinguished** –*

7. Forced Landing .... EXECUTE (*REFER TO 3.4.1)*

NOTES

a. If the location/source of the fire can be determined, electrical power can be removed from that circuit via the isolating switch. This will remove the need to switch off the master.

b. The EFIS and associated equipment (iBox, RDAC etc.) can still be powered from the EFIS battery backup circuit when the master switch is off; provided that the EFIS system is not the source of the electrical fire.

3.5.6 Cabin Fire

1. Master .... OFF
2. Cabin Heat .... CLOSE
3. Ventilate Cabin .... OPEN VENTS
4. Extinguisher .... USE (*IF POSSIBLE)*

*If fire **IS extinguished** –*

5. Precautionary Landing .... CONSIDER (*REFER TO 3.4.2)*

*If fire is **NOT extinguished** –*

6. Forced Landing .... EXECUTE *(REFER TO 3.4.1)*

3.6 Recovery from Unintentional Spin

WARNING

Intentional Spins are Prohibited!

Unintentional spin recovery technique:

1. Throttle .... IDLE
2. Lateral Control.............................. AILERONS NEUTRAL
3. Yaw Control .... FULLRUDDERIN OPPOSITE DIRECTION OF SPIN
4. Pitch Control.................................. NOSE DOWN

when rotation stops –

5. Yaw Control .... RUDDER NEUTRAL
6. Longitudinal Control .... RECOVER FROM DIVE[(a)]

NOTES

a. Do not exceed VNE or load factor limits in the recovery dive.

In the unlikely event that the aircraft enters a flat spin and the steps above do not result in recovery of control, the following may be implemented:

1. Throttle .... IDLE
2. Lateral Control .... AILERONS NEUTRAL
3. Longitudinal Control................... FULL NOSE DOWN
4. Yaw Control................................ FULL RUDDER IN OPPOSITE DIRECTION OF SPIN

when rotation stops –

5. Yaw Control................................ RUDDER NEUTRAL
6. Longitudinal Control................... RECOVER FROM DIVE

3.7 Other Emergencies

3.7.1 Propeller Control Failure

The propeller/propeller controller can fail in various modes/ways. The pilot should completely familiarize themselves with the Airmaster propeller operator's manual, and specifically the section that deals with **Emergency Operation** and **Failure Modes.**

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

1. Engine Speed .... PREVENT OVERSPEED
2. Propeller Mode .... SELECT MANUAL (MAN)
3. Propeller Pitch .... VERIFY OPERATION

*If propeller pitch control is still **available** –*

4. Propeller Pitch .... SET TO REQUIRED

*If propeller pitch control is **unavailable** –*

5. Propeller switch .... OFF

*If failure results in pitch **within** flight range –*

6. Proceed............................... WITH CAUTION *(treat as if it is a fixed propeller)*

*If failure results in pitch **outside** flight range –*

7. Precautionary Landing .... EXECUTE *(REFER TO 3.4.2)*

CAUTION

Selection of too fine a propeller pitch, and high throttle settings may result in an engine overspeed.

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

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.**

3.7.2 Engine Vibration / Rough Running

If any abnormal engine vibrations occur:

1. Fuel... CHECK QUANTITY
2. Fuel Pumps.................................. BOTH ON *(MAIN & AUX)*
3. Feed Pump .... ON
4. Fuel Selector................................ CHANGE *(UNLESS 2ND TANK DRY)*
5. ECU Backup .... ON
6. Engine RPM .... SET WHERE VIBRATION IS LEAST
7. Precautionary Landing .... EXECUTE *(REFER TO 3.4.2)*

3.7.3 EFIS System Failure

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

1. Straight and Level Flight .... MAINTAIN[a]
2. EFIS Main Switch .... OFF
3. EFIS Back-Up Switch .... OFF

wait for 3 seconds –

4. EFIS Main Switch .... ON
5. EFIS Back-Up................................ ON

wait for at least 15 seconds for the system to boot –

6. EFIS Functionality .... CONFIRM

*if EFIS **still not functioning** correctly –*

7. Land... AS SOON AS PRACTICABLE[b]

NOTES

a. Through use of ground references and other instruments.
b. Execute landing at first safe opportunity and have instrument repaired.

3.7.4 Alternator / Charge System Failure

An alternator A/B failure is indicated by the lane warning lights.

3.7.4.1 Alternator A Failure –

Alternator A failure is evident by the steady illumination of the lane A warning light, and a drop in the main bus voltage to nominal battery voltage (+/- 12.5 V)

1. Lane A .... CYCLE SWITCH *(OFF 1 SECOND, BACK ON)*
2. Lane A .... VERIFY WARNING LIGHT OFF

If Lane A warning light ***is still on*** *– assume alternator failure.*

3. ECU Backup .... ON
4. EFIS Backup .... ON
5. Non-Essential Equipment...... ALL OFF[(a)] Lights, autopilot, secondary EFIS, etc.
6. EFIS Brightness....................... MINIMUM
7. Radio Communication .... MINIMUM
8. Land .... AS SOON AS PRACTICAL

NOTE

a. No battery charging will occur in this scenario, and the main battery must be conserved if there is to be a subsequent alternator B failure.

NOTE

The ECU uses GEN A to run the engine, and GEN B is used to charge the main battery. If GEN A fails, GEN B is reprioritized to run the engine only and the main battery will no longer charged.

3.7.4.2 Alternator B Failure –

Alternator B failure is evident by the steady illumination of the Lane B warning light, and a drop in the main bus voltage to nominal battery voltage (+/- 12.5 V).

1. Lane B .... CYCLE SWITCH *(OFF 1 SECOND, BACK ON)*
2. Lane B .... VERIFY WARNING LIGHT OFF

If Lane B warning light ***is still on*** *– assume alternator failure.*

3. ECU Backup............................ ON
4. EFIS Backup............................ ON
5. Non-essential Equipment...... OFF(c) *Lights, autopilot, secondary EFIS, etc.*
6. Radio Communication .... MINIMAL
7. Land .... AS SOON AS PRACTICABLE

NOTES

c. No battery charging will occur in this scenario, and the main battery must be conserved if there is to be a subsequent alternator A failure.

3.7.4.3 Alternator A and B Dual Failure –

This will result in engine failure when the main battery goes flat, as no power is available to the ECU and subsequently the fuel pumps. These must be powered by the main battery in order for the engine to run.

1. ECU Backup........................... ON
2. EFIS Backup........................... ON
3. Main Battery......................... VERIFY VOLTAGE(d)
4. Non-essential Equipment...... OFF Lights, autopilot, secondary EFIS, etc.
5. Radio Communication .... MINIMAL
6. Precautionary .... EXECUTE AS SOON AS POSSIBLE *(REFER TO 3.4.2)*

NOTES

d. Expect **systems failure** when battery voltage drops below **10 Volt**. This includes the ECU and fuel pumps, which will result in engine failure.

WARNING

The engine can run from the main battery for approximately 30 minutes following a dual alternator A and B failure; from a full charge with all ancillary equipment turned off. The engine will fail due to fuel starvation, as the fuel pumps will stop when the voltage is too low.

3.7.4.4 Loss of Sensors

For redundancy purposes the engine sensors, are powered by Lane A/B separately. This means that if one of the two lanes fails, a subset of the engine sensors will also fail.

Failure of Lane	Resultant Sensor Failure
A	Coolant Temperature
	Exhaust Gas Temperature
	Ambient Temperature
	Ambient Pressure
	Throttle Lever Position
B	Oil Temperature
	Oil Pressure

3.7.5 Main Bus Power Failure

Please refer to 7.11.4 Main Bus, for a list of equipment affected by a loss of power to the main bus.

1. ECU Backup .... ON
2. EFIS Backup .... ON
3. Land .... AS SOON AS POSSIBLE

CAUTION

Power loss to the main bus will not result in the main fuel pump stopping but the starter motor will be non-operational. If the engine is allowed to run dry and stop, the engine will have to be restarted via airstream driven propeller rotation (windmilling).

4 Normal Procedures

4.1 Introduction

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

The checklists proposed are considered to be the most desirable, and checks should follow them, unless there is a valid reason to deviate.

4.2 Speeds for Normal Operation

Unless otherwise noted, the following speeds are based on a maximum weight of 1,120 kg (2,469.17 lb).

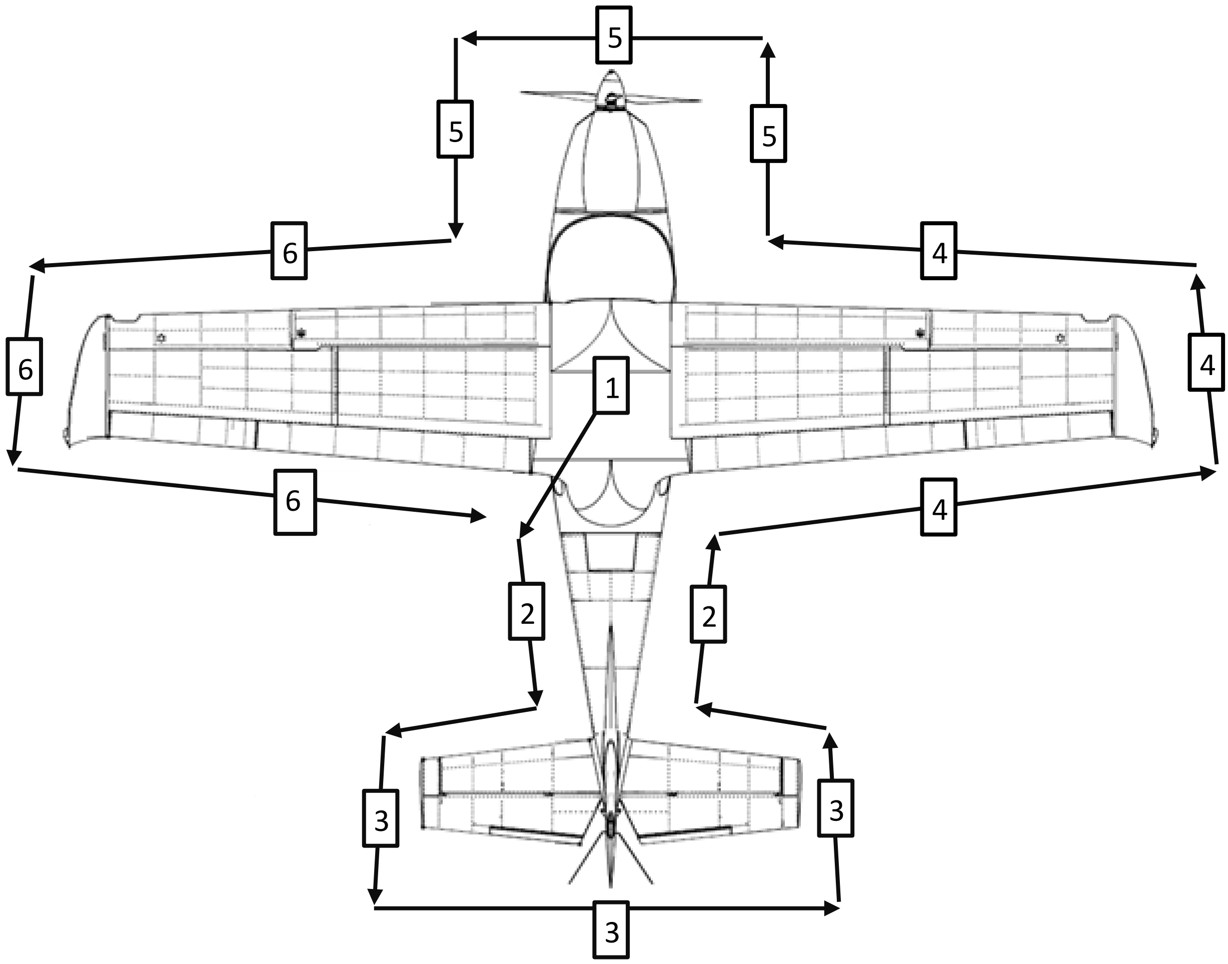
SPEED		KIAS	REMARKS
V_X	Best Angle of Climb Speed	75	The speed (flaps fully retracted) which results in the greatest altitude gain over a given horizontal distance.
V_Y	Best Rate of Climb Speed	80	The speed (flaps fully retracted) which results in the greatest altitude gain over a given time period.
-	Normal Climb Out	80	
V_{ROT}	Rotation Speed	58	The speed at which the aircraft should be rotated about the pitch axis during take-off.
V_{LOF}	Lift-off Speed	60	The speed at which the aircraft generally lifts off from the ground during take-off.
-	Cruise Climb Speed	80 - 90	
-	Approach speed	75 - 80	
V_{REF}	Threshold crossing speed	75	Indicated airspeed at 15 m (50 ft) above threshold, which is not less than $1.3V_{SO}$.

4.3 Pre-flight Inspection

A pre-flight inspection is required prior to every flight. It must also be performed after any incident, accident, maintenance activity etc. Incomplete or careless inspections can result in an accident. Carry out the inspection following the instructions on the Inspection Checklist.

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.



4.3.1 Inspection Checklist

4.3.1.1 Cabin

Ignition...................................... OFF
Master Switch .... ON
Fuel .... VERIFY QUANTITY
Flaps.. FULL DOWN
Avionics..................................... VERIFY CONDITION
Master Switch .... OFF
Controls (all) .... CHECK *(for full, free movement up to stops)*
Harnesses and Seats .... CHECK CONDITION[(a)]
Cabin and Windshield .... CHECK CONDITION *(and cleanliness)*
Door .... CHECK CONDITION
Cockpit .... CHECK FOR LOOSE OBJECTS *(and secure)*
Fire Extinguisher .... VERIFY PRESENT / VALID
Documentation .... VERIFY PRESENT / VALID[(b)]

NOTES

a. Check security of buckles and attachment points. Ensure the seat adjustment mechanism is locked correctly after adjustment.

b. Documents such as current POH, ATF, RF Licence (RSA Only).

4.3.1.2 Fuselage

Surface Condition .... CHECK CONDITION
Wing/Fuselage Fairing .... CHECK
Empennage Fairing .... CHECK
Antenna/e.................................... CHECK CONDITION / SECURITY
Luggage Compartment Door........ CLOSED / LOCKED
Static Source .... CHECK CONDITION

4.3.1.3 Empennage

Tie-Down Rope .... REMOVED
Horizontal Stabilizer..................... CHECK CONDITION
Vertical Stabilizer .... CHECK CONDITION
Elevator....................................... CHECK CONDITION / MOVEMENT
Elevator Trim Tab......................... CHECK CONDITION
Rudder .... CHECK CONDITION / MOVEMENT
Hinges, Bolts, Pushrods................ CHECK CONDITION / SECURITY
Strobe .... CHECK CONDITION

4.3.1.4 Right Wing and Right Main Gear

Wheel Fairing............................... CHECK CONDITION / SECURITY
Wheel and Brakes .... CHECK CONDITION[(a)]
Wheel Struts .... CHECK CONDITION / CRACKS
Chocks .... REMOVE
Flap .... CHECK SECURITY
Flap Hinges, Control Horn, Pushrod .... CHECK CONDITION / SECURITY
Wing Trailing Edge .... CHECK CONDITION
Aileron .... CHECK SECURITY / MOVEMENT
Aileron Hinges, Control Horn, Pushrod ...... CHECK CONDITION / SECURITY
Wingtip .... CHECK CONDITION
Nav Light..................................... CHECK CONDITION
Taxi/Landing Light Lens................ CHECK CONDITION
Wing Leading Edge....................... CHECK CONDITION
Fuel Vent (underside of wing).......... CHECK UNOBSTRUCTED
Fuel Quantity .... CHECK THROUGH FILLER

NOTES

a. Fluid leaks, brake pad and disc condition, tyre condition, tyre inflation (See 4.3.1.7 Tyre Pressure Visual Inspection)

WARNING

Physically verify the fuel level before each take-off. Fuel can be seen, through the filler cap. If the fuel is just covering the (total) bottom of the fuel tank then there is approximately30 litres present.

4.3.1.5 Nose Section and Nose Gear

Engine Cowling .... CHECK CONDITION / SECURITY
Propeller and Spinner .... CHECK CONDITION / SECURITY
Air Intakes.................................... CHECK CONDITION / OBSTRUCTION
Radiators...................................... CHECK CONDITION
Engine Mount .... CHECK CONDITION / SECURITY
Exhaust Manifold......................... CHECK CONDITION
Leaks .... CHECK COWL OUTLETS
Engine Oil..................................... CHECK LEVEL WITH DIPSTICK
Coolant .... CHECK LEVEL[a]
Parachute .... CHECK COVER SECURITY *(If applicable)*
Nose Wheel .... CHECK CONDITION
Chocks .... REMOVE

NOTES

a. DO NOT fill the coolant level to the max mark on the overflow bottle mounted to the firewall. It's best practice to have the fluid level just above the min mark when cold. If there is any doubt about fill level, remove the radiator cap (only when cold) to verify fluid presence.

CAUTION

During the inspection of the propeller , **make sure the ignition is OFF.** Always handle the propeller blade area with the palm of your hand, and not only the tips of your fingers.

4.3.1.6 Left Wing and Left Main Gear

Fuel Quantity ....CHECK THROUGH FILLER
Fuel Vent *(tip of wing)*.................CHECK UNOBSTRUCTED
Wing Leading Edge....................CHECK CONDITION
Pitot Tube ....CHECK CONDITION / UNOBSTRUCTED
Taxi/Landing Light Lens.............CHECK CONDITION
Wingtip ....CHECK CONDITION
Nav Light..................................CHECK CONDITION
Aileron ....CHECK SECURITY / MOVEMENT
Aileron Hinges, Control Horn, Pushrod . CHECK CONDITION / SECURITY
Wing Trailing Edge ....CHECK CONDITION
Flap ....CHECK SECURITY
Flap Hinges, Control Horn, Pushrod ......CHECK CONDITION / SECURITY
Wheel Fairing............................CHECK CONDITION / SECURITY
Wheel and Brakes ....CHECK CONDITION[a]
Wheel Struts ....CHECK CONDITION / CRACKS
Chocks ....REMOVE

NOTES

a. Fluid leaks, brake pad and disc condition, tyre condition, tyre inflation (See 4.3.1.7 Tyre Pressure Visual Inspection)

WARNING

Physically verify the fuel level before each take-off. Fuel can be seen, through the filler cap. If fuel is just covering the (total) bottom of the fuel tank then there is approximately 30 litres present.

4.3.1.7 Tyre Pressure Visual Inspection

The tyres must be visually inspected prior to every flight. It is not necessary to check the pressure of the tyre with a gauge; it is sufficient to visually inspect the tyre.

Correct Inflation	Underinflation
	
	

NOTE

Pay specific attention to the following, when determining whether tyre pressure is satisfactory:

- Outmost tread lines
- Sidewall deflection

4.4 Engine Start and Taxi

4.4.1 Before Engine Start

1. Pre-flight Inspection .... COMPLETE
2. Emergency Equipment................. ON BOARD
3. Passenger Briefing .... COMPLETE
4. Seats .... CORRECTLY ADJUSTED
5. Harnesses .... SECURE
6. Park Brake .... ON
7. Circuit Breakers .... IN

4.4.2 Engine Start

1. Master Switch .... ON
2. EFIS Backup Switch .... ON *(VERIFY BATTERY VOLTAGE)*
3. ECU Backup Switch .... ON
4. Lane A and B Switch .... ON *(CHECK IF WARNING INDICATORS SWITCH ON, THEN OFF WITHIN 3 SECONDS)*
5. Main Fuel Pump .... ON *(CHECK FUEL PRESSURE/ABNORMAL SOUNDS)*
6. Fuel Selector............................. EMPTIEST TANK *(IF NOT EMPTY)*
7. Aux Fuel Pump .... ON *(CHECK FUEL PRESSURE/ABNORMAL SOUNDS)* ..... OFF *(AFTER 5 SECONDS)*
8. Feed Fuel Pump 2..................... ON *(CHECK FUEL PRESSURE /ABNORMAL SOUNDS)* ..... OFF *(AFTER 5 SECONDS)*
9. Main Fuel Pump .... OFF
10. Aux and Feed Pump 2 .... ON *(CHECK FUEL PRESSURE /ABNORMAL SOUNDS)* ..... OFF *(AFTER 5 SECONDS)*
11. Main Fuel Pump .... ON
12. Throttle .... SET *(IN ACCORDANCE TO FIGURE 4.4.2.1. ENGINE PRE-HEATING IS REQUIRED IF AMBIENT TEMPERATURE IS BELOW 10 °C/14 °F.)*
13. ECU Backup Switch .... OFF
14. Propeller.................................. AREA CLEAR
15. Starter .... ENGAGE *(TILL ENGINE SPEED IS ABOVE 1500RPM, ENGAGE STARTER FOR MAXIMUM OF 10 SECONDS)*
16. Throttle .... SET IDLE *(REDUCE THROTTLE IN ACCORDANCE TO FIGURE 4.4.2.1. IF REQUIRED)*
17. Engine instruments .... *(CHECK IF IN RANGE WITH OPERATIONAL LIMITS)*
18. Throttle .... SET *(2500RPM AND HOLD FOR 8 SECONDS, TO ALLOW FOR GENERATOR SWITCHING)*
19. Ignition / Lane Lights .... VERIFY OFF
20. Alternator B.............................. CHECK ONLINE
21. Avionics Switch......................... ON

After Engine Start

1. Engine instruments....................... CHECK *(CHECK IF IN RANGE WITH OPERATIONAL LIMITS)*
2. Throttle.. SET *(+/- 2000 RPM AND HOLD FOR 2 MINUTES)*
3. Throttle.. SET *(+/- 2500 RPM, TILL OIL TEMPERATURE REACHES 50 °C / 120 °F)*
4. Throttle.. SET IDLE

NOTE

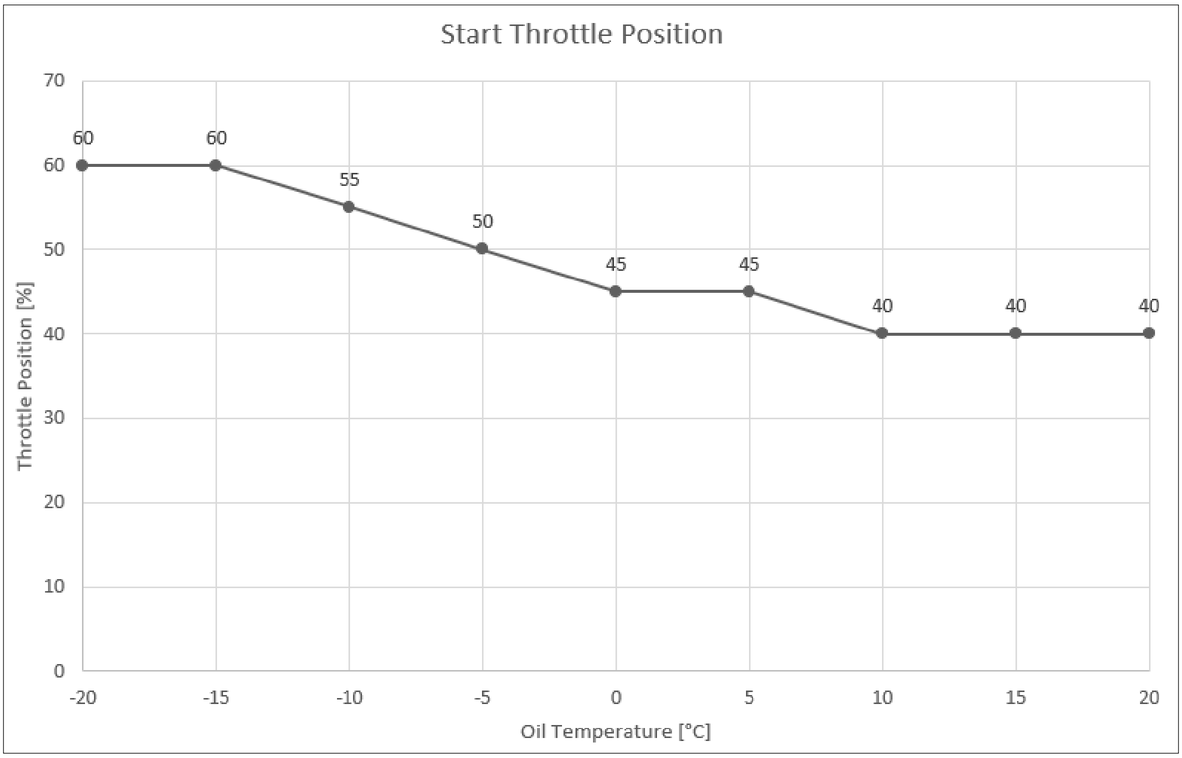
a. Main bus voltage should move up from +/- 12.5V to above 13V when the engine RPM is held above/at 2500 RPM for more than 5 seconds. This is the indication that Alternator B has been brought online by the ECU.

b. When the oil is below 50 °C, the oil filter is bypassed due to the increased viscosity of the oil. Significant throttle settings must not be used during this period, as it may cause damage.

CAUTION

- The starter can be activated for a maximum of 10 seconds, followed by a 2-minute cooling down period.
- Only increase engine speed 10 seconds after start, once oil pressure is steady above 2 bar (29psi).

4.4.2.1 *Start Throttle Position vs. Oil Temperature*



NOTE

Since the engine tends to vibrate substantially with low throttle settings on start-up, start the engine with the throttle set as per the graph above to achieve a throttle RPM of approximately 2,000 rpm.

4.4.3 Taxi

1. Flaps .... UP
2. Brakes...................................... OFF
3. Controls .... INTO WIND OR NEUTRAL
4. Power .... AS REQUIRED
5. Brakes...................................... CHECK AT START OF TAXI

4.5 Before Take-off

To be conducted at a holding point or equivalent –

4.5.1 Run Up & Pre-Take-off

1. Direction.......................... INTO WIND (IF POSSIBLE)
2. Oil Temperature .... ABOVE 50°C
3. Fuel Selector.................... FULLEST TANK
4. Engine RPM .... 5800 RPM
5. Lanes .... B OFF – ON*(a)*
   .... A OFF – ON*(a)*
6. Main Fuel Pump .... MAIN ON, AUX OFF *(CHECK FUEL PRESSURE)*
7. Aux Fuel Pump .... AUX ON, MAIN OFF *(CHECK FUEL PRESSURE)*
8. Fuel Pumps...................... BOTH ON *(MAIN & AUX)*
9. Feed Pump 2 .... ON
10. Propeller.......................... CHECK VP FUNCTIONALITY*(b)*
11. Engine RPM .... 2,500 RPM
12. Trim .... SET NEUTRAL
13. Flaps .... SET STAGE 1 / TAKEOFF
14. Controls.......................... FREE & FULL / CORRECT SENSE
15. Fuel Quantity................... VERIFY *(SUFFICIENT FOR PLANNED FLIGHT)*
16. Circuit Breakers .... ALL IN
17. Switches .... CHECK AND SET AS REQUIRED
18. Instruments..................... CHECK AND SET ALL
19. Engine Parameters .... VERIFY *(TEMPERATURES, PRESSURES, VOLTAGES)*
20. Doors............................... CLOSED / LATCHED
21. Harness .... SECURE *(CORRECTLY FASTENED AND TIGHT)*
22. Brief Passengers .... BRIEF

NOTE

a) Lane Check

Switch off each lane for 15 second, then switch back on. Wait until the lane warning light extinguishes (+/- 3 sec) before proceeding to the next lane / check. No more than 250rpm increase / decrease during check.

The Manifold Air Temperature must be less than 65°C (149°F) during the lane check procedure, otherwise the ECU internal check of the Pressure Control Valve and Wastegate will not be executed.

b) Propeller VP Functionality Check

1. Set Propeller Controller to MAN *(Manual)*
2. Adjust pitch coarse +/-500 rpm
3. Adjust pitch fine +/- 500 rpm
4. Adjust pitch coarse +/- 500 rpm
5. Set propeller controller to AUTO
6. Confirm rpm return to 4,000 rpm

4.6 Take-off

1. Throttle .... FULL OPEN
2. Engine Speed .... VERIFY 5,800 RPM
3. Elevator Control .... NEUTRAL
4. Engine Parameters .... VERIFY *(PRESSURES, TEMPERATURES)*
5. Rotate 58KIAS
6. Airspeed .... 75 KIAS (V_x *used for obstacle clearance)*
   .... 80 KIAS (V_y *normal climb out*)
7. Brakes .... APPLY TO STOP WHEEL SPIN
8. Flaps .... UP *(MIN .65 KIAS / MIN. ALT. 300FT)*
9. Trim .... AS REQUIRED
10. Power .... AS REQUIRED
11. Climb .... COMMENCE

WARNING

Take-off is prohibited if:

- The engine is running rough or intermittently.
- The engine parameters (instrument indications) are outside operational limits.
- The crosswind component exceeds permitted limits (15 knots).

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 5500 RPM applies.

4.7 Flight

4.7.1 Climb

1. Throttle .... GREATER THAN 5,200 RPM
2. Airspeed ....
   .... V_Y – 80 KIAS
   .... CRUISE 80 – 90 KIAS
3. Trim .... AS REQUIRED
4. Engine Parameters .... VERIFY *(PRESSURES, TEMPERATURES)*

CAUTION

If the cylinder head temperature or oil temperature approach their limits, reduce the climb angle to increase airspeed to prevent over-temping the engine.

NOTE

Only use 5,800 RPM when necessary i.e. take-off, emergency climbing.

4.7.2 Cruise

1. Airspeed .... 110 – 125 KIAS
2. Aux Fuel Pump .... OFF
3. Feed Pump .... OFF
4. Throttle .... AS REQUIRED
5. Trim .... AS REQUIRED
6. Fuel................................. SWITCH EVERY HOUR
   (*AUX PUMP ON DURING SWITCH*)

4.7.3 Descent

1. ATIS / Weather .... CHECKED
2. Altimeter .... SET
3. Fuel Selector........................ FULLEST TANK
   (AUX PUMP ON DURING SWITCH)
4. Lights .... AS REQUIRED
5. Seatbelts.............................. CHECKED
6. Approach Brief .... COMPLETE
7. Throttle .... AS REQUIRED
8. Trim .... AS REQUIRED

4.8 Landing

4.8.1 Before Landing

1. Brakes.............................. CHECK PARK BRAKE IS OFF
2. Fuel Pumps...................... BOTH ON *(AUX & MAIN)*
3. Feed Pump .... ON *(BOTH)*
4. Airspeed .... 80 KIAS
5. Flaps .... 1 STAGE ON DOWNWIND
   .... 2 STAGE ON BASE
6. Trim .... AS NEEDED
7. Harnesses .... SECURE
8. Landing Light .... ON

4.8.2 Approach

1. Airspeed .... 75 KIAS
2. Propeller.......................... T.O. (5,800 RPM)
3. Flaps .... FULL ON FINAL
4. Trim .... AS REQUIRED
5. Throttle .... AS REQUIRED[(a)] *(NOT BELOW 3,000 RPM)*

WARNING

The fuel tank pickup point is situated at the bottom of the inboard wall. During normal operations, the dihedral of the wing ensures fuel is always present at the pickup. The aircraft should never be subjected to a sustained side slip towards a near empty fuel tank that is being drawn from. This may expose the pickup point to air, thereby starving the engine and leading to engine stoppage. This is particularly dangerous at low altitudes during an approach.

4.8.3 Normal Landing

1. Airspeed @50 ft .... 75 KIAS
2. Power .... AS NEEDED
3. Flare .... TO MINIMUM FLIGHT SPEED
4. Touchdown .... MAINS FIRST *(HOLD NOSE WHEEL OFF)*
5. Brakes.............................. APPLY AS NEEDED

4.8.4 After Landing (Clear of Runway)

1. Flaps .... UP
2. Aux Fuel Pump .... OFF
3. Feed Pump .... OFF
4. Landing Light .... OFF
5. Transponder .... SET

4.8.5 Engine Shutdown

1. Engine Speed....................................IDLE (+/-1,800rpm)
2. Park Brake ....SET
3. Engine Parameters ....WITHIN LIMITS (wait 2 minutes if increased operating temperature)
4. Lane B..OFF
5. Lane A..OFF
6. Main Fuel Pump ....OFF
7. EFIS..OFF
8. Master ....OFF
9. All Switches ....OFF
10. Fuel Selector....................................OFF

NOTES

At least 5 minutes must pass between landing and shutting down the engine. If the ambient temperature is excessively warm, and causes the coolant temperature to rise, then engine may be shut down prior to the 5-minute mark.

The ECU must be shut off before the fuel pumps to avoid faults and failure entries in the ECU. Shutting down the engine by turning the fuel pumps off is reserved purely for emergency scenarios.

CAUTION

Rapid engine cooling should be avoided during operation. This happens especially during descent and taxi i.e. Low engine RPM scenarios. Under normal conditions, the engine temperatures stabilize during descent and taxi at suitable values to shut down the engine. If temperatures are unstable (high or low), run the engine at +/- 3,000 RPM for a minimum of 2 minutes to stabilize the temperatures prior to shut down.

4.9 Special Procedures

4.9.1 Baulked / Rejected Landing

1. Throttle .... FULL / 5,800 RPM
2. Flaps .... RETRACT SLOWLY
   .... STAGE 1 @70 KIAS
   .... UP @ 75 KIAS, min. 300ft.
3. Aux Fuel Pump .... OFF
4. Trim .... AS NECESSARY
5. Complete circuit for new approach

4.9.2 Short Field Take-off

1. Runway Length................ MEASURED[a] *(WITHIN AIRCRAFT CAPABILITY)*
2. Abort Point .... MARKED
3. Aircraft Weight................ MINIMISE
4. Runway Position............. MAXIMUM POSSIBLE LENGTH AHEAD
5. Elevator and Trim .... NEUTRAL
6. Flaps .... STAGE 2
7. Park Brake .... SET
8. Engine Parameters .... VERIFY *(PRESSURES, TEMPERATURES)*
9. Throttle .... FULL
10. Park Brake .... RELEASE
11. Rotate............................. 55 KIAS
12. Abort .... IF NOT AIRBORNE BY ABORT POINT
13. Climb .... BEST ANGLE (V_X – 75 KIAS)

NOTES

a. Calculate Density Altitude before take-off.

4.9.3 Short Field Landing

1. Approach .... FLAT / UNDER POWER
2. Throttle .... AS REQUIRED
3. Approach Airspeed .... 70 KIAS[(a)]
4. Throttle .... IDLE
5. Flare .... COMMENCE
6. Touch down...................... MAINS FIRST
7. Braking .... HEAVY

If runway overrun is possible –

8. Ignition Lanes .... OFF *(MINIMISE PROPELLER/GEARBOX DAMAGE)*

NOTES

a. Exercise caution approaching at low speeds as the effects of a wind *gust will be amplified.*

4.9.4 Soft Field Landing

1. Crew .... SECURE
2. Flaps .... FULL
3. Approach .... FLAT/ UNDER POWER
4. Approach Speed .... 70 KIAS
5. Flare .... ABOVE THRESHOLD
6. Power .... AS NEEDED
7. Speed .... 60 KIAS
8. Main Wheels .... TOUCH BEFORE STALL
9. Nose Wheel .... HOLD OFF WITH FULL ELEVATOR

4.9.5 Soft Field Take-off

1. Aircraft Weight................ MINIMISE
2. Elevator Trim................... NEUTRAL
3. Flaps................................ STAGE 2
4. Propeller.......................... T.O. (5,800 RPM)
5. Engine Parameters .... VERIFY *(PRESSURES, TEMPERATURES)*
6. Throttle .... FULL
7. Elevator .... FULL BACK *(UNTIL NOSE WHEEL JUST LIFTS)*
8. Rotate.............................. 52 KIAS

4.9.6 Crosswind Take-off

1. Aileron............................. FULL INTO WIND
2. Take-off Procedure.......... NORMAL
3. Aileron............................. REDUCE INPUT AS REQUIRED[a]

NOTES

a. As the aircraft accelerates, the pilot must reduce aileron input to avoid the wing hitting the ground. Only a slight roll angle into the wind is normally required to keep the aircraft tracking true.

4.9.7 Crosswind Landing

1. Approach Procedure .... NORMAL
2. Approach......................... UNDER POWER
3. Final Approach .... LONG
4. Rudder............................. INTO CROSSWIND
5. Flare .... OVER THRESHOLD
6. Wing Roll .... LEVEL
7. Rudder............................. APPLY OPPOSITE
8. Direction.......................... ALIGN WITH RUNWAY
9. Main Gear .... TOUCH DOWN
10. Nose Wheel .... HOLD OFF
11. Brakes.............................. APPLY *(ONCE NOSE WHEEL ON THE GROUND)*

5 Performance

5.1 Introduction

The data presented in this section has been gathered from flight tests performed in the aircraft with the engine in good condition using average piloting techniques.

If not otherwise stated, the performance in this section is valid for:

- Maximum take-off weight of 1,120 kg (2,469.17 lb).
- ISA conditions.
- Rotax 915 iS @ 104 kW (140 hp) [refer to Section 8.8 for 916 iS data]
- Whirlwind Composite Propeller
    - Three Blade, Variable Pitch, 72” Diameter

5.2 Take-off and Landing Distance

5.2.1 Take-off Distances

Surface	Altitude	Mass	Run Distance	15m / 50 ft. Distance
Tar	MSL	1,050kg	250 m / 820 ft	625 m / 2050 ft
		950 kg	*To be tested*	*To be tested*
		850 kg	*To be tested*	*To be tested*
	6,000ft.	1,050kg	250 m / 820 ft	825 m / 2707 ft
		950 kg	*To be tested*	*To be tested*
		850 kg	*To be tested*	*To be tested*

5.2.2 Landing Distance

Surface	Altitude	Mass	Run Distance (Brakes)	15m / 50 ft. Distance
Tar	6,000ft.	1,050kg	225 m / 740 ft	630 m / 2070 ft

5.3 Rate of Climb

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

Altitude	**Rate of Climb**	**Best Rate of Climb Speed (V_Y)**
[ft. ISA]	*[fpm]*	*[KIAS]*
0	700	80
1,000	690	
2,000	685	
3,000	680	
4,000	670	
6,000	655	
8,000	640	
10,000	625	
12,000	610	
14,000	600	
16,000	580	
18,000	570	

5.4 Cruise Speeds

Power	95%[a]		MAX ECO[b]		75%[c]	
Propeller State	Climb 5,500 RPM		Cruise 5,000 RPM		Cruise 5,000 RPM	
Altitude	IAS	TAS	IAS	TAS	IAS	TAS
0	134	134	125	125	117	117
1,000	134	136	124	127	117	119
2,000	133	137	123	128	116	120
3,000	132	139	123	129	116	122
4,000	131	140	122	131	115	123
5,000	130	141	121	132	115	125
6,000	130	143	120	133	114	126
7,000	129	144	120	135	114	128
8,000	128	146	119	136	113	129
9,000	127	147	118	137	113	131
10,000	126	148	118	138	112	132
11,000	126	150	117	140	112	134
12,000	125	151	116	141	111	135
13,000	124	153	116	142	111	137
14,000	123	154	115	144	110	138
15,000	122	155	114	145	110	140
16,000	122	157	113	146	109	141
17,000	121	158	113	148	109	143
18,000	120	160	112	149	108	144

NOTES

a) Maximum continuous power.
b) The Rotax 915 iS uses an automatic switching ECO mode, which has a significant effect on fuel consumption. At lower altitudes, ECO mode is activated below approximately an 80% power setting. At higher altitudes, ECO mode is activated below approximately a 77% power setting. MAX ECO is the power setting just before the engine leaves ECO mode, which results in an approximate fuel consumption change from 28 LPH to 33 LPH in the cruise propeller setting.
c) Cruise information for the Sling 4 HW is tabled using a 75% power setting at 5,000RPM.

5.5 Fuel Consumption

<table>
<tr><th colspan="2">Engine Power</th><th>%</th><th>100%</th><th>95%</th><th>90%</th><th>MAX ECO[b]</th><th>75%[c]</th></tr>
<tr><td colspan="2">Engine RPM</td><td>RPM</td><td>5,800</td><td>5,500</td><td>5,000</td><td>5,000</td><td>5,000</td></tr>
<tr><td colspan="2" rowspan="2">Fuel Burn</td><td>LPH</td><td>43</td><td>39</td><td>37</td><td>28</td><td>27</td></tr>
<tr><td>GPH</td><td>11.4</td><td>10.3</td><td>9.8</td><td>7.40</td><td>7.13</td></tr>
<tr><td rowspan="5">198 Litre Main Tanks
52.3 US gallons</td><td>Endurance</td><td>[hrs]</td><td>3.8</td><td>4.4</td><td>4.7</td><td>6.2</td><td>6.4</td></tr>
<tr><td>Range[c]
1,000 ft.</td><td>[nm]</td><td></td><td>600</td><td>640</td><td>780</td><td>762</td></tr>
<tr><td>Range
5,000 ft.</td><td>[nm]</td><td></td><td>630</td><td>660</td><td>820</td><td>800</td></tr>
<tr><td>Range
10,000 ft.</td><td>[nm]</td><td></td><td>660</td><td>690</td><td>860</td><td>850</td></tr>
<tr><td>Range
12,000 ft.</td><td>[nm]</td><td></td><td>670</td><td>700</td><td>870</td><td>870</td></tr>
</table>

NOTES

Please see previous page for information regarding notes (b) and (c).

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

5.6 Airspeed Indicator System Calibration

IAS *[knots]*	**CAS** [knots] *(average)*	**CAS** *[knots]* *(this aircraft)*
25	20	
30	26	
35	31	
40	37	
45	42	
50	47	
55	53	
60	58	
65	64	
70	69	
75	75	
80	80	
85	86	
90	91	
95	97	
100	102	
105	107	
110	113	
115	118	
120	124	
125	129	
130	135	
135	140	

6 Weight and Balance

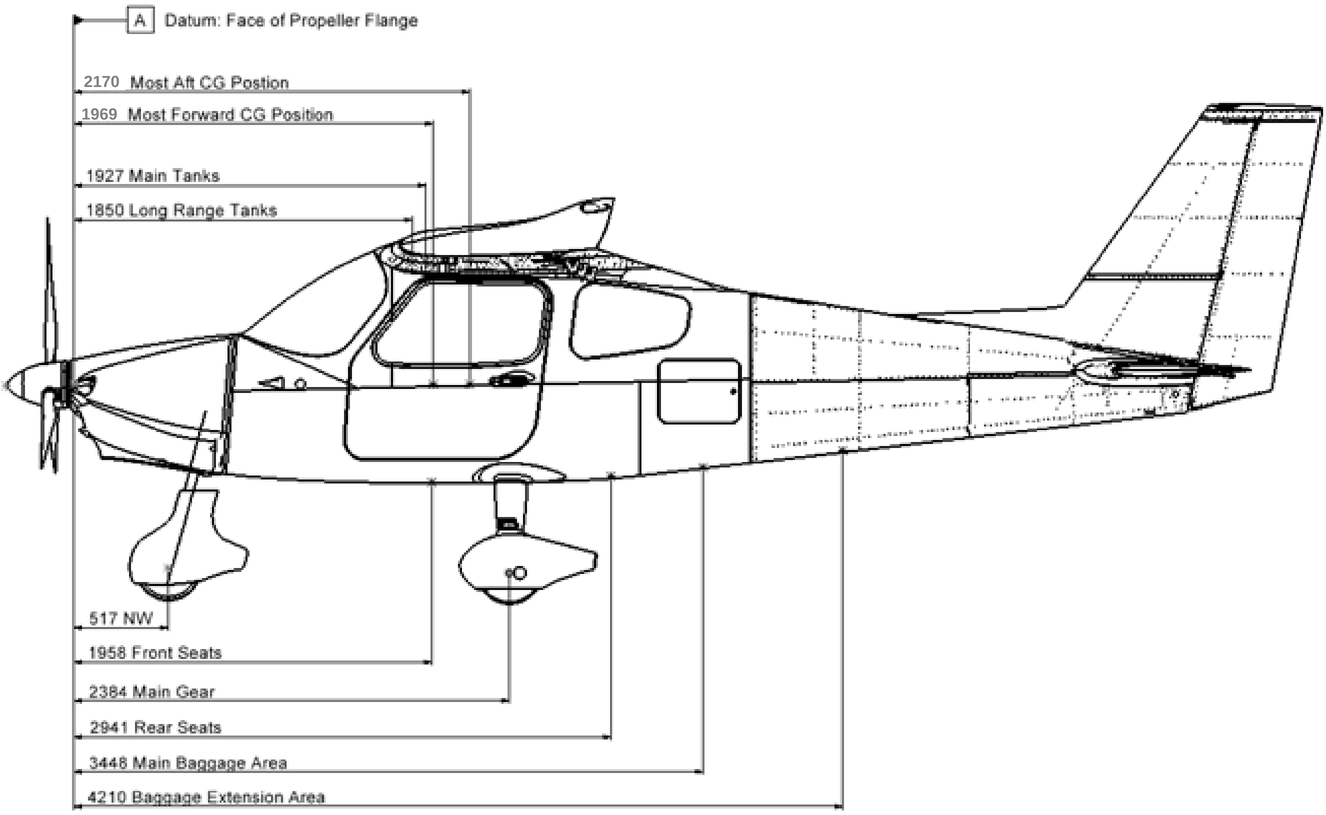
6.1 Introduction

This section details weight and balance information together with payload ranges for safe operation of the aircraft.

6.2 Installed Equipment List

Type	Equipment Item
Standard	Garmin G3X Glass Cockpit
	Garmin GTX 35 Transponder
	Garmin GTR 200 Radio
	3 Ah IBBS Backup Battery
	Electric Flap Controller
	Electric Elevator Trim System
	Magnetic Compass
Optional	Garmin G5 Certified Electronic Flight Instrument
	Garmin GMA 245R Audio System
	Garmin GMC 507 Auto Pilot
	Heated Pitot
	ELT

6.3 Centre of Gravity Arms



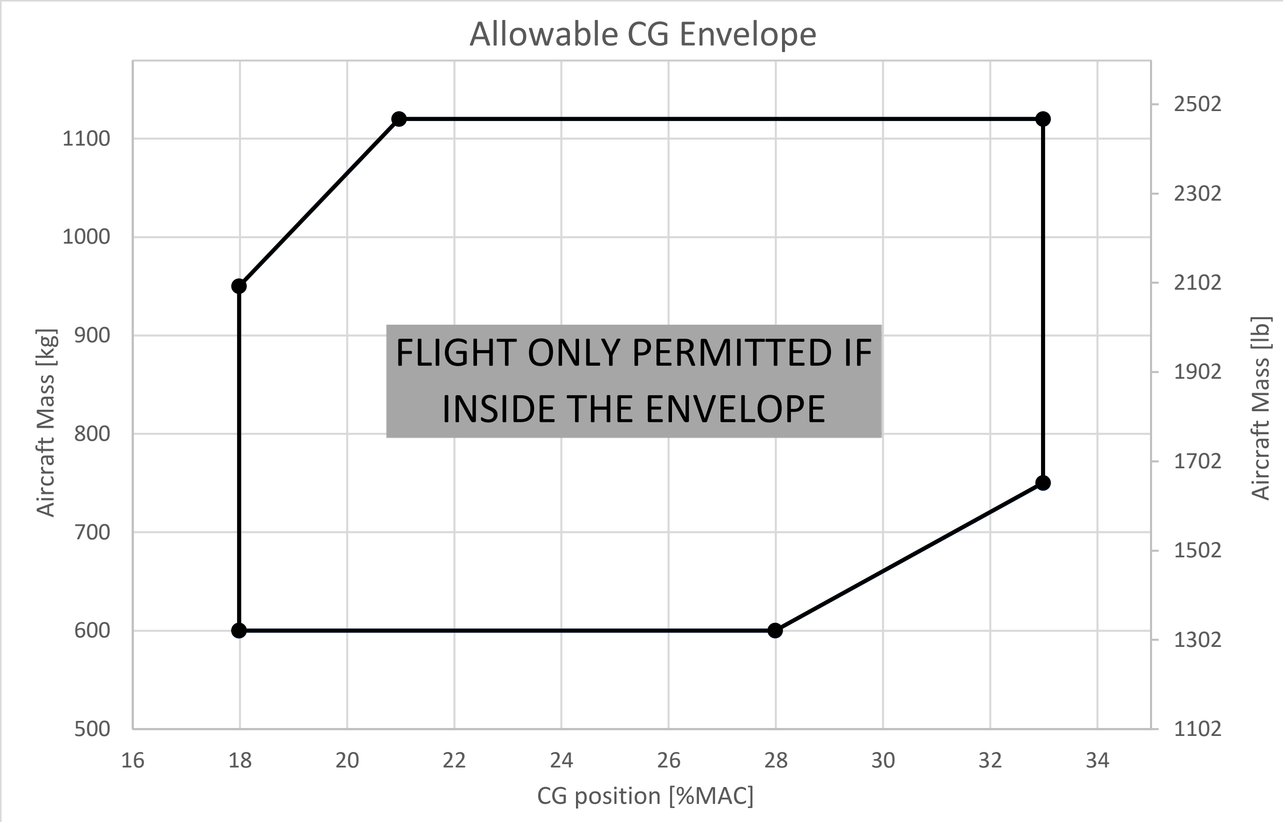
WARNING

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

NOTE

- GC range is 1,969 mm (6.460 ft) to 2,170 mm (7.120 ft) aft of the reference datum (18% to 33% of MAC).
- The leading edge of the wing at MAC is 1,728 mm (5.670 ft) aft of the reference datum.
- The MAC is 1,340 mm (4.396 ft).

6.4 CG Envelope



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

6.5 Determination of CG

Sling Aircraft makes use of a numerical method in calculating the CG of the aircraft. The following will be required to complete a CG check:

#	Item
1	Empty CG Value
2	Blank CG Form
3	Forward CG Check (Take-off)
4	Rear CG Check (Landing)

The principal formula for CG calculation is:

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

The %MAC formulas are:

$$\%MAC = (CG - 1728\ mm) \times \frac{100}{1340\ mm}$$

$$or,$$

$$\%MAC = (CG - 5.67\ ft.) \times \frac{100}{4.40\ ft.}$$

WARNING

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

The aircraft's empty CG is determined in a conventional manner, by weighing the aircraft whilst it is standing level. Refer to the Maintenance Manual for more.

Maximum all up weight (MAUW) = 1120 kg (2469.17 lb)

Maximum useful load (example):

$$W_{max,useful} = W_{MAUW} - W_E$$

$$= 1120kg\ (2469.17lb) - 600kg\ (1322lb)$$

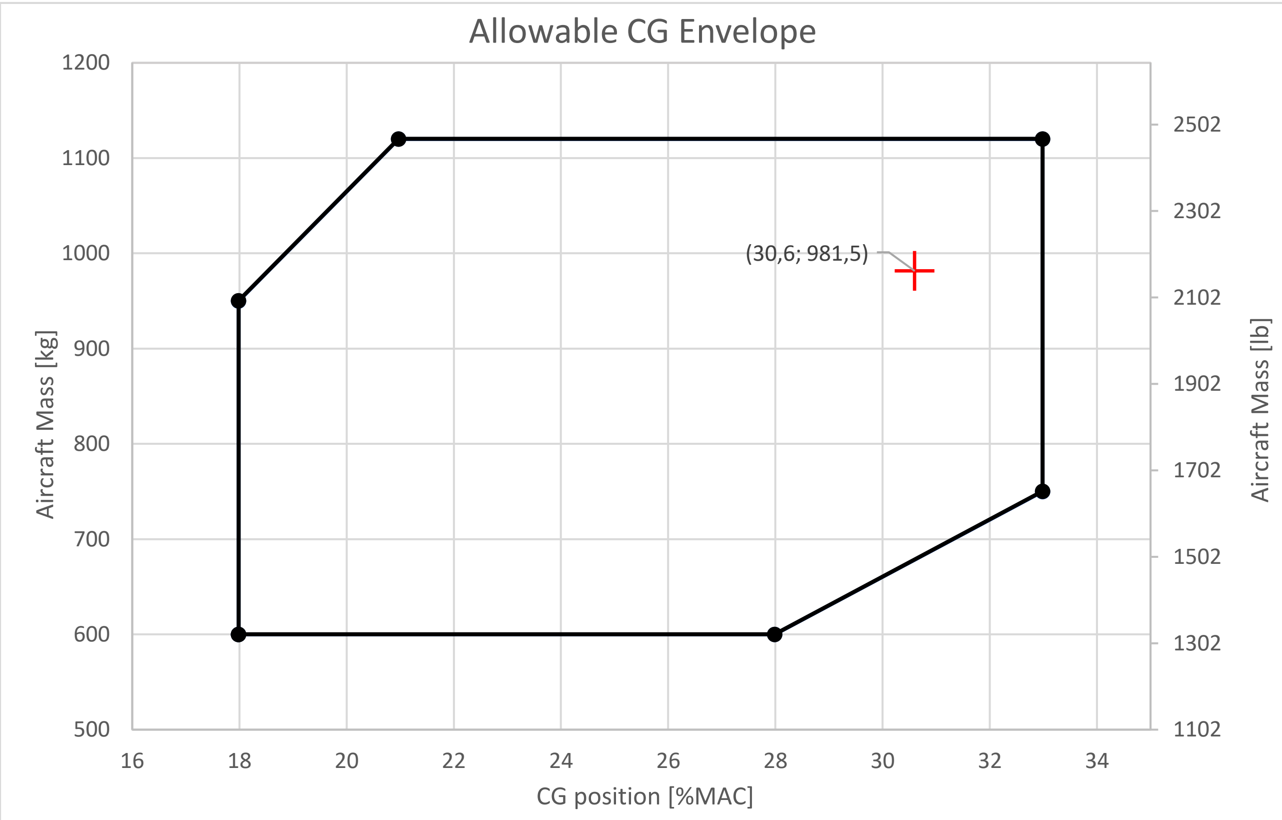
$$= 520kg\ (1146.40\text{lb})$$

6.6 Determination of Empty CG

	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 = 2 384 (7.82)	
	Left Main Wheel	W_L =	L_L = 2 384 (7.82)	
	Nose Wheel	W_N =	L_N = 517 (1.7)	
	Totals	Empty weight: W_E = …………………	-	Aircraft moment: M_0=………………..
	Empty CG	CG = ………………… mm (ft)		

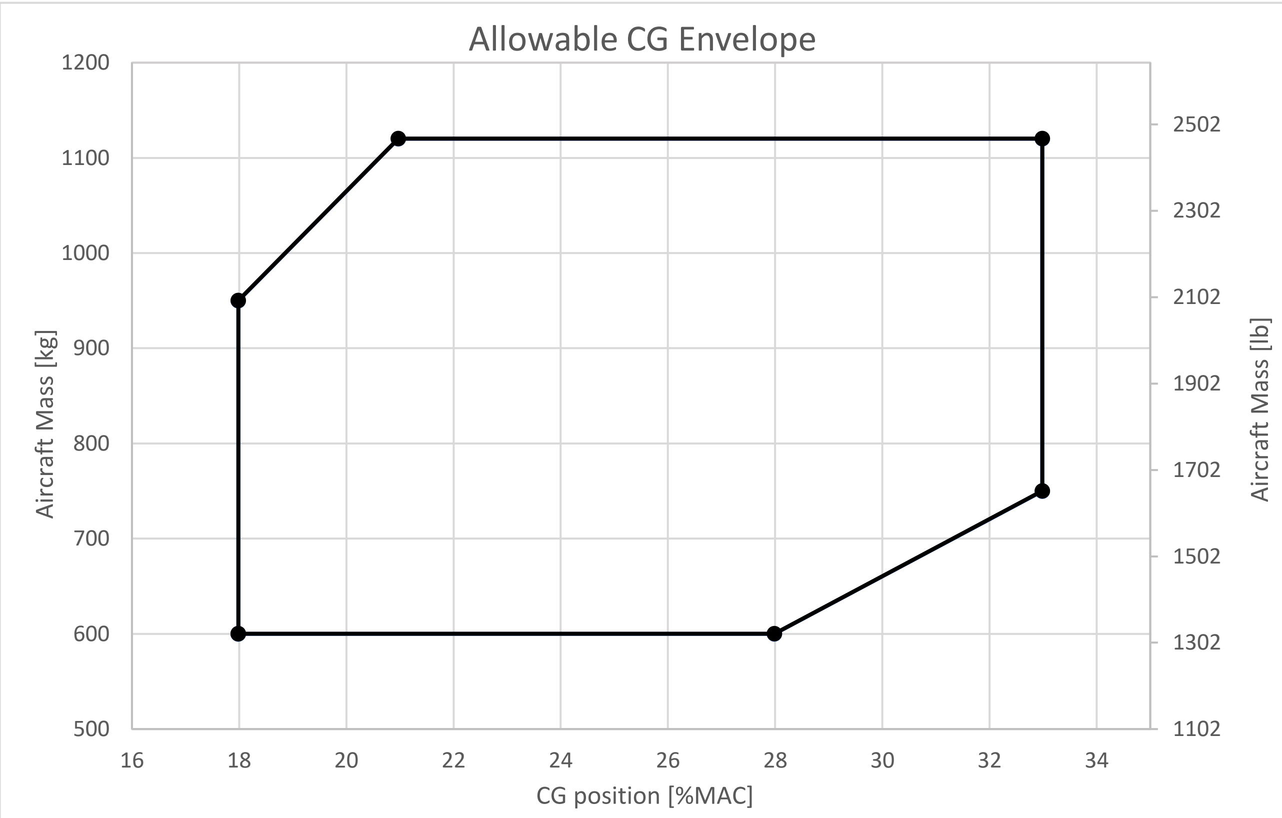
6.7 CG Determination (Example)

	Weight [kg (lb)]	Arm [mm (ft)]	Moment (weight x arm) [kg.mm (lb.ft)]
Crew [Front]	140 (309)	1 958 (6.42)	274 120 (1 982.71)
Passengers [Rear]	120 (265)	2 941 (9.65)	352 920 (2 552.268)
Baggage	15 (33)	3 448 (11.32)	51 720 (374.09)
Baggage Ext.	0	4 210 (13.81)	0
Main Fuel Tanks	106.5 (234.8)	1 927 (6.32)	205 225 (1 484.40)
AC Empty	600 (1 323)	2 025 (6.64)	1 215 000 (8 788.11)
Totals	W_T = 981.5 (2164)	-	M_T = 2 098 985 (15 182)
			CG = 2 138.6 mm
			CG = 30.6 %MAC



6.8 Blank CG Form and Graph for Use

	Weight [kg (lb)]	Arm [mm (ft)]	Moment (weight x arm) [kg.mm (lb.ft)]
Crew [Front]		1 958 (6.42)	
Passengers [Rear]		2 941 (9.65)	
Baggage		3 448 (11.32)	
Baggage Ext.		4 210 (13.81)	
Main Fuel Tanks		1 927 (6.32)	
AC Empty			
Totals	W_T=	-	M_T =
			CG =
			CG = %MAC



7 Aircraft and Systems

7.1 Airframe

The Sling 4 HW has a composite and metal construction with single curvature stressed aluminium alloy skins riveted to stiffeners. Construction is of 6061-T6 aluminium alloy sheet metal riveted to angles, of the same material, with high quality blind rivets. This high strength aluminium alloy construction provides long life and low maintenance costs, thanks to its durability and corrosion resistance characteristics. The fuselage section of the aircraft is composite with an aluminium wing carry-though section above the passenger's heads. The wing has a high lift airfoil (NACA 2414) and is equipped with semi-slotted fowler type flaps.

7.2 Control System / Pilot Controls

7.2.1 Control Column(s)

The aircraft is equipped with dual control sticks, which manipulate two of the three control axes: pitch (elevator) and roll (aileron). The stick has the following button allocations:

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

7.2.2 Rudder Pedals

The aircraft is fitted with dual rudder pedals, which control the rudder and the nose wheel, for yaw control in flight and directional control while on the ground.

7.2.3 Brake Controls

7.2.3.1 Brake Lever –

The braking system is typically a single hydraulic master cylinder acting on both wheels of the main landing gear, through a disk/calliper arrangement. Activation of the brakes is via the lever located on the cabin's centre console.

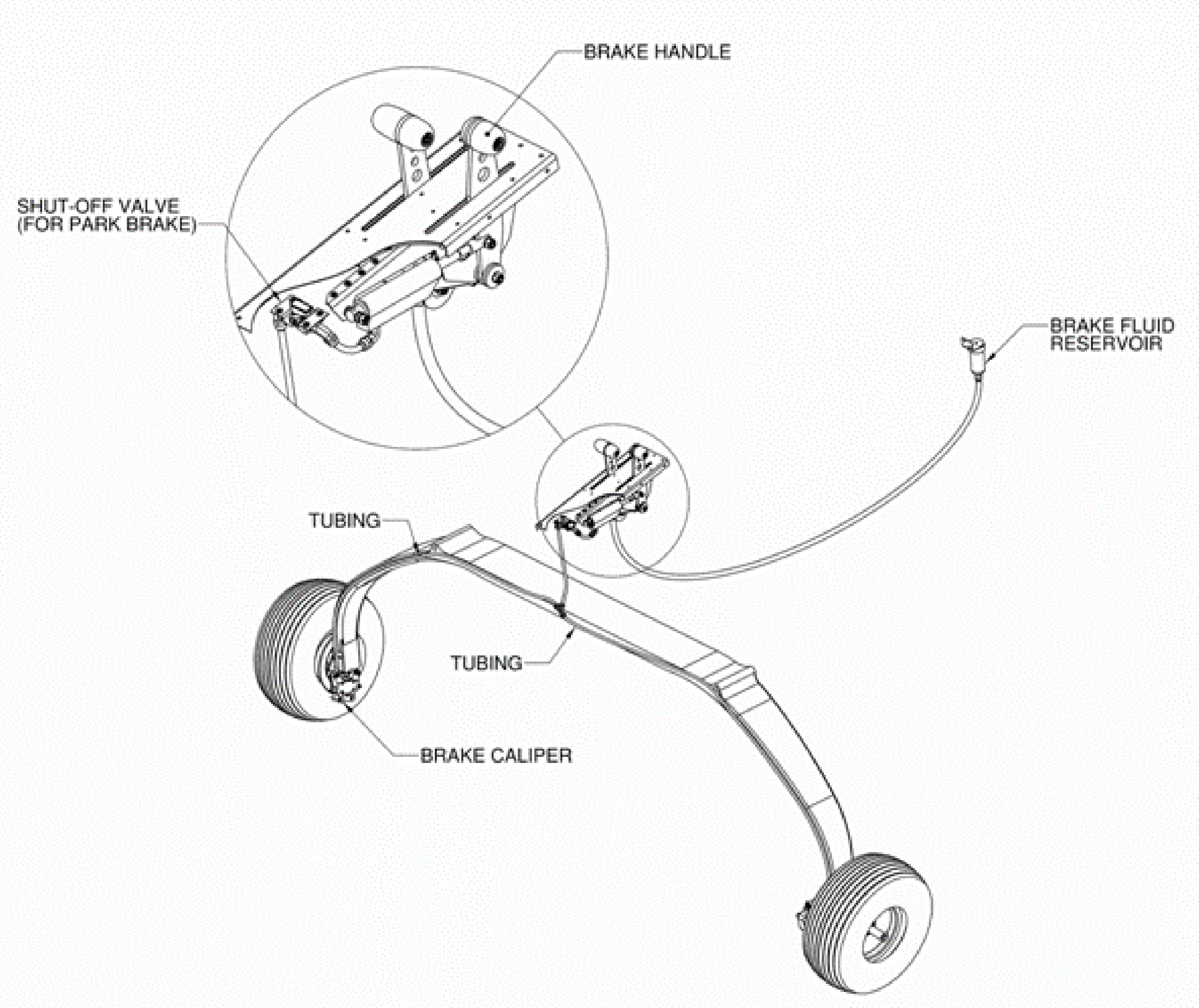
7.2.3.2 Toe Brakes –

A differential foot-controller braking system may also be fitted as an option. In this case, each brake calliper is separately actuated by way of two master brake cylinders fitted to each pedal; with the right pedal actuating the right calliper, and left pedal the left calliper.

7.2.3.3 Park Brake –

The park brake is typically an intercept valve, which stops pressure relief when pressure is removed from the brake lever/toe brakes. For normal braking operation, the intercept valve must be off.

7.2.3.4 Brake System Diagram



7.2.4 Throttle Lever

The aircraft makes use of a single lever power system, as the propeller is normally only ground-adjustable and mixture is controlled by the ECU.

Refer to 7.7 Cockpit Layout for more information.

7.2.5 Fuel Selector Valve

Fuel tank feed selection is enabled by a red coloured, three-position (LEFT, RIGHT, OFF) rotary selector valve, located at the bottom centre of the instrument panel. Refer to in 7.7 Cockpit Layout, for the location of the selector.

An additional knob must be activated to move the selector, through a detent, to the OFF position. This prevents accidental closure of the valve (OFF position).

7.2.6 Ballistic parachute (if fitted)

The red coloured activation lever is located at the bottom centre of the instrument panel.

The accidental operation of the lever is prevented by a locking pin, which is tagged with a red flag.

Standard Sling 4 High Wing
This pin must be removed before flight.

7.2.7 Electrical equipment / 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 (main bus) to EFIS system on/off.	UP ON DOWN OFF
EFIS BKUP	Connects EFIS to EFIS back-up battery.	
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 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 A magneto/ignition source.	

7.2.8 EFIS

The EFIS selection and control mechanism is described in detailed in the EFIS manufacturer documentation. Please refer to this documentation. Refer to 7.2.8 EFIS for more information.

7.2.9 Elevator Trim

Elevator trim is electrically controlled by buttons on the control column, and these buttons are detailed in 7.2.1 Control Column(s).

The trim motor is located in the left elevator (if facing forward) and drives the trim tab. Pilot controls are via buttons on the control column, as detailed in 7.2.1 Control Column(s). The trim servo is powered by the main bus, though a circuit breaker.

7.2.10 Flap Control

Wing flaps are electrically controlled by a four-position rotary knob or a four-pushbutton sector located on the instrument panel. Each selector position corresponds to the following flap deflection:

Selector position	Degrees flap deflection
0	0°
1	12°
2	22°
3	32°

The flap system makes use of an interconnected torque tube, with a servo in the cabin centre console. Bar a linkage failure, this prevents the flaps being deployed in an unsymmetrical manner.

The flap controller is powered from the main bus, via a circuit breaker.

CAUTION

If power on the main bus fails, the flap and trim system becomes defunct.

7.2.11 Cabin Heat

Heated air, warmed by the heat exchanger with the engine exhaust, can be controlled via the heater box control panel, located on the roof of the cockpit.

7.3 Landing Gear

The landing gear is a tricycle landing gear with a steerable nose wheel, regardless of braking architecture. The main landing gear uses two composite spring sections.

7.4 Safety Harness and Seats

The aircraft features side-by-side seating. three-point safety belts are provided for each front seat, whereas the back seats don't have shoulder harnesses. Front seats can be adjusted forwards and backwards, with electrical actuators which allow the seat to be adjusted vertically.

CAUTION

Ensure that the seat(s) is 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.

7.5 Baggage Compartment

The baggage compartment comprises of two sections, main baggage and golf club extension, positioned behind the seats and is designed to carry up to 35 kg (77 lb) in total.

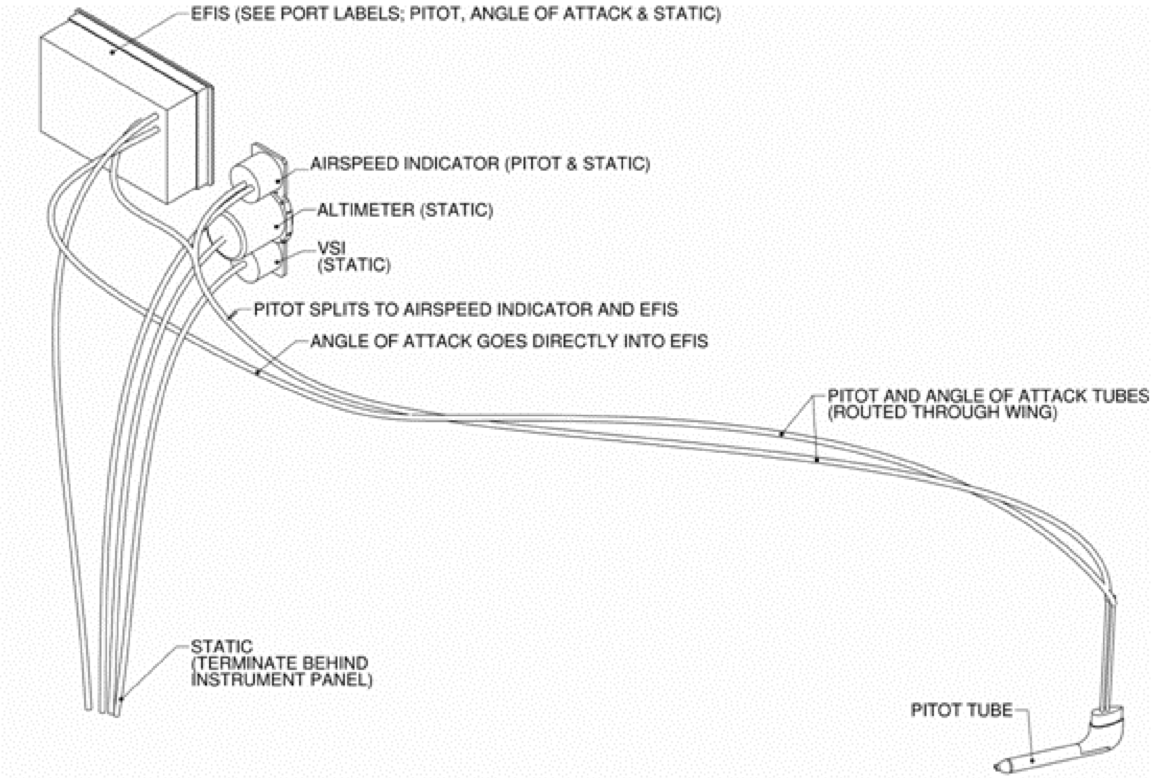
It is the pilot's obligation to ensure that the aircraft CG is within the permissible limits and that all baggage must be properly secured.

7.6 Pitot and Static Systems

A pitot tube is located below the left wing, and the relevant pressures, experienced by the pitot, are transferred to the instrument through flexible hoses. The pitot features a second hole for the 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.

An example of a pitot static system is shown below:

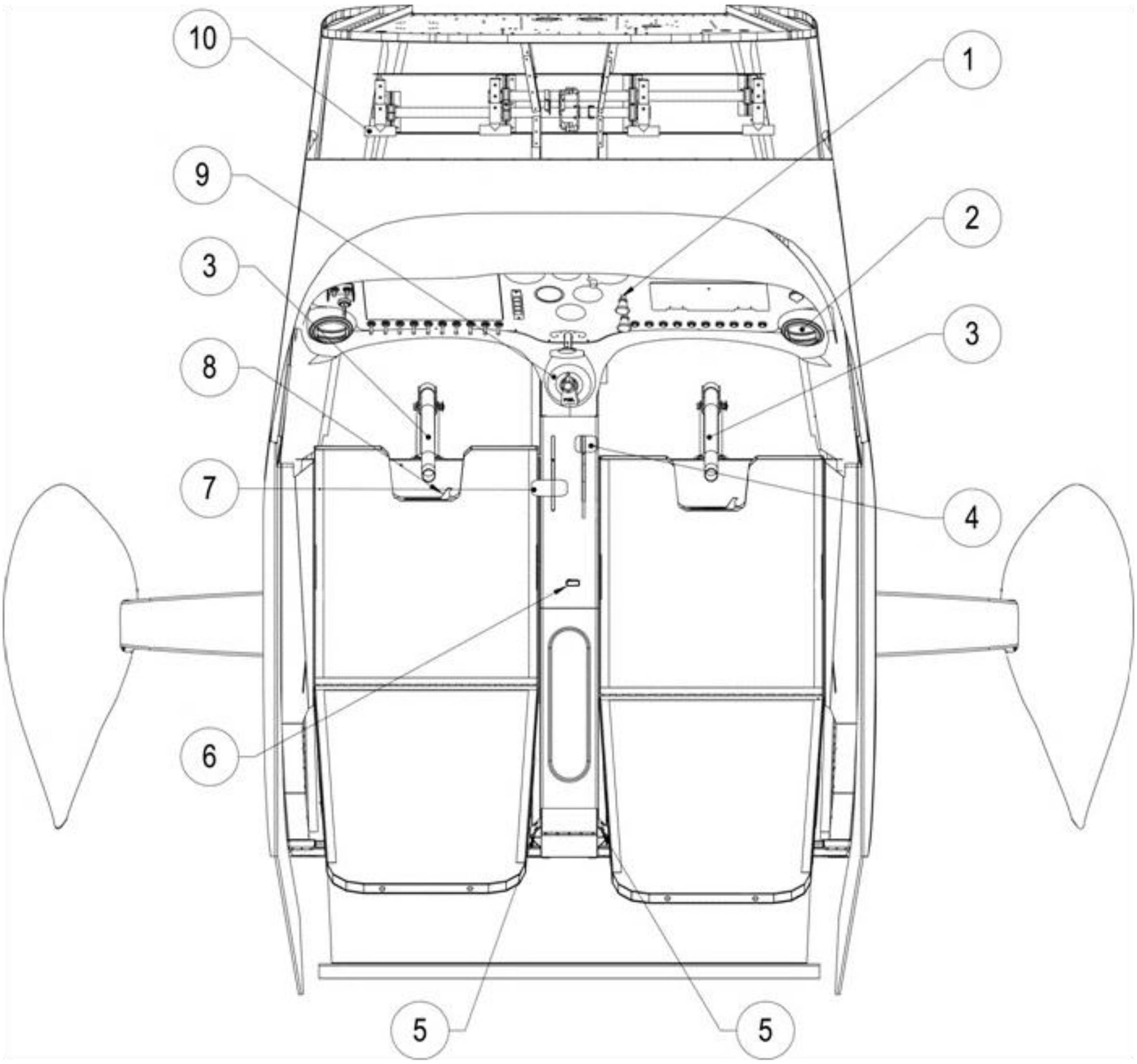


NOTE

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

7.7 Cockpit Layout

The basic cockpit layout is the same for all Sling 4 HW aircraft, notwithstanding that instrumentation may differ substantially. All airplanes contain the minimum instrumentation, but particular airplanes may contain additional instrumentation. The basic cockpit layout is configured as in the diagram, with key, below:



Cockpit Layout Key	
1	Instrument panel
2	Air vent
3	Control Stick (With PTT, Trim, AP Control)
4	Brake actuator (if footbrake not fitted)
5	Headset plugin sockets
6	Park-brake actuator valve
7	Throttle
8	Seat adjustment lever
9	Fuel selector valve
10	Rudder pedals (with brakes if footbrakes are fitted)
11	Ballistic parachute operating lever
12	Fire extinguisher

NOTE

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

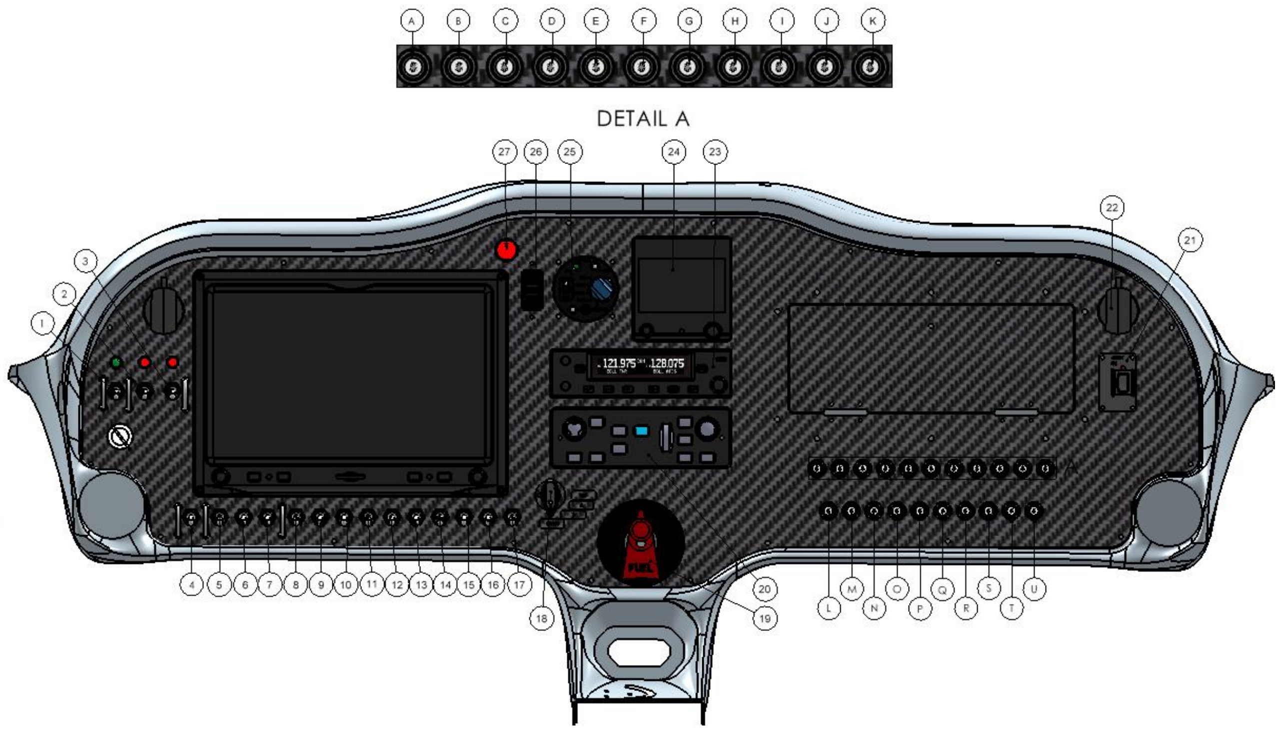
Seats and pedals are adjustable. There is an unlocking lever that allows the movement of the seat, and a locking/setting bolt that allows movement of the pedals.

A fire-extinguisher is held in place against the front retaining wall of the baggage space.

An adjustable red interior light is positioned behind and between the pilot and passengers’ heads.

7.8 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 below, as choice of instruments and layout is decided by the customer. It is the responsibility of the pilot to ensure that they are familiar with the instrumentation in the aircraft, its layout and operation.



ELECTRONICS	
FLAP CONTROLLER	18
FUEL SELECTOR	19
GMC 307 CONTROL UNIT	20
ELT	21
12 V POWER PORT	22
RADIO (GTR 200)	23
GARMIN G5	24
PROPELLER CONTROLLER	25
PROPELLER CONTROL SWITCH	26
EFIS WARNING LIGHT	27

Key containing switches and circuit breakers for standard panel configuration:

SWITCHES	
MASTER	1
LANE A	2
LANE B	3
ECU BACKUP	4
MAIN/FEED PUMP	5
AUX PUMP	6
TRANSFER PUMP	7
EFIS BACKUP	8
EFIS 1	9
EFIS 2	10
PROP	11
AVIONICS MASTER	12
LANDING LIGHTS	13
STROBE LIGHTS	14
NAV LIGHTS	15
WIG-WAG LIGHTS	16
AUTO PILOT	17

CIRCUIT BREAKERS	
FUSEBOX	A
ECU	B
PROP	C
GEA 24	D
GSU 24	E
AUX POWER	F
FEED PUMP	G
BACKUP BATTERY	H
GAD 27	I
FLAP	J
TRIM	K
EFIS 1	L
EFIS 2	M
CAB/INST	N
NAV/STROBE	O
LAND/TAXI	P
AUDIO PANEL	Q
COM1	R
XPDR	S
AUTO PILOT	T

7.8.1 EFIS System

The Garmin G3X multifunction “Glass Cockpit” instrument is the standard EFIS used by Sling Aircraft. This instrument incorporates a range of different instruments and functions. The full instrumentation provided by the EFIS will typically include, but not limited to:

Feature	**Comment**
Speeds	• ASI, IAS and TAS • Ground Speed
Altitude	• ALT • Height Above Ground *(Dependent on loaded maps)*
VSI	• Vertical Speed Indicator
Compass	-
Attitude Indicator	-
Turn Coordinator	-
G-Meter	-
Time	• Clock and Stopwatch • Flight Time Recorder
Autopilot	• If servos are fitted
GPS Navigation	• Comprehensive mapping and navigation software and data, including GPS and GLS (GPS Landing System)
Engine Monitoring	• RPM Indicator • CHT and EGT Indicators • Coolant Temperature • Oil Temperature and Pressure indicators • Fuel Level, Flow and Pressure Indicators • Hobbs and Flight Time Recorder • Voltmeter

The EFIS installed can be powered from two separate systems:

- Main Bus
    - Through the main EFIS switch, labelled “EFIS”
- Back-up Battery
    - Through the selection switch, labelled “EFIS BKUP”
    - It is recommended that **BOTH** the main and the back-up switches are kept on during operation of the aircraft. This will ensure that, if there is a power failure on the main bus, the EFIS will automatically change over to the battery.

Note – Use and set-up of the EFIS and its features extensively described in documentation supplied with the unit and will not be dealt with in this handbook.

The autopilot functionality is incorporated in the EFIS.

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.

7.8.2 Minimum Instruments and Equipment Required for Flight

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

#	Item
1	Altimeter
2	Airspeed Indicator
3	Compass
4	Fuel Gauges
5	Oil Pressure Indicator
6	Oil Temperature Indicator
7	Cylinder Head Temperature Indicator
8	Outside Air Temperature Indicator
9	Tachometer
10	Chronometer
11	First Aid Kit *(Compliant with Local Regulations – not required in US)*
12	Fire Extinguisher

WARNING

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.

7.9 Engine

The engine fitted, as standard, is the Rotax 915 iS. 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 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 2.54, and features an integrated shock absorber. The engine will continue to run after an alternator ***or*** battery failure. Please see 3.7.4 Alternator / Charge System Failure for more information.

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

7.10 Cooling System

Cylinders are air-cooled through forced air circulation, from the inlets on the nose of the cowl, over cooling fins on the barrels.

Cylinder heads are liquid cooled via a closed-circuit system, with an expansion tank. The pump is driven from the camshaft and circulates the coolant in the loop (cylinder heads / radiator).

The expansion tank is closed by a pressure cap. When the coolant temperature rises, there is a pressure increase and coolant is forced into the overflow bottle, mounted to the firewall. When the coolant cools down, the coolant in the overflow bottle is drawn back into the expansion tank.

Conventional ethylene glycol coolant and distilled water mixture (1:1) may be used. Please refer to the latest edition of the engine manufacturers operators and maintenance manual.

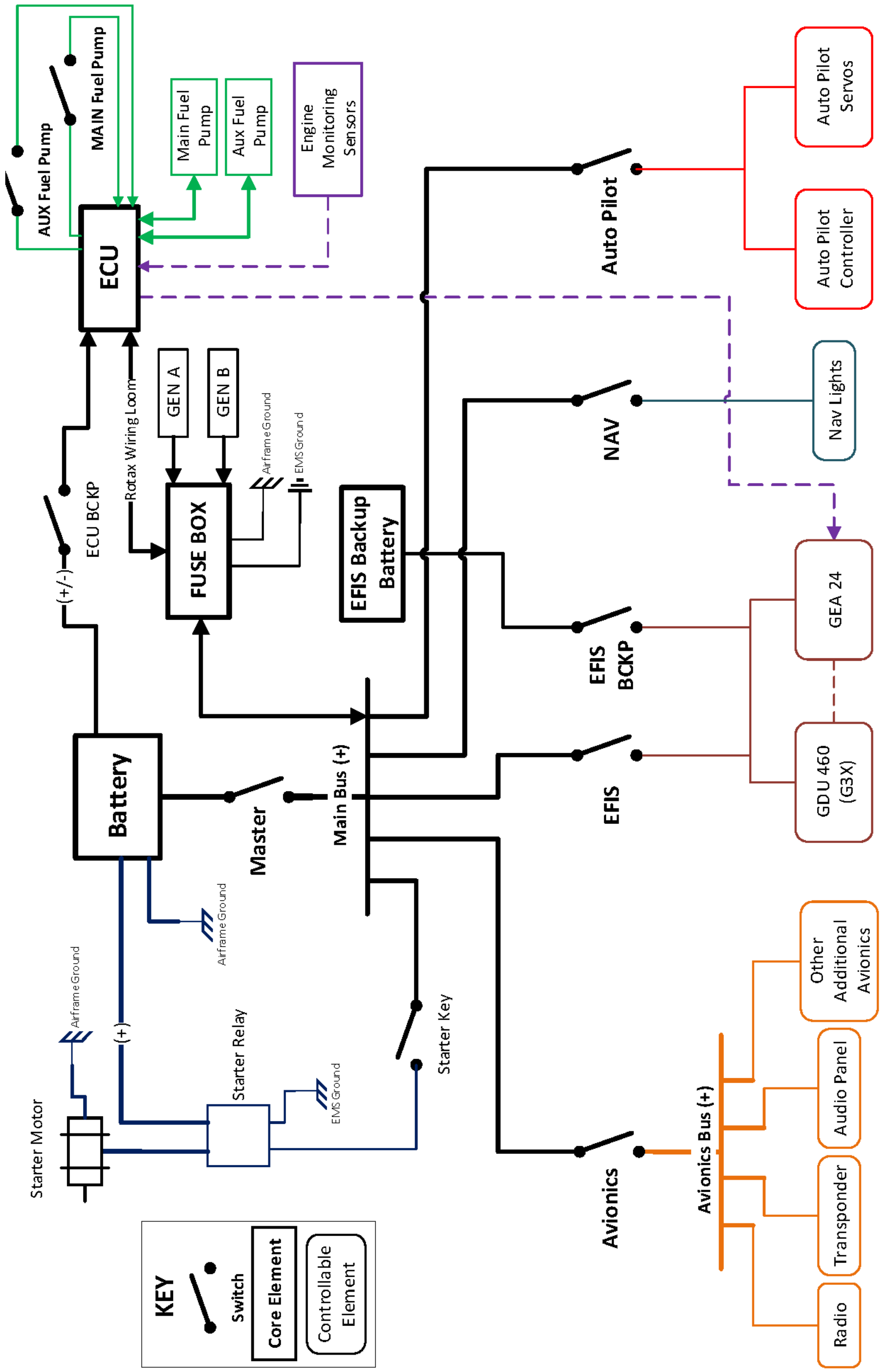
The coolant volume is approximately 2.5 litres (0.66 US Gal.)

WARNING

Waterless coolant *(propylene-glycol)* may not be mixed with conventional *(ethylene-glycol/water)* coolant or additives. Mixing can lead to damage of the cooling system and subsequently the engine.

7.11 Electric System

7.11.1 Broad Overview Diagram



7.11.2 Charge System

The alternating current (AC) output of the two alternators (A and B) is passed through a rectifier, where it is converted to direct current (DC) for the aircraft systems. The charge system output is approximately 13.5 to 14V (from 1000 +/- 250 rpm and higher). When a third external alternator is installed, the output is used to charge the battery through a breaker switch.

7.11.3 Main Battery

The 12V, 17 Ah main battery is mounted on the engine side of the firewall.

7.11.4 Main Bus

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

#	Item
1	Autopilot (specifically, the servos)
2	Flaps
3	Radio
4	Transponder
5	Cabin Lights
6	Strobe, navigation, landing and taxi lights.
7	EFIS (unless powered by the EFIS battery back-up)
8	Trim
9	Prop. pitch control
10	Feed Pump
11	Cabin heater
12	Transfer pump (if long range fuel tanks in use)

7.11.5 EFIS Back-up Battery / Circuit

The 12V EFIS back-up battery is mounted on the cabin side of the firewall, under the instrument panel.

7.11.6 Master and Starter Switches

The master switch is a toggle switch located on the left side of the instrument panel. It links the main bus to the 12V battery / charge system.

The starter switch is a key switch that is mounted on the left side of the instrument panel. It activates the starter motor.

7.11.7 Ignition Switches

Two ignition switches, one for each system, are located on the left-hand side of the panel. The switches are marked as ‘LANE A’ and ‘LANE B’ and are two separate ignition circuits.

NOTE

The engine 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. The 915 iS engine requires adequate power supply to at least one electrical fuel pump to remain operational (to prevent fuel starvation).

7.11.8 Electrical Equipment Switches

Lever type switches are used, and are ON in the UP position, and OFF in the DOWN position. There are exceptions to this, for instance, the taxi light switch is a three-way switch, i.e. ON-WIG WAG-OFF.

7.11.9 Circuit Breakers

Circuit breakers are push-to-reset (i.e. push in) for restoring/supplying electrical power to their corresponding electrical circuits. Circuit breakers are located on the instrument panel.

7.12 Propeller

7.12.1 Introduction

The propeller system makes use of two components from two different manufactures, namely:

1. Constant Speed Hub
    a. Airmaster AP 430 Constant Speed Hub
2. Propeller Blade
    a. Whirlwind WWR772B, 3-blade, nickel leading edge, composite propeller

NOTE

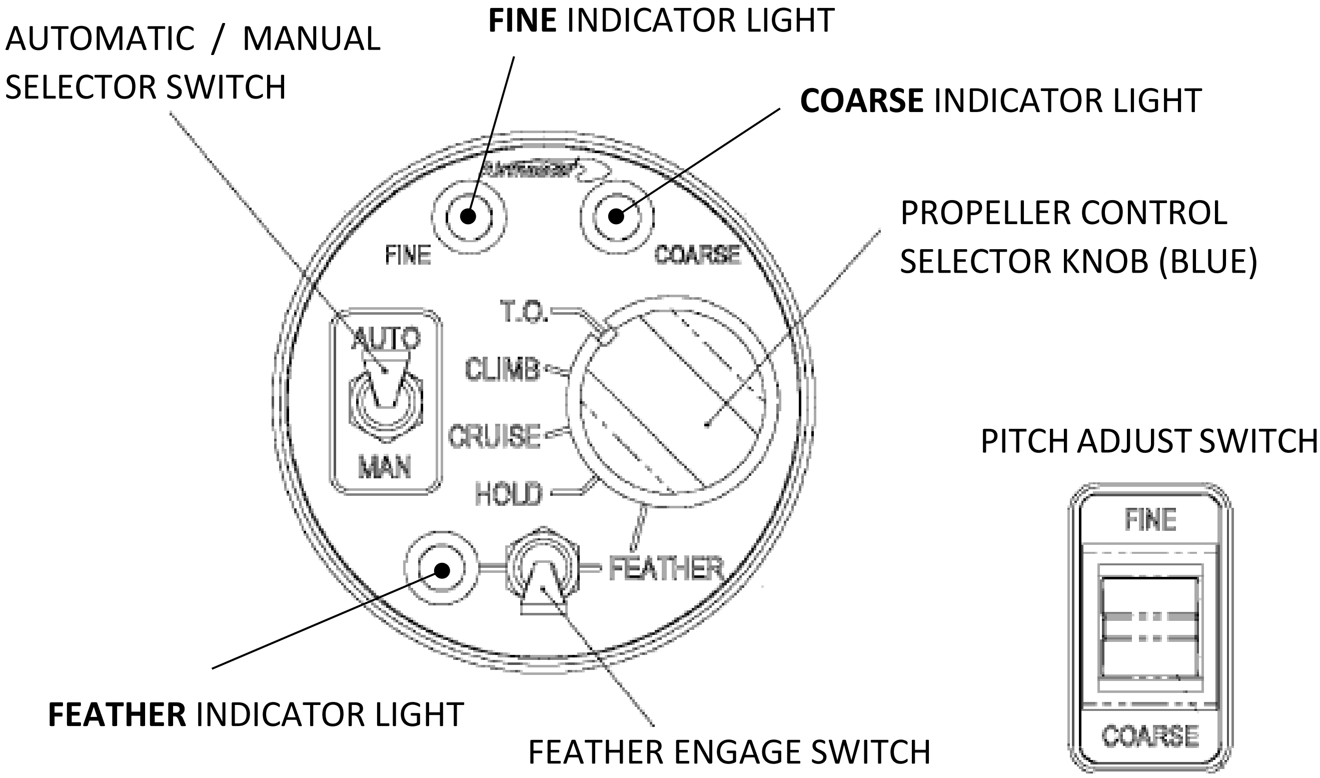
For technical data refer to documentation supplied by the propeller manufacturer.

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 labelled PROP, located on the instrument panel.

7.12.2 Propeller Controller

7.12.2.1 Diagram



7.12.2.2 Operation of the propeller controls

- The power switch, labelled **PROP**, located on the instrument panel. This switch activates/deactivates the power supply to the propeller control unit and propeller pitch adjustment motor.
- Automatic/Manual **[AUTO/MAN]** selector switch, located on the propeller controller, changes the propeller mode between automatic and manual.
    - **AUTO** – Automatic mode operation allows constant speed governing in pre-set modes i.e. Take-off, climb, cruise and hold.
    - **MAN** – manual mode operation allows direct control over the propeller pitch, allowing the propeller to become a more traditional in-flight variable pitch propeller.

- **Propeller control selector**, the blue rotary knob, allows the pilot to change between pre-set propeller settings. This knob has no effect when manual [MAN] is selected on the automatic/manual selector switch. These pre-set setpoints are:
    - **T.O.** – Use for take-off and landing.
    - **CLIMB** – Use for climbing and any other operations where continuous high-power settings are required.
    - **CRUISE** – Use for cruise and normal operation.
    - **HOLD** – Use for constant speed governing at a pilot selected speed not a part of the options above.

- **Feather engage switch** is active when the AUTO mode is selected on the automatic/manual selector switch, and the propeller control selector is set to FEATHER. Engaging this switch will initiate the automatic feathering of the propeller.

- **Manual propeller control** switch is a toggle button, located separately from the propeller controller unit on the instrument panel. This switch allows:
    - Direct control of the propeller pitch when manual mode (MAN) is selected with the automatic/manual selector switch.
    - Moving the switch up moves the propeller in the fine direction. The fine indicator light should be illuminated orange during this operation.
    - Moving the switch down moves the propeller in the coarse direction. The coarse indicator light should be illuminated orange during this operation.
    - With the automatic/manual switch set to AUTO, and the propeller control selector knob selected to HOLD, the switch (manual propeller control) is used to set a pilot selected propeller governing speed.
        - Actuate the switch to change the propeller pitch in the direction desired. When the desired rpm is reached, release the switch. The propeller/engine will be governed to that speed.
        - 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.

7.12.2.3 Indicator Lights

Information conveyed to the pilot by the propeller system is through three lights located on the propeller controller, namely Coarse, Fine and Feather indicator lights. The following table lists the various propeller status indications provided by the lights.

Indicator Light		***Propeller Status***
FINE	Orange	Pitch decreasing
	Orange Flashing	No speed signal
	Green	Fine pitch limit
	Green Flashing	Pitch motor engaged at fine pitch limit
	Red	Over-current while pitch decreasing
COARSE	Orange	Pitch increasing
	Green	Coarse pitch limit
	Green Flashing	Pitch motor engaged at coarse pitch limit
	Red	Over-current while pitch increasing
FEATHER	Orange	Pitch Increasing in Feather
	Green	Feather pitch limit
	Green Flashing	Pitch motor engaged at feather pitch limit
	Red	Over-current while pitch increasing in feather
ALL	Red Flashing	Open circuit failure
	Rapid-Red Flashing	Controller software fault

When the propeller is in manual mode, many of the indicator lights will still operate.

7.13 Fuel System

The aircraft makes use of two main fuel tanks, located in the leading edge of each wing. Each tank has a volume of 99 litres, leading to total volume of 198 litres.

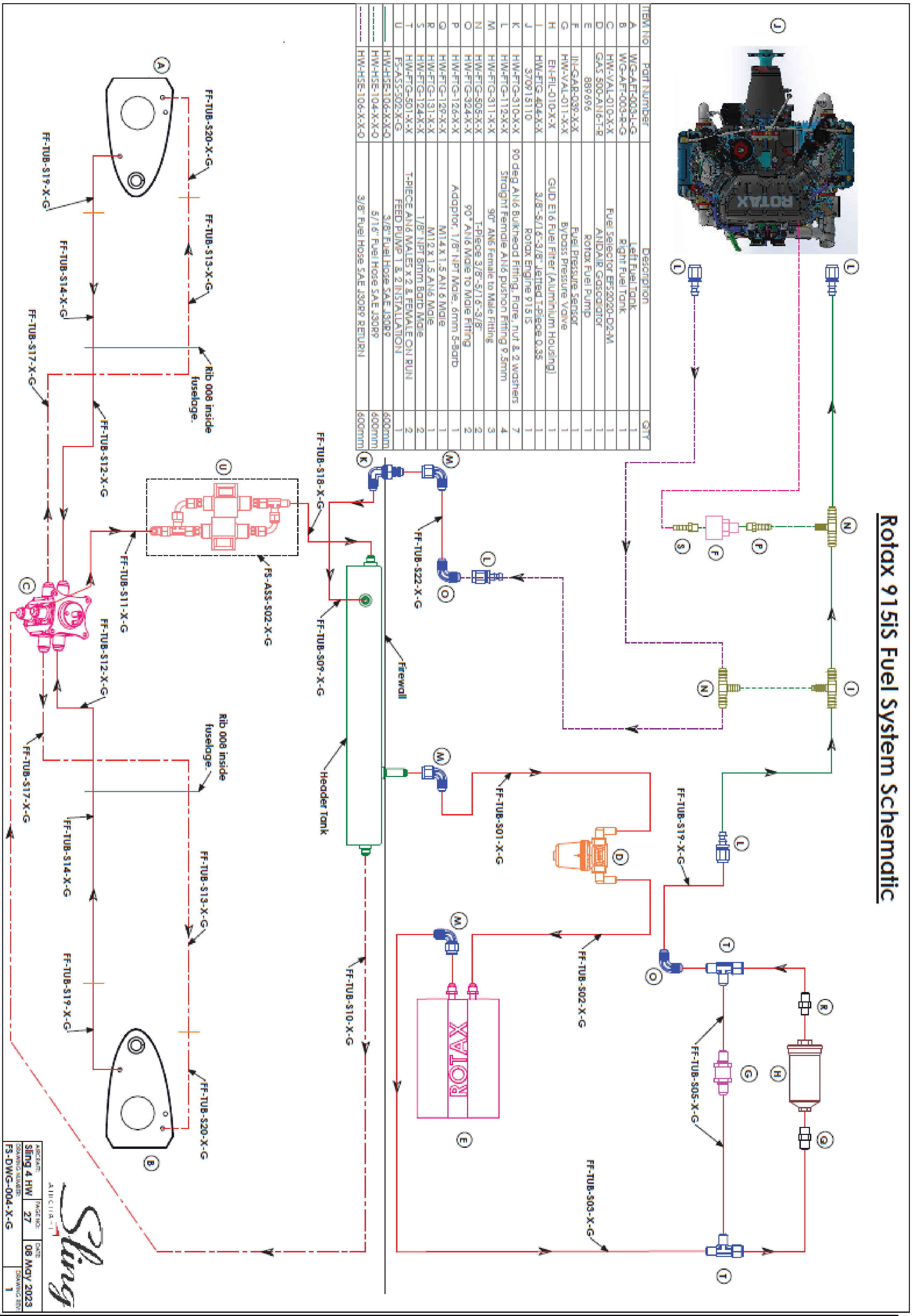
As an optional extra, long-range tanks can be added. These tanks are located outboard of the main tanks, in between the wing tip and the main tanks. These tanks have a volume of 30 litres each, leading to a total volume of 60 litres. The overall aircraft fuel capacity will be increased to 258 litres. Refer to Section 9.5 for further details of the long range fuel tank system.

WARNING

The fuel pick-up pipe in the wing fuel tanks are situated adjacent to the lower inside wall of the tank. The aircraft should at no time be subjected to a sustained sideslip towards a near empty fuel tank, as it may cause air to be drawn into the pickup, as fuel will run to the tip end of the tank. This poses a significant threat when at low altitudes,

A diagram of the fuel system with a key can be found on the next page.

Rotax 915iS Fuel System Schematic



ITEM No	Part Number	Description	QTY
A	WG-AFT-003-L-G	Left Fuel Tank	1
B	WG-AFT-003-R-G	Right Fuel Tank	1
C	HW-VAL-010-X-X	Fuel Selector EFS2020-D2-M	1
D	GAS 500-AN6-T-R	ANDAIR Gascolator	1
E	889696	Rotax Fuel Pump	1
F	IN-GAR-039-X-X	Fuel Pressure Sensor	1
G	HW-VAL-011-X-X	Bybass Pressure Valve	1
H	EN-FIL-010-X-X	GUD E16 Fuel Filter (Aluminium Housing)	1
I	HW-FTG 404-X-X	3/8"-5/16"-3/8" Jetted T-Piece 0.35	1
J	370915110	Rotax Engine 915 IS	1
K	HW-FTG-310-X-X	90 deg AN6 Bulkhead Fitting, Flare, nut & 2 washers	7
L	HW-FTG-112-X-X	Straight Female AN6 pushon Fitting 9.5mm	4
M	HW-FTG-311-X-X	90° AN6 Female to Male Fitting	3
N	HW-FTG-505-X-X	T-Piece 3/8"-5/16"-3/8"	2
O	HW-FTG-324-X-X	90° AN6 Male to Male Fitting	2
P	HW-FTG-126-X-X	Adaptor, 1/8" NPT Male, 6mm 5-Barb	1
Q	HW-FTG-129-X-X	M14 x 1.5 AN 6 Male	1
R	HW-FTG-131-X-X	M12 x 1.5 AN6 Male	1
S	HW-FTG-124-X-X	1/8" NPT 8mm Barb Male	2
T	HW-FTG-501-X-X	T-PIECE AN6 MALES x 2 & FEMALE ON RUN	2
U	FS-ASS-S02-X-G	FEED PUMP 1 & 2 INSTALLATION	1
——— (solid green)	HW-HSE-106-X-X-0	3/8" Fuel Hose SAE J30R9	600mm
- - - (dashed green)	HW-HSE-104-X-X-0	5/16" Fuel Hose SAE J30R9	600mm
- - - (dashed purple)	HW-HSE-106-X-X-0	3/8" Fuel Hose SAE J30R9 RETURN	600mm

7.13.1 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, both fuel pumps can be selected/operated, irrespective of the master switch status.

WARNING

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

7.13.2 Feed Fuel Pump

There are 2 feed fuel pumps, powered by the main bus. If power to the main bus is unavailable, these fuel pump will stop working. These pumps are used to pump fuel from the fuel selector to the header tank. The header tank has a maximum capacity of 6 litres. The main feed pump is linked to the main pump switch. There is a secondary feed pump switch and circuit breaker to control the second feed pump.

WARNING

With no feed pump operational, engine stoppage will occur due to fuel starvation. There is a fuel level sensor in the header tank. The EFIS should send a warning if the fuel level drops below full, indicating that fuel starvation may occur.

WARNING

When the aircraft is operated using a single fuel pump at high throttle settings, in hot conditions, at high altitudes and using automotive fuels, it is possible that vaporisation of fuel may occur in the fuel pump system, causing cavitation. In these extreme conditions there may be a decrease in fuel pressure to below the minimum permissible pressure. In such circumstances BOTH fuel pumps should be selected. In the highly unlikely event that a low fuel pressure warning persists with the use of both fuel pumps, the throttle setting or propeller speed should be reduced to a level which results in the fuel pressure returning to within range. Should the above circumstances arise or should the conditions which can lead to such circumstances be present, pilots may choose to use avgas in favour of mogas so as to minimise the possibility of such a fuel pressure loss. The addition of the boost pump to the fuel system mitigates this issue

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.

7.14 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 and oil filter to points of lubrication.

Surplus oil emerging from the points of lubrication gather 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.

The lubrication system has an approximate volume of 3.5 litres (3.7 Quarts/7.4 pints).

7.15 Autopilot System

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

The EFIS / autopilot inputs data from an electronic compass and AHRS. With this, it 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 labelled AUTOPILOT, located on the instrument panel. This switch must be on for the autopilot to have any effect.

The autopilot can be engaged by:

- The autopilot engage / disengage button on the control stick(s)
- Via the EFIS screen interface

The autopilot can be disengaged by:

- The autopilot engage / disengage button on the control stick(s).
- Via the EFIS screen interface
- A servo reports a slipping clutch or torque overdrive for 1 second, i.e. the pilot overrides the autopilot via force in the control column.
- Removing power to the autopilot servos, at the isolating switch, removing the ability of the controller to control the servos.

7.16 Position, Anti-collision, Taxi and Landing Lights

The aircraft is equipped with a landing and taxi light in the leading edge of the wing. The standard option is left wing only, with an optional extra for left and right wing. This is typically a requirement for IFR rated aircraft. The control of these lights are through switches labelled (LAND) and (TAXI). With the dual light option, the TAXI switch is a three-way switch controlling ON-WIG WAG-OFF.

Combination navigation/position lights (red, green and white) and anti-collision lights (white) are fitted to the wingtips, in the standard configuration (red left, green right). A combination position/anti-collision light (white) is fitted underneath the vertical stabilizer.

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

The method of control of all lights is:

Switch	Light Element				
	Landing	Taxi	Red / Green Wingtips	White Wingtips	White Empennage
TAXI		ON			
WIG-WAG		ON *(Flashing)*			
LAND	ON				
NAV			ON	ON (Steady)	ON *(Steady)*
STROBE				ON *(Flashing)*	ON *(Flashing)*

8 Ground Handling and Servicing

8.1 Introduction

This section contains factory-recommended procedures for proper ground handling and servicing of the Sling 4 HW. 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.*

8.2 Ground Handling

8.2.1 Taxiing

When taxiing, it is important to use all controls at their minimum to achieve what is required, such as the throttle and brakes. Speed must be kept to a minimum during all ground operations. Caution must be taken in windy conditions, and the following control inputs must be made, depending on wind direction *(originating from):*

Wind Direction (*Originating From*)	Control	Action
Front	Elevator	Nose Down
Front Left	Elevator	Neutral
	Aileron	Roll Left
Front Right	Elevator	Neutral
	Aileron	Roll Right
Rear Left	Elevator	Nose Down
	Aileron	Roll Right
Rear Right	Elevator	Nose Down
	Aileron	Roll Left
Rear	Elevator	Nose Down

8.2.2 Towing

If you wish to move the aircraft, other than under its own power, it is best to pull/push the aircraft by holding one or more of the propeller blades, close to the spinner. The rear fuselage/empennage may be pushed down directly above the bulkhead or close to the root on the horizontal stabilizer, directly above the front spar where it attaches to a rib. This for lifting the nosewheel for manoeuvring purposes.

It is also acceptable to push the aircraft backwards by putting pressure on the wing/horizontal stabilizer leading edge, directly over a rib.

CAUTION

Avoid excessive pressure on the aircraft airframe - especially at or near control surfaces. The skins are thin and minimum pressure should be placed on them. Excessive pressure could lead to the buckling of the skin.

8.2.3 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 4 HW 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.

8.2.4 Parking

It is advisable to park the aircraft inside a hangar, or alternatively inside other suitable spaces, with good temperature, good ventilation, low humidity and dust-free.

When parking for extended periods, cover the windscreen and windows, and possibly the whole aircraft by means of a suitable tarpaulin.

When parking the aircraft outside, avoid parking for extended periods of time. Cover the panel/interior with a suitable cover or tarpaulin to avoid degradation of the upholstery due to the sun.

8.2.5 Mooring

The aircraft should be tied down when parked outside the 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.

The mooring procedure is as follows:

1. Fuel Selector .... OFF
2. Switches .... ALL OFF
3. Master .... OFF
4. Ignition / Lanes .... OFF
5. Control Column .... SECURE[(a)]
6. Air Vents .... CLOSE
7. Doors .... CLOSE AND LOCK
8. Moor .... THOUGH MOORING EYES[(b)]
9. Chocks .... INSTALL

NOTES

a. Through use of a, for example, safety harness.
b. Typically, rope will be used to connect the aircrafts mooring eye, with a mooring eye fastened in the ground/concrete.

NOTE

In the case of long-term parking, especially during winter, it is recommended to cover the windscreen and windows, or possibly the whole aircraft, by means of a suitable tarpaulin attached to the

8.2.6 Road Transporting

The aircraft may be transported after loading on a suitable, aircraft specific trailer, or a flatbed with suitable rigging. It is necessary to remove the wings before road transport. It is suggested that the wings should be securely stored in a cradle of some kind.

8.3 Servicing

8.3.1 Jacking

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

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

- By pushing the rear fuselage section down above the bulkhead, the fuselage front section may be raised, and a support placed under the firewall. The same effect can be achieved by pushing down on the horizontal stabilizer as described under 8.2.2 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 of a large, flat surface to avoid damage to the under-fuselage skin. The wings should also be gently supported to prevent the aircraft from rolling as its weight shifts to the nose wheel.
- To lift a wing, push from underneath the wing at the main spar only, and use a support with a large surface area again. *Do not attempt to lift the wing by placing force on the composite wingtip.*
- A wheel can be lifted by either lifting the wing, or jacking under the wheel strut where it meets the fuselage.

8.3.2 Aircraft Inspection/Servicing Periods

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

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

After first flight:	25 flight hours.
And thereafter:	Every 100 flight hours or annually, whichever first.

This is stipulated in the latest revision of the applicable[a] engine/propeller manufacturer documentation.

NOTES

a. Both the manufacturers' Operators Manual and Maintenance Manual.

More detail is supplied in the *Sling 4 HW Maintenance Manual*.

8.3.3 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 the original spare parts, produced by the aircraft/engine/propeller manufacturer.

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

8.3.4 Servicing fuel, Oil and Coolant

This document makes a brief statement on these topics in Section 1. Before carrying out any work, refer to the Rotax Maintenance and Operators Manual, along with the Sling 4 HW Aircraft Maintenance Manual.

8.4 Cleaning and Care

Use efficient cleaning detergents to clean the aircraft, such as regular car wax or degreaser. Detergents with a wax coating will better preserve the paintwork of the aircraft. Oil spots on the aircraft surface ***(except for the windscreen & windows)*** may be cleaned with petrol/gasoline.

The windscreen and windows may only be cleaned by washing it with a sufficient quantity of lukewarm water and an adequate amount of compatible detergent. Use either a soft, clean cloth sponge or deerskin. Then use suitable dry polishers/soft cloth to clean the windscreen and windows.

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

CAUTION

Never clean the windscreen and windows under dry conditions or use petrol or chemical solvents.

9 Supplementary Information

9.1 Introduction

This section contains the appropriate supplements necessary to operate the aircraft safely and efficiently when equipped with various common optional extras not supplied with the standard aircraft.

The supplements included in this manual are –

Date	Supplement No.	Title of inserted supplement
11/05/2020	02/2020	External Alternators
07/07/2021	01/2021	Magnum 901 Ballistic Parachute
08/08/2021	08/2021	Tail Dragger Information
18/05/2022	05/2022	Long Range Fuel Tanks
07/02/2023	02/2023	Hand Control System
23/02/2023	02/2023	MTV-6/190-69
08/08/2023	08/2023	Rotax 916 iS Engine
28/02/2025	02/2025	DUC 4 bladed FlashBlack-3-R

9.2 Supplement 01/2021 – Magnum 901 Ballistic Parachute

9.2.1 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 regard 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 Magnum 901 ballistic parachute.

- The Sling 4 HW is specifically designed for convenient fitment of the Magnum 901 ballistic parachute recovery system, manufactured by Stratos 07. The system is designed to enable the pilot or passenger to deploy the parachute, in case of an emergency, in such a manner that the aircraft structure is carried under the parachute to the ground. Thus, to ensure that the occupant will not be injured, and the aircraft suffers minimum damage.
- Use of a ballistic parachute system involves inherent risks, and the system should be properly understood by the pilot prior to use.

9.2.2 *Ballistic Parachute Operational Parameters*

Parameter	Value
Limit Deployment Speed	150 kt or 277 km/h .
Deployment Time *(at Limit Speed)*	8 s
Maximum Supported Mass	1120kg *or* 2469 lb.
Descent Rate *(at Maximum Mass)*	7,8 m/s
Minimum deployment altitude	700 feet

9.2.3 *Ballistic Parachute Deployment Procedure*

1. Speed ....BELOW 150 kt.
2. Throttle ....CLOSE
3. Ignition Lanes / Magnetos .....OFF
4. Fuel Pump(s) ....OFF (BOTH)
5. Fuel Selector...........................OFF
6. Harnesses ....SECURE & TIGHT
7. Security ....ALL LOOSE OBJECTS SECURE
8. Parachute ....DEPLOY
   ....PULL ACTIVATION HANDLE

   before impacting the ground –
9. Master ....OFF
10. Avionics ....OFF
11. Other Electrical Equipment …ALL OFF

9.3 Supplement 02/2021 – External Alternator

Information contained in this supplement adds to or replaces information from the standard Sling 4 HW Pilot Operating Handbook with regard only to the specific sections addressed herein. Limitations, procedures and information not addressed in this supplement remain as set out in Sling 4 HW Pilot Operating Handbook.

This supplement provides information necessary for the operation of an aircraft fitted with an external alternator. An external alternator is fitted as an option if the output of the integrated generator is inadequate. Reference should be made to the service instruction (SI-PAC-001) for Rotax 915 iS (Series).

9.3.1 Operational Parameters

The alternating current (AC) output of the external alternator is routed to its integrated rectifier regulator where it is converted (rectified) and regulated, to provide direct current (DC) output available to the main battery. The external alternators charge output is 14.2 to 14.8 V DC.

9.3.2 Operational Instructions

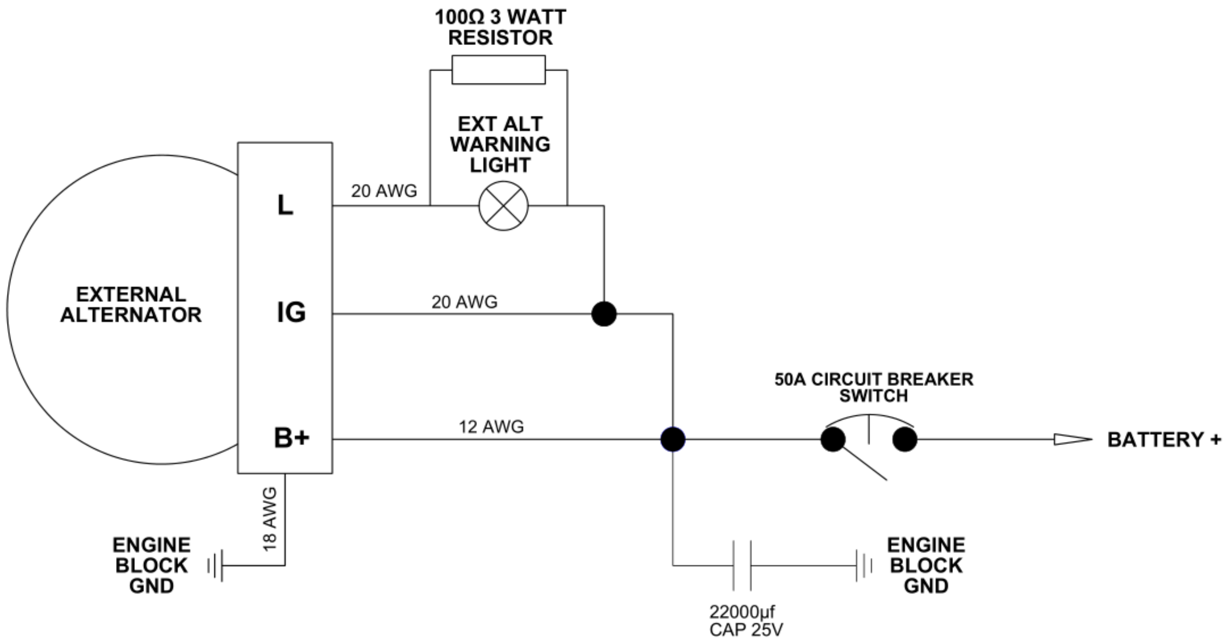
The external alternator is operated with a circuit breaker switch (refer to external alternator wiring in picture below). Trip indication is by switch actuation in the OFF (DOWN) position. Refer to paragraph 7.8 for switch layout on the instrument panel.

Ensure that the external alternator is switched to the off position before engine start. It may be switched on after engine start.

The external alternator warning light (labelled Alt 2) comes on when the alternator is not functioning. The light should illuminate if there is an external alternator failure.

Refer to paragraph 3.7.4 for procedures following charge system failure.

9.3.3 External Alternator Wiring



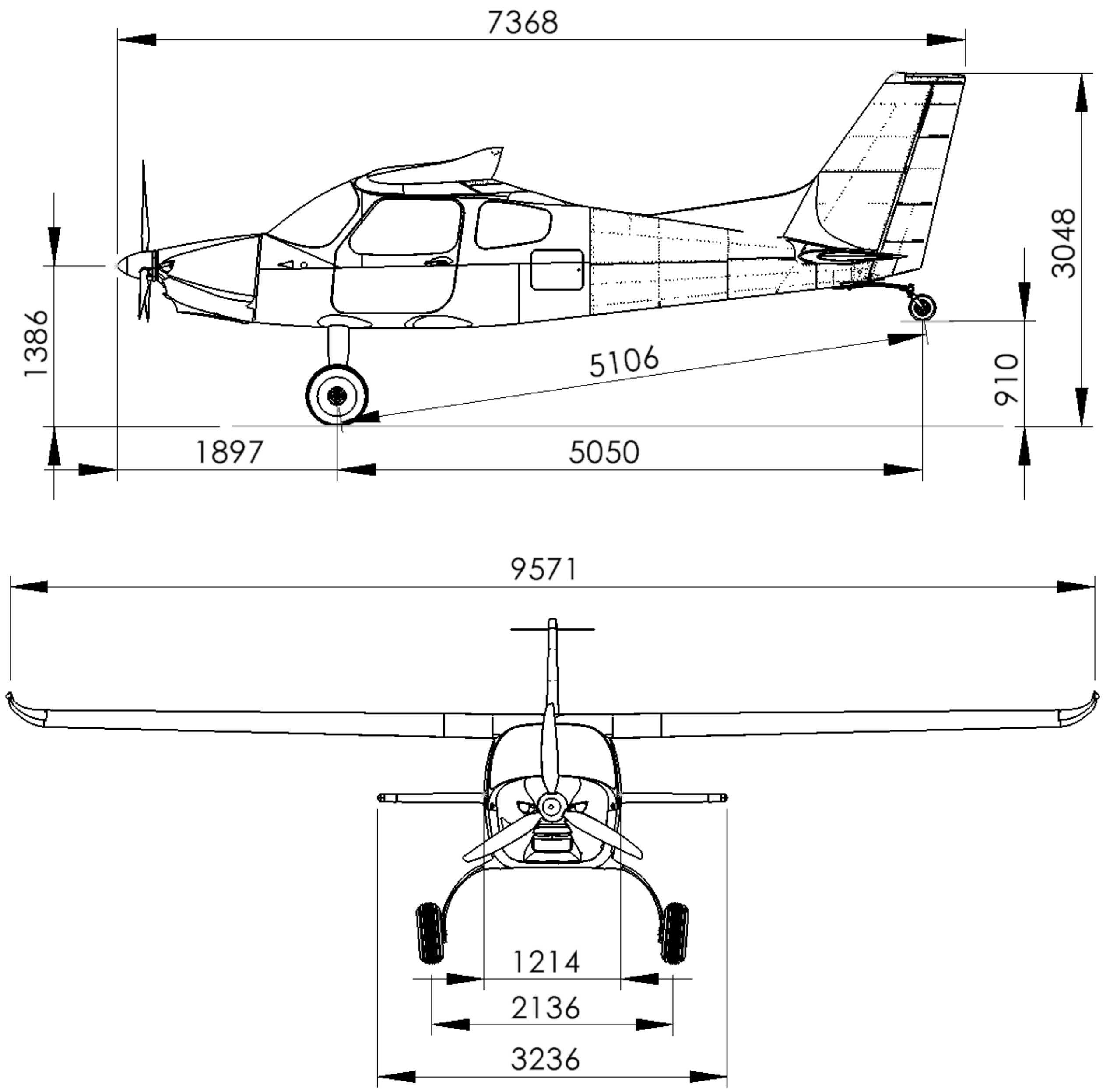
9.3.4 Effect on Mass and Balance

The CG range mentioned in Section 1 of this document continues to apply and following fitment of the external alternator, the empty CG of the aircraft should be measured and appropriately recorded. Refer to paragraph 6.5. The external alternator mass is 3.0 kg (6.6 lbs).

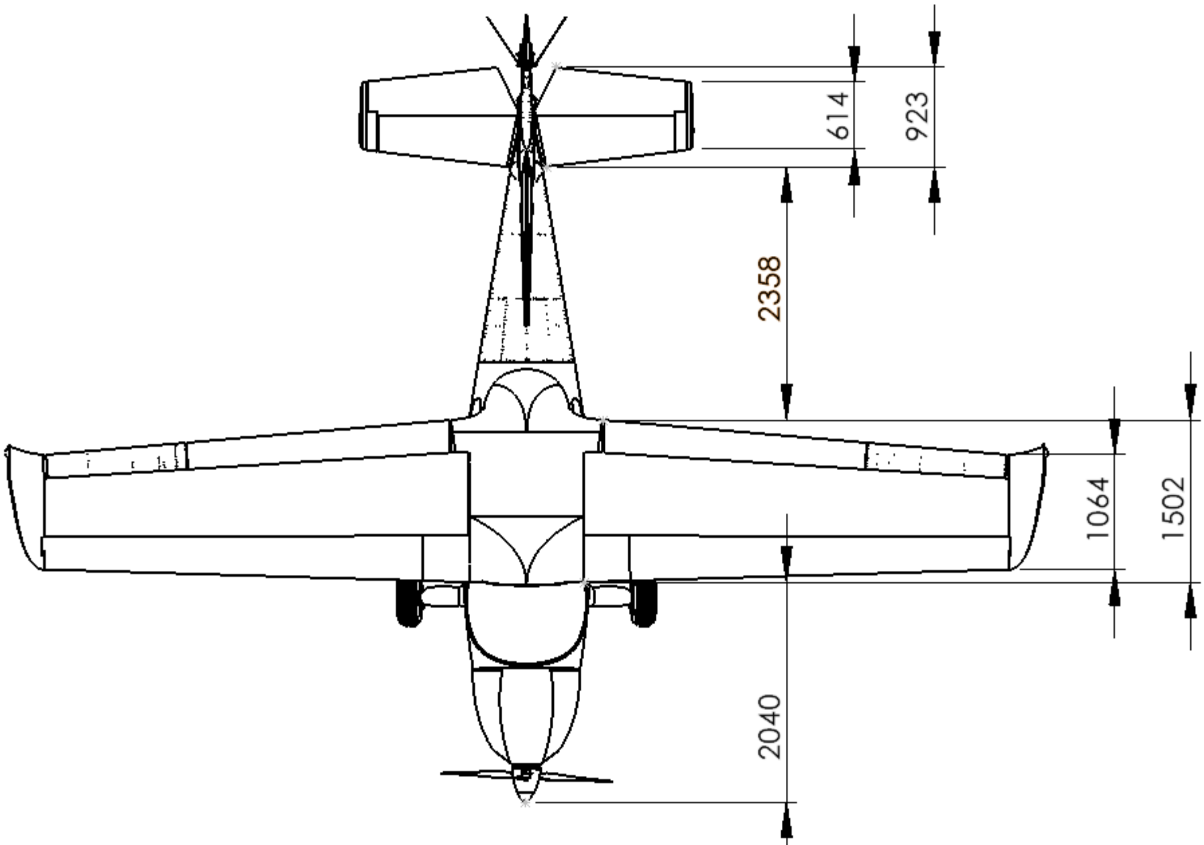
9.4 Supplement 08/2021 – Tail Dragger Information

This section outlies the various elements that are used in the tail dragger configuration, that differ from the tricycle model.

9.4.1 Aircraft 3-View Drawing



DIMENSIONS IN THESE DRAWINGS ARE IN MILLIMETRES.



DIMENSIONS IN THIS DRAWING ARE IN MILLIMETRES.

9.4.2 Landing Gear

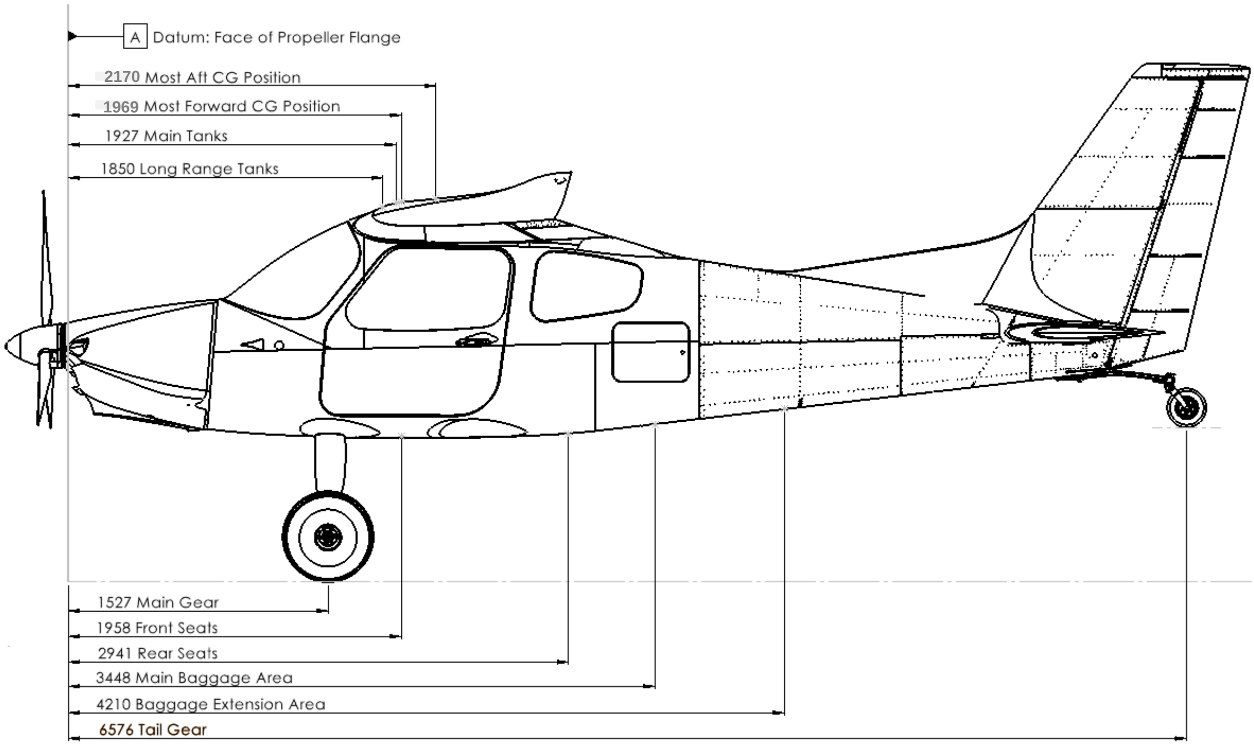
Parameter / Item	Value
Wheel Track	2.14 m / 7 ft. 02 in.
Wheelbase	5.11 m / 16 ft. 77 in.
Brake Type	Hydraulic
Main Gear Tyres	21 x 8-6; 4-ply (2.2 bar / 32 psi)
Tail Wheel Tyres	10 x 3.50-4; 6-ply (4.14 bar / 60 psi)

9.4.3 Pilot Controls

The aircraft is also fitted with dual rudder pedals, steerable tail wheel and toe brakes. Differential braking and the steerable tail wheel are used in conjunction while on the ground for directional control. The differential brake system is controlled using toe brakes on the rudder pedals.

9.4.4 Weight and Balance

9.4.4.1 Centre of Gravity Arms



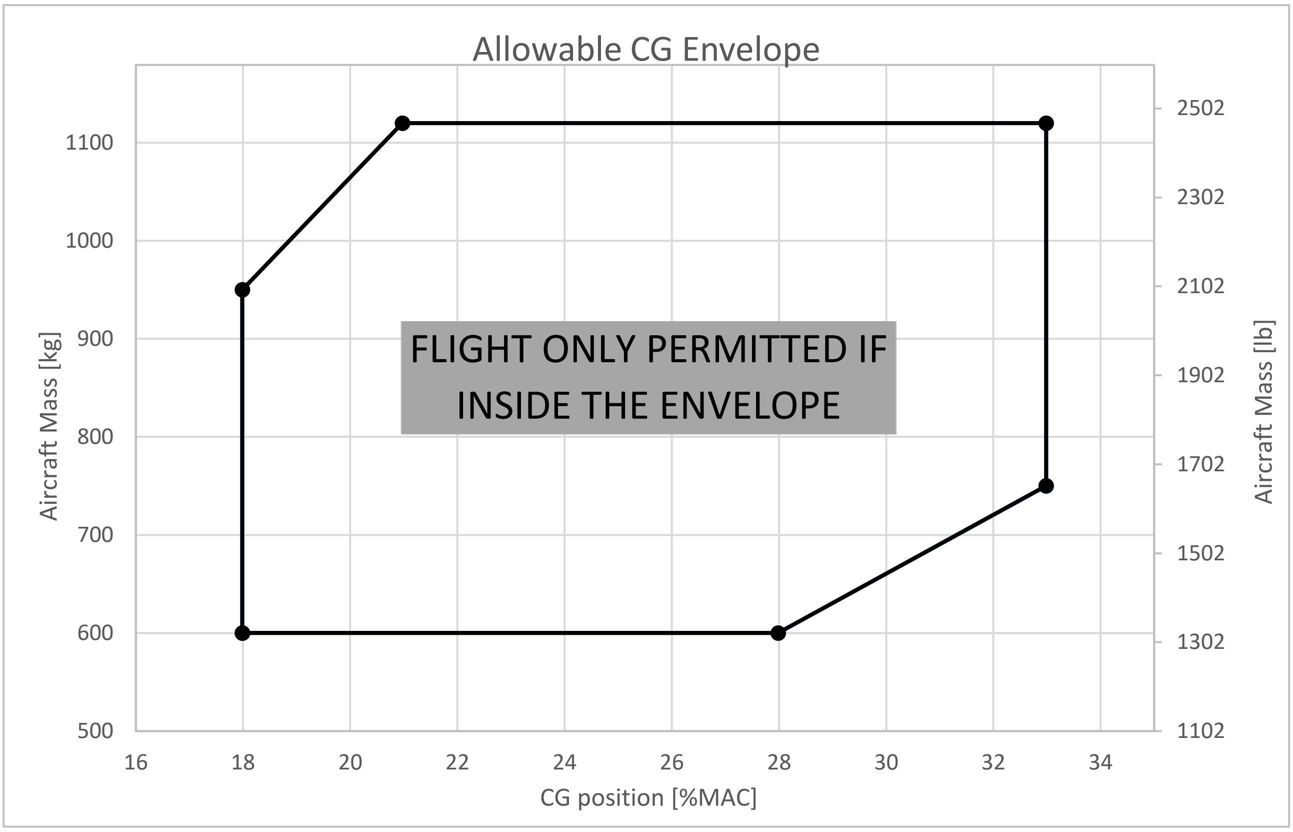
WARNING

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

NOTE

- GC range is 1,969 mm (6.427 ft) to 2,170 mm (7.087 ft) aft of the reference datum (18% to 33% of MAC).
- The leading edge of the wing at MAC is 1,728 mm (5.66 ft) aft of the reference datum.
- The MAC is 1,340 mm (4.396 ft).

9.4.4.2 CG Envelope



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

9.4.4.3 Determination of CG

Sling Aircraft makes use of a numerical method in calculating the CG of the aircraft. The following will be required to complete a CG check:

#	Item
1	Empty CG Value
2	Blank CG Form
3	Forward CG Check
4	Rear CG Check

The principal formula for CG calculation is:

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

The %MAC formulas are:

$$\%MAC = (CG - 1728\ mm) \times \frac{100}{1{,}340\ mm}$$

$$or,$$

$$\%MAC = (CG - 5.66\ ft.) \times \frac{100}{4.27\ ft.}$$

WARNING

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

The aircraft's empty CG is determined in a conventional manner, by weighing the aircraft whilst it is standing level. Refer to the Maintenance Manual for more.

Maximum all up weight (MAUW) = 1,120 kg (2,469.17 lb)

Maximum useful load (example):

$$W_{max,useful} = W_{MAUW} - W_E$$

$$= 1{,}120kg\ (2{,}469.17lb) - 600kg\ (1{,}322lb)$$

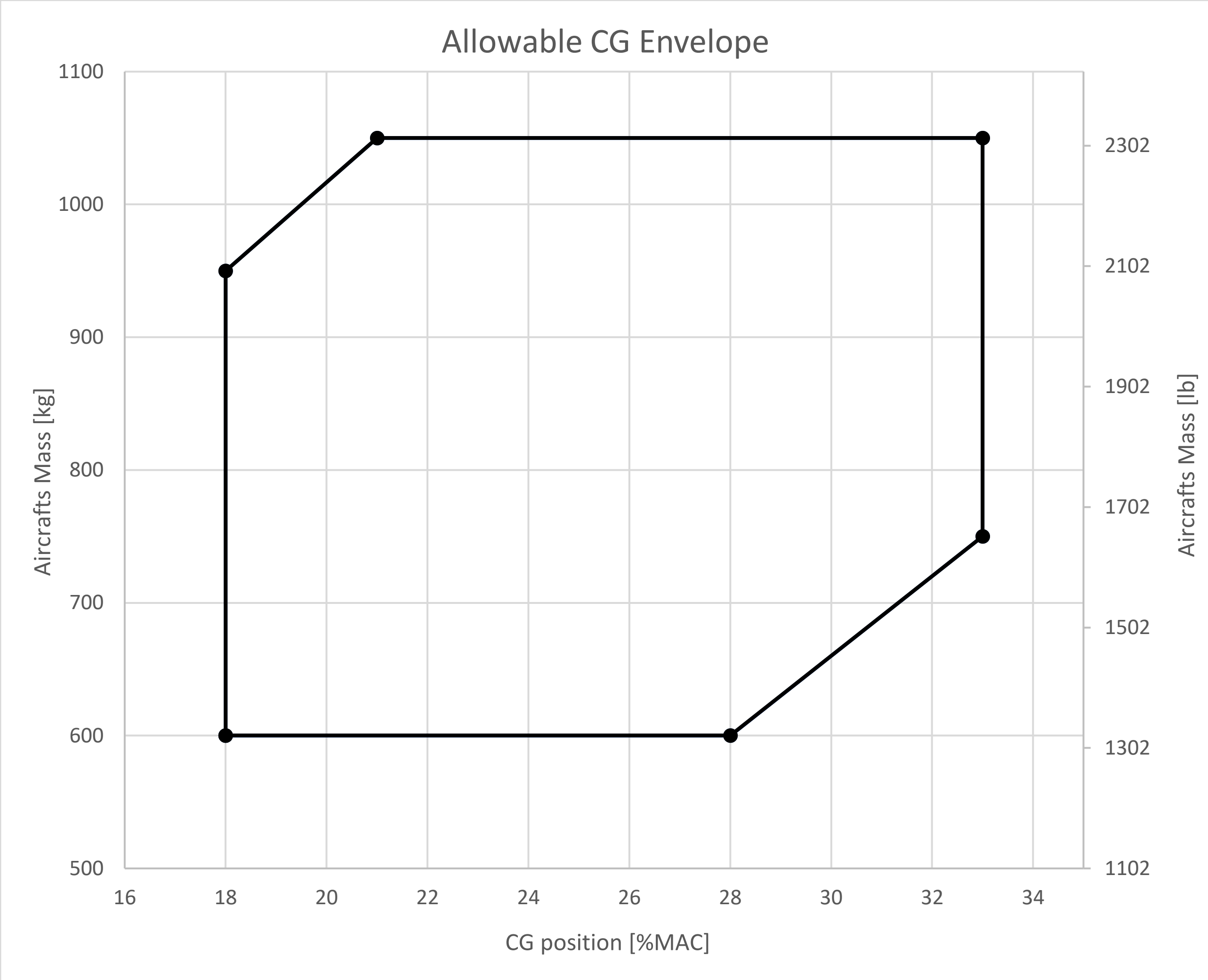
$$= 520kg\ (1{,}146.40\text{lb})$$

9.4.4.4 Determination of Empty CG

	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 = 1,527 (5.01)	
	Left Main Wheel	W_L =	L_L = 1,527 (5.01)	
	Tail Wheel	W_T =	L_T = 6,576 (21.57)	
	Totals	Empty weight: W_E = …………………	-	Aircraft moment: M_0=………………..
	Empty CG	CG = ………………… mm (ft)		

9.4.4.5 Blank CG Form and Graph for Use

	Weight [kg (lb)]	**Arm** [mm (ft)]	**Moment** (weight x arm) [kg.mm (lb.ft)]
Crew [Front]		1 958 (6.39)	
Passengers [Rear]		2 941 (9.65)	
Baggage		3 448 (11.34)	
Baggage Ext.		4 210 (13.81)	
Main Fuel Tanks		1 927 (6.32)	
AC Empty			
Totals	W_T=	-	M_T =
			CG =
			CG = %MAC



> ***Warning***
>
> Aircraft CG and MAUW limitations must be adhered to at all times.

9.5 Supplement 05/2022 – Long-Range Fuel Tanks

This supplement provides information relating to the operation of Sling 4 HW aircraft fitted with long range fuel tanks.

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 4 HW Pilot Operating Handbook with regard only to the specific sections addressed herein. Limitations, procedures and information not addressed in this supplement remain as set out in Sling 4 HW Pilot Operating Handbook. For the purposes of this manual the main tanks will be referred to as 'A tanks' and the long-range tanks will be referred to as 'B tanks'.

9.5.1 Introduction

The two B tanks are located inside the leading edge of each outboard wing section.

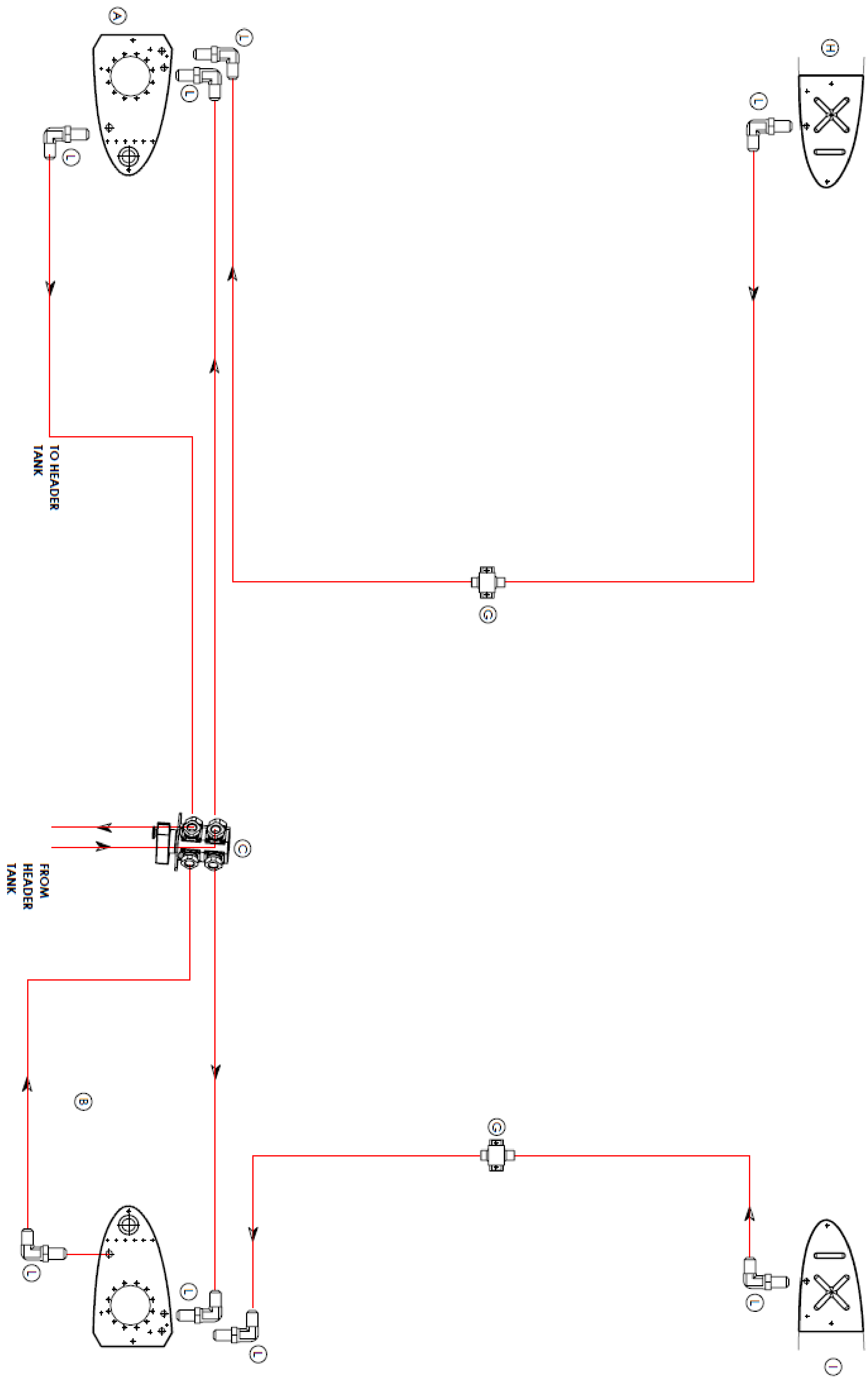
Volume of B tanks: 2 x 25 litres (6.6 US gallons), 50 litres (13.2 US gallons) total.

As in the A tanks, each tank is equipped with a vent outlet. A drain valve is located in the lowest point of each tank. A tank outlet/fuel pick-up is located at the lowest point of the inboard sidewall of each tank. A finger screen if fitted to each fuel pick-up. An inline mesh fuel filter is fitted in the fuel line from each tank to the electrical fuel pump through a common T-piece.

Refer to the fuel system schematic (section 9.5.2) to see the fuel flow of the B tanks into the corresponding A tanks.

9.5.2 Schematic of Long-Range Fuel Tanks

The schematic for the fuel system can be seen below with the key on the following page.


A
L
H
TO HEADER TANK
G
C
FROM HEADER TANK
B
I

Item	Description
A	Left A Tank
B	Right A tank
C	Fuel Selector
G	Facet Solid State Fuel Pump
H	Left B tank
I	Right B tank
L	An6, 90^o Bulkhead With Nut
——	3/8" Fuel Hose Aluminium

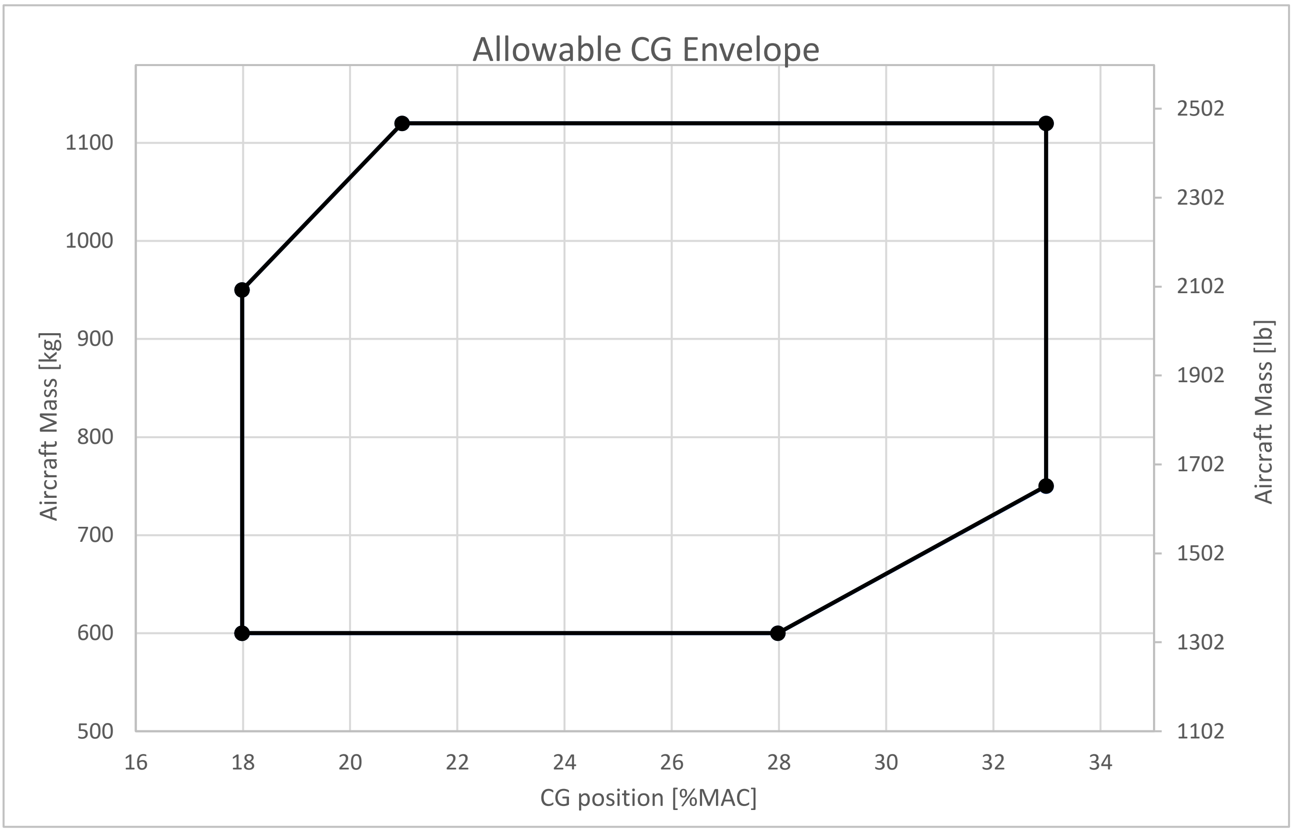
9.5.3 Operation of Long-Range Fuel Tanks

The Facet electric pumps are activated by the transfer pump switch on the instrument panel. The left B tank can only pump fuel into the Left A tank and the right B tank can only pump fuel into the right A tank.

9.5.4 Effect on Aircraft CG

For long-range tanks, an amendment is made to the standard blank CG form. The moment arm for long-range tanks, 1,949 mm, is added as shown in the table below.

	Weight [kg (lb)]	**Arm** [mm (ft)]	**Moment** (weight x arm) [kg.mm (lb.ft)]
Crew [Front]		1,958 (6.39)	
Passengers [Rear]		2,941 (9.65)	
Baggage		3,448 (11.34)	
Baggage Ext.		4,210 (13.81)	
Main Fuel Tanks		1,927 (6.32)	
Long Range Tanks		1,949 (6.39)	
AC Empty			
Totals	W_T=	-	M_T =
			CG =
			CG = %MAC


Allowable CG Envelope
Aircraft Mass [kg]
1100
1000
900
800
700
600
500
16
18
20
22
24
26
28
30
32
34
CG position [%MAC]
Aircraft Mass [lb]
2502
2302
2102
1902
1702
1502
1302
1102

9.6 Supplement 02/2023 – Hand Control System

This supplement provides information relating to the operation of the Sling 4 HW hand control system. The system allows full control of the aircraft making use of both hands only.

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 4 HW Pilot Operating Handbook with regard only to the specific sections addressed herein. Limitations, procedures and information not addressed in this supplement remain as set out in Sling 4 HW Pilot Operating Handbook.

9.6.1 Introduction

A full hand control system may be optionally installed in the Sling 4 HW to allow pilots who have reduced/no functionality of the legs to pilot the aircraft in a safe manner.

The hand control system allows the pilot to control the following systems with each hand:

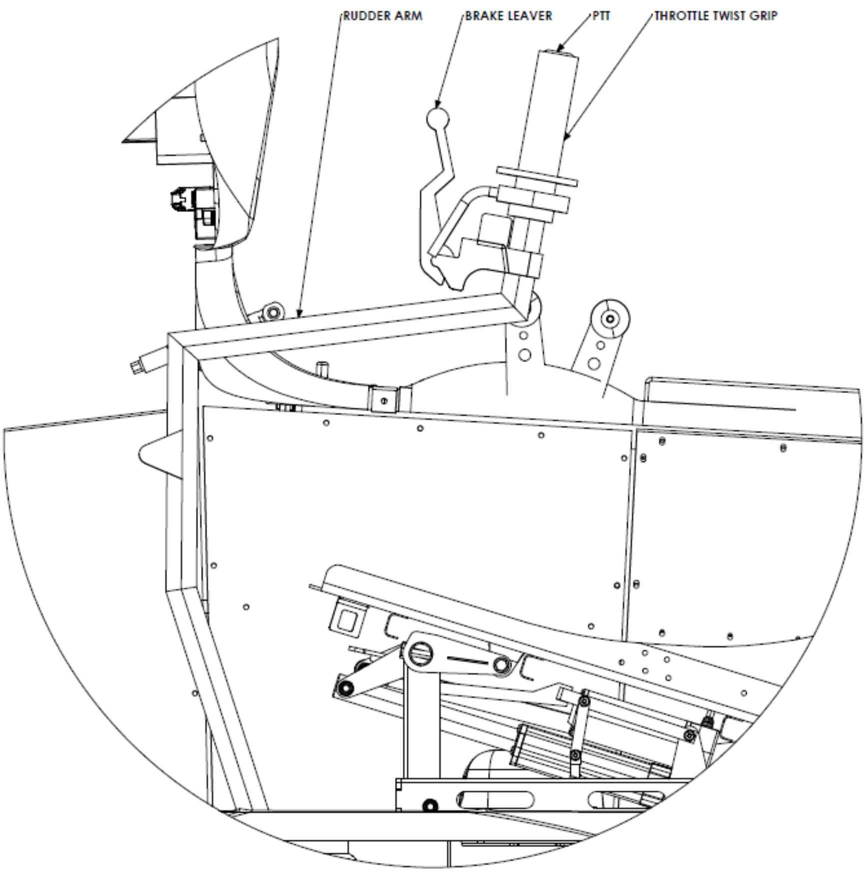
- Right Hand – Rudder, throttle, brakes and PTT key
- Left Hand – Pitch, Roll, Trim, Autopilot Disconnect, PTT key

The installation of the hand control system does not impinge on the functionality of the standard controls, and they remain fully operational.

The hand control system can be seen in the figure in Section 8.6.2.

9.6.2 Installation of the hand control system

The hand control system is mounted on the left-hand side of the aircraft and is connected alongside the standard control stick. The hand control system is mounted directly to the floor of the aircraft and is connected to the pedals (rudder control) via a pushrod. The twist grip throttle control is connected to the standard throttle control quadrant and actuates the standard throttle lever when operated. The brake lever, which also becomes the new brake reservoir, is connected in series through the standard master cylinder.



9.6.3 Operation of the hand control system

9.6.3.1 Rudder control

Rudder control is achieved by pushing the hand control stick forwards and backwards. Pushing the lever forward/away from the pilot will result in a right yaw control input and pulling the lever back/towards the pilot will result in left yaw control input.

Controlled with the pilot’s right hand.

9.6.3.2 Throttle control

Throttle control is achieved by rotating the twist grip, mounted at the top of the hand control stick. Rotating the grip clockwise will result in increased power and rotating the grip counter clockwise will result in decreased power.

Controlled with the pilot’s right hand.

9.6.3.3 Brake control

Brake control is achieved by squeezing the lever back towards the pilot. Brake pressure is relieved by releasing the lever.

Controlled with the pilot’s right hand.

9.6.3.4 PTT

The hand control stick has a PTT (push-to-talk) key, which is mounted atop the stick. To use this PTT key, press and hold the button during speech on the selected frequency.

This PTT key is connected in parallel to the two PTT keys on each of the standard control sticks and pressing any three of the buttons will activate the PTT.

Controlled with the pilot's right hand.

9.6.3.5 Roll, Pitch, Trim and AP Disconnect

The standard control stick remains unchanged and is operated as described in Section 7- Aircraft and Systems.

Controlled with the pilot's left hand.

9.7 Supplement 02/2023 – MTV-6/190-69

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 with 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.

9.7.1 Introduction

This supplement provides the necessary information for the operation of an aircraft fitted with a MTV-6/190-69 constant speed propellor.

The propellor is hydraulically actuated though use of a constant speed governor mounted on the back of the engine's gearbox. There are two distinct control system variants for the MTV-6, manually controlled constant speed and single lever control.

9.7.2 Manual Constant Speed Control

This control system arrangement makes use of an aviation standard of control, the vernier control. Blue in colour to indicate pitch, the pilot can adjust the desired propellor RPM one of two ways:

- Coarse Control
  - Depressing the button on the end of the control knob will allow actuation of the control inwards and outwards. This provides coarse adjustment of the propellor RPM.
- Fine Control
  - Turning the control knob, without depressing the button, will allow for fine adjustment of the propellor PRM.

9.7.3 Single Lever Control (RS Flight Systems)

A single lever control system is created by combining the MTV-6 propellor system with the RS Flight Systems 9iS SCU.

There is no interface for propellor control afforded to the pilot, as the control of the propellor happens internally in the single lever system. The RS Flight System SCU features a specific engine/propellor control map that is used to always optimize power delivery, without breaching continuous power/RPM limitations of the powerplant itself.

9.8 Supplement 08/2023 – Rotax 916 iS Engine

The Rotax 916 iS engine may be fitted to the Sling 4 High Wing. This engine is a 4-stroke, turbocharged, 4-cylinder, horizontally opposed, spark ignition engine, with one central camshaft -pushrod OHV and a displacement of 1,352cc (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 a 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 3.7.4 Alternator / Charge System Failure for more information.

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

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	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.

9.8.1.4 *Engine Operational and Speed Limits*

Parameter		Value
Engine Model		ROTAX 916 iS
Engine Manufacturer		BRP-Rotax GmbH & Co KG
Power	Maximum take-off	117kW / 156.9 hp at 5,800 rpm, max. 5 minutes
	Maximum continuous	101 kW / 135 hp at 5,500 rpm
RPM	Maximum take-off	5,800 rpm, max. 5 minutes
	Maximum continuous	5,500 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 (1,742 °F)
Coolant Temperature	Minimum	-20 °C (-4 °F)
	Maximum	120 °C (248 °F)
Oil pressure	Minimum	0.8 bar (11.6 psi) – below 3,500 rpm
	Maximum	7 bar (101.5 psi) – permissible for short periods during cold engine starts
	Normal	2 to 5 bar (29 to 72.5 psi) – above 3,500 rpm
Fuel Pressure	Minimum	2.9 bar (42 psi)[6]
	Maximum	3.2bar (46 psi)[7]
Manifold Pressure	Maximum Continuous	1,800 hPa / 53.15 in. Hg
	Maximum Take-off	60 hPa / 1.77 in. Hg
Altitude limitations	Service ceiling	23,000 ft
	Full take off power	Up to 15,000 ft

NOTE

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

[6] Minimum Acceptable Fuel Pressure exceedance (max. 3 sec) = 2.5 bar (36 psi)
[7] Maximum Acceptable Fuel Pressure exceedance (max. 3 sec) = 3.5 bar (51 psi)

9.8.1.5 Take-off Distances

Surface	Altitude	Mass	Run Distance	15m / 50 ft. Distance
Tar	MSL	1,120 kg	360 m / 1,180 ft	810 m / 2,657 ft
		1,050kg	230 m / 755ft	544 m / 1,785 ft
		950 kg	190 m / 624 ft	479m / 1,572 ft
		850 kg	160 m / 525 ft	427 m / 1,400 ft
Tar	5,000 ft.	1,120kg	420 m / 1,377ft	940 m / 3,084 ft
		1,050kg	270 m / 886 ft	631 m / 2,070 ft
		950 kg	225 m / 738ft	562 m / 2,140 ft
		850 kg	190 m / 623ft	496 m / 1,627 ft

9.8.1.6 Landing Distance

Surface	Altitude	Mass	Run Distance (Brakes)	15m / 50 ft. Distance
Tar	6,000ft.	1,050kg	225 m / 740 ft	630 m / 2,070 ft

9.8.1.7 Rate of Climb

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

Altitude	Rate of Climb	Best Rate of Climb Speed (V_Y)
[ft. ISA]	*[fpm]*	*[KIAS]*
0	700	80
1,000	693	
2,000	685	
3,000	678	
4,000	670	
6,000	656	
8,000	641	
10,000	626	
12,000	611	

14,000	597	
15,000	589	

9.8.1.8 Cruise Speeds

Power	**95%[(a)]**		**MAX ECO[(b)]**		**80%**	
Propeller State	**Climb 5,500 RPM**		**Cruise 5,000 RPM**		**Cruise 5,000 RPM**	
Altitude	**IAS**	**TAS**	**IAS**	**TAS**	**IAS**	**TAS**
0	135	136	128	128	117	117
1,000	134	137	127	130	117	119
2,000	133	138	126	131	116	120
3,000	133	139	126	132	116	122
4,000	132	141	125	134	115	123
5,000	131	142	124	135	115	125
6,000	130	143	123	136	114	126
7,000	129	144	123	138	114	128
8,000	128	145	122	139	113	129
9,000	127	147	121	140	113	131
10,000	126	148	121	141	112	132
11,000	125	149	120	143	112	134
12,000	124	150	119	144	111	135
13,000	124	151	119	145	111	137
14,000	123	153	118	147	110	138
15,000	122	154	117	148	110	140

NOTES

a) Maximum continuous power.
b) The Rotax 916 iS uses an automatic switching ECO mode, which has a significant effect on fuel consumption. ECO mode is activated at approximately 88% power setting. MAX ECO is the power setting just before the engine leaves ECO mode, which results in an approximate fuel consumption of 32 LPH in the cruise propeller setting. Cruise information for the Sling 4 HW is calculated using an 88% power setting at 5,000 RPM.

9.8.1.9 Fuel Consumption

Engine Power		%	100%	95%	MAX ECO(b)	80%
Engine RPM		*RPM*	5,800	5,500	5,000	5,000
Fuel Burn		*LPH*	49.7	39.4	31.7	28
		GPH	12.2	10.4	8.4	7.4
198 Litre Main Tanks 52.3 US gallons	Endurance(c)	*[hrs]*	3.2	4.2	5.4	6.2
	Range(c) 1,000 ft.	*[nm]*		661	777	808
	Range 5,000 ft.	*[nm]*		644	768	801
	Range 10,000 ft.	*[nm]*		621	760	794
	Range 12,000 ft.	*[nm]*		613	751	787

NOTES

Please see previous page for information regarding notes (b)

(c) Endurance information is calculated using maximum useable fuel, exclusive of 45-minutes reserve fuel. The range information was calculated inclusive of 45-minutes reserve fuel.

9.9 Supplement 02/2025 – DUC 4 bladed FlashBlack-3-R

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 Pilot Operating Handbook.

9.9.1 Introduction

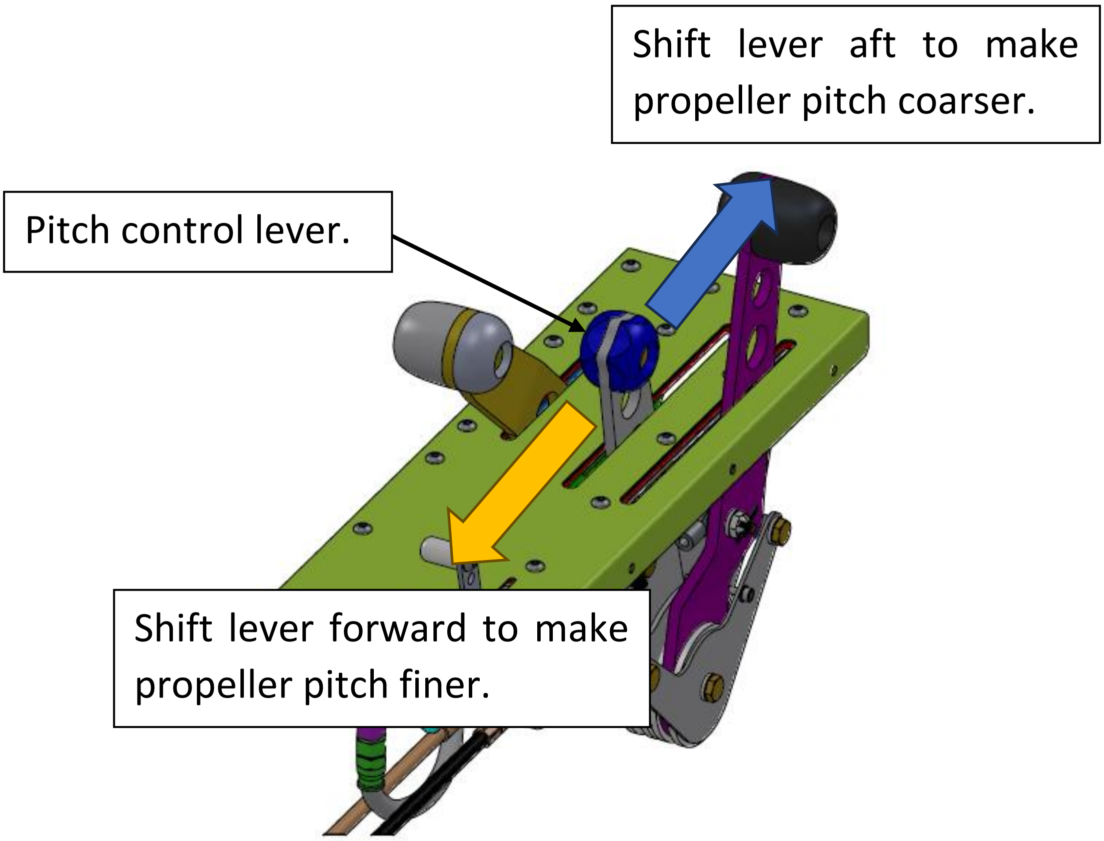
This supplement provides the necessary information for the operation of an aircraft fitted with a DUC, 4 bladed, FlashBlack-3-R constant speed propellor.

The propellor is hydraulically actuated through use of a constant speed governor mounted on the back of the engine's gearbox, that is manually controlled.

9.9.2 Manual Constant Speed Control

In order to control the pitch of the propeller (and ultimately the engine RPM), the blue leaver on the throttle quadrant may be used.

As seen in the figure below, shifting the lever forward will make the propeller pitch finer and shifting it aft will make the pitch coarser.



9.9.3 Performance

The Sling 4 High Wing can be outfitted with the DUC FlashBlack-3-R propeller. When the aircraft is outfitted with a FlashBlack-3-R propeller and Rotax 916 iS engine, it achieves similar flight performance to that which are outfitted with a MTV 6 propeller and Rotax 916 iS engine.

The DUC FlashBlack-3-R achieves the same take-off and cruise performance as the MTV 6 propeller, but slightly lower climb rates at higher altitudes. The table below details the climb rates for different altitudes of the aircraft, when outfitted with a 916 iS and DUC FlashBlack-3-R.

9.9.3.1 Take-off Distances

Surface	Altitude	Mass	Run Distance	15m / 50 ft. Distance
Tar	MSL	1,120 kg	290 m / 1,180 ft	740 m / 2,657 ft
Tar	6, 900 ft.	1,120kg	350 m / 1,377ft	895m / 3,084 ft

9.9.3.2 Rate of Climb

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

Altitude	Rate of Climb	Best Rate of Climb Speed (V_Y)
[ft. ISA]	*[fpm]*	*[KIAS]*
0	679	80
1,000	673	
2,000	668	
3,000	662	
4,000	656	
6,000	644	
8,000	632	
10,000	620	
12,000	608	
14,000	596	
16,000	591	
18,000	585	

9.9.3.3 Cruise Speeds

Power	95%[(a)]		MAX ECO[(b)]		80%	
Propeller State	Climb 5,500 RPM		Cruise 5,500 RPM		Cruise 5,500 RPM	
Altitude	IAS	TAS	IAS	TAS	IAS	TAS
0	133	135	126	128	117	118
1000	132	136	125	129	116	120
3000	131	138	125	131	116	121
4000	130	139	124	132	115	123
5000	130	140	123	134	115	124
6000	129	142	123	135	114	125
7000	128	143	122	136	114	127
8000	127	145	121	138	113	128
9000	126	146	121	139	112	130
10000	126	148	120	141	112	131
11000	125	149	119	142	111	133
12000	124	150	119	144	111	134
13000	123	152	118	145	110	135
14000	122	153	117	146	110	137
15000	122	155	117	148	109	138
16000	121	156	116	149	108	140
17000	120	158	116	151	108	141
18000	119	159	115	152	107	143

NOTES

a) Maximum continuous power.
b) The Rotax 916 iS uses an automatic switching ECO mode, which has a significant effect on fuel consumption. ECO mode is activated at approximately 88% power setting. MAX ECO is the power setting just before the engine leaves ECO mode, which results in an approximate fuel consumption of 32 LPH in the cruise propeller setting. Cruise information for the Sling 4 HW is calculated using an 88% power setting at 5.000 RPM.

9.9.4 Before Take-off

To be conducted at a holding point or equivalent –

9.9.4.1 Run Up & Pre-Take-off

1. Direction .... INTO WIND (IF POSSIBLE)
2. Oil Temperature .... ABOVE 50°C
3. Fuel Selector.................... FULLEST TANK
4. Engine RPM .... 5800 RPM
5. Lanes .... B OFF – ON*(a)*
   .... A OFF – ON*(a)*
6. Main Fuel Pump .... MAIN ON, AUX OFF *(CHECK FUEL PRESSURE)*
7. Aux Fuel Pump .... AUX ON, MAIN OFF *(CHECK FUEL PRESSURE)*
8. Fuel Pumps...................... BOTH ON *(MAIN & AUX)*
9. Feed Pump 2 .... ON
10. Propeller.......................... CHECK VP FUNCTIONALITY*(b)*
11. Engine RPM .... 2,500 RPM
12. Trim .... SET NEUTRAL
13. Flaps .... SET STAGE 1 / TAKEOFF
14. Controls .... FREE & FULL / CORRECT SENSE
15. Fuel Quantity................... VERIFY *(SUFFICIENT FOR PLANNED FLIGHT)*
16. Circuit Breakers .... ALL IN
17. Switches .... CHECK AND SET AS REQUIRED
18. Instruments .... CHECK AND SET ALL
19. Engine Parameters .... VERIFY *(TEMPERATURES, PRESSURES, VOLTAGES)*
20. Doors .... CLOSED / LATCHED
21. Harness .... SECURE *(CORRECTLY FASTENED AND TIGHT)*
22. Brief Passengers .... BRIEF

NOTE

a) Lane Check

Switch off each lane for 15 second, then switch back on. Wait until the lane warning light extinguishes (+/- 3 sec) before proceeding to the next lane / check. No more than 250rpm increase / decrease during check.

The Manifold Air Temperature must be less than 65°C (149°F) during the lane check procedure, otherwise the ECU internal check of the Pressure Control Valve and Wastegate will not be executed.

b) Propeller VP Functionality Check

1. Set Throttle Setting to Idle
2. Propeller Controller to Full Fine
3. Increase Throttle until approximately 4,700 RPM
4. Cycle Propeller Pitch Control Lever going from Full Fine to Full Course (Approximately 1 second at Full Course) and then back to Full Fine
5. Confirm rpm return to approximately 4,700 rpm
6. Repeat steps 4 and 5 **TWO-THREE (2-3)** times.