AIRCRAFT OPERATING INSTRUCTIONS
Light Sport Aircraft

EDGE X SERIES MICROLIGHTS with
Wizard 3 or Streak 2 Wing

2 LIMITATIONS

2.1 General

The limitations section of this AOI outlines the various operating limitations, instrument function and placards necessary for the safe operation of this aircraft, engine and standard equipment.

2.2 Wing Combination Limitations

The aircraft is **only** to be operated using the Airborne Wings and Trike units as detailed below. Only these combinations meet the requirements of the accepted Design Standards to which the aircraft complies.

Trike Base			Streak Wing	Wizard Wing
Edge Series	582	X	√	√
Edge Series	503	X	√	√

Table 1 Section 2. Wing Combinations

2.3 Airspeed Limitations

X Series Aircraft

	Streak Wing (IAS)	Wizard Wing (IAS)
V_{ne}	81 knots (93 mph)	54 knots (62 mph)
Manoeuvring speed	81 knots (93 mph)	54 knots (62 mph)
Trim Speed Fwd CG	45-55 knots (52-63 mph)	34-36 knots (39-41 mph)
Trim Speed Middle CG	40-50 knots (46-58 mph)	32-34 knots (37-39 mph)
Trim Speed Rear CG	35-45 knots (40-52 mph)	30-32 knots (35-37 mph)
Stall Speed (Power Off) Take Off Weight (250 kg)	24.0 knots (27.6 mph)	23.0 knots (26.5 mph)
Stall Speed (Power Off) Take Off Weight (340 kg)	29.0 knots (33.4 mph)	26.0 knots (29.9 mph)
Stall Speed (Power Off) Take Off Weight (401 kg)	34.0 knots (39.1 mph)	28.0 knots (32.2 mph)
Take Off Safety Speed & Nominated Approach Speed Take Off Weight (250 kg)	34 knots (39 mph)	31 knots (36 mph)
Take Off Safety Speed & Nominated Approach Speed Take Off Weight (340 kg)	39 knots (45 mph)	34 knots (39 mph)
Take Off Safety Speed & Nominated Approach Speed Take Off Weight (401 kg)	44 knots (51 mph)	37 knots (43 mph)
Maximum Level Speed	80 knots (92 mph)	50 knots (58 mph)
Max wind operating conditions (At ground level)	20 knots (23 mph)	20 knots (23 mph)
Cross winds of up to	11 knots (13 mph)	11 knots (13 mph)

Table 2 Section 2. Airspeed Limitations

2.4 Airspeed Indicator markings

The standard pressure airspeed indicator on the left side of the dash has dual red radial markings indicating V_{ne}. for the Streak and Wizard wings. The pilot should be aware of the combination of wing and base and be familiar with the appropriate V_{ne} marking.

2.5 Power Plant

Engine Model Applicable Aircraft	Rotax 503 – UL X Series Redback	Rotax 582 - UL X Series Outback and Classic
Approved Propeller / GearBox Combinations	C-Type (Reduction 3.47 : 1) BROLGA 68" x 4 Blade Ground Adjustable. Pitch Setting 14° pitch blocks. Bolly BOS 68" x 3 Blade Ground Adjustable. Pitch Setting 10° blade tip. Warp Drive 68" x 3 Blade Ground Adjustable. Pitch Setting 10° blade tip.	E-Type (Reduction 3.47 : 1) BROLGA 68" x 4 Blade Ground Adjustable. Pitch Setting 17° pitch blocks. Bolly BOS 68" x 3 Blade Ground Adjustable. Pitch Setting 16° blade tip. Warp Drive 68" x 3 Blade Ground Adjustable. Pitch Setting 16° blade tip.

Table 3 Section 2. Gearbox and Propeller Limitations

2.5.1 Engine Limitations

ENGINE LIMITATIONS	Rotax 503		Rotax 582	
ENGINE SPEED	**Metric**	**Imperial**	**Metric**	**Imperial**
Take Off (Max 5 mins)	6800 rpm	6800 rpm	6800 rpm	6800 rpm
Maximum Continuous	6500 rpm	6500 rpm	6500 rpm	6500 rpm
PERFORMANCE				
Performance @ 6500rpm	37 KW	50 hp	48 KW	64.4 hp
COOLANT TEMPERATURE				
Maximum			80°C	175°F
Minimum			65°C	150°F
CYLINDER HEAD TEMPERATURE				
Maximum	250°C	480°F	150°C	300°F
Normal	180 – 220°C	350 – 430°F	110 - 130°C	230 - 270°F
EXHAUST GAS TEMPERATURE				
Maximum	650°C	1200°F	650°C	1200°F
Normal	460-580°C	860 -1000°F	500-620°C	930 -1050°F
AMBIENT START & OPERATING TEMPERATURE				
Maximum	50°C	120°F	50°C	120°F
Minimum	-25°C	-13°F	-25°C	-13°F

Table 4 Section 2. Engine Limitations

The cockpit may be fitted with a cylinder head temperature gauge (CHT) and or an exhaust gas temperature (EGT) gauge. Aircraft fitted with the Rotax 582 water cooled engine may also have a water temperature gauge fitted.

The maximum operating temperatures are indicated by a **RED** mark on the gauge.

2.5.2 Engine Cylinder Head Temperature Limitations

	503 UL	582 UL
Normal Operating Range	180 to 220 deg C 356 to 428 deg F	110 to 130 deg C 230 to 270 deg F
Maximum Operating Temperature	250 deg C 482 deg F	150 deg C 300 deg F
Difference between 2 Cylinders	20 deg C 36 deg F	10 deg C 18 deg F

Table 5 Section 2. Engine Cylinder Head Temperature Limitations

2.5.3 Engine Exhaust Gas Temperature Limitations

	503 UL	582 UL
Normal Operating Range	460 to 580 deg C 860 to 1000 deg F	500 to 620 deg C 930 to 1150 deg F
Maximum Operating Temperature	650 deg C 1200 deg F	650 deg C 1200 deg F
Difference between 2 Cylinders	25 deg C 43 deg F	25 deg C 43 deg F

Table 6 Section 2. Engine Exhaust Gas Temperature Limitations

2.5.4 Engine Water Temperature Limitations

	503 UL	582 UL
Normal Operating Range	Not Applicable	65 to 80 deg C 150 to 175 deg F
Maximum Operating Temperature	Not Applicable	80 deg C 175 deg F

Table 7 Section 2. Engine Water Temperature Limitations

The instrument panel may be fitted with an engine tachometer gauge, and the operation of the engine rpm can be monitored using this gauge. The maximum rpm is indicated with a **RED** mark on the gauge.

	503 UL	582 UL
Engine Tachometer Limitations (5 minute maximum for Take off speed)	6800 rpm Max	6800 rpm Max
Cruising speed	6500 rpm	6500 rpm

Table 8 Section 3. Engine Water Temperature Limits

2.5.5 Fuel Grades

FUEL	
Preferred Fuel Type	En228 Premium/Regular. Super grade gasoline, lead free, min RON 90
Optional Fuel Type	AVGAS (see note)

Table 9 Section 2. Fuel Specification

NOTE
Due to higher lead content in AVGAS deposits in the combustion chamber will increase. Therefore, use AVGAS only if you encounter problems with vapour lock or if the other fuel type is not available.

Use of AVGAS requires higher frequency maintenance intervals. Refer to the maintenance manual.

Refer to section 2.6.7 for fuel capacities and limitations

2.5.6 Engine Lubricating Oil

Aircraft using Rotax 582 powerplant supply engine lubrication via the oil injection system which is gravity fed. The oil quantity is defined by engine rpm and the lever position. The lever is actuated via a Bowden cable connected to the throttle cable. The oil injection tank has a capacity of 2 litres.

Aircraft using Rotax 503 powerplant use fuel premixed with two stroke oil.

	503 UL	582 UL
Engine lubricating oil. Fuel oil mixture ratio	50:1 fuel and oil premix	Automatic oil injection

Table 10 Section 2. Engine Lubrication Oil

Engine Lubricating Oil Specifications
Oil used is Super two stroke ASTM/CEC standards, API-TC classification (consult your Rotax dealer for a recommended oil to suit your operating environment).

2.5.7 Rotary Valve Lubrication

Applicable to X Outback and Classic, 582 powered aircraft.

Rotary valve lubrication is supplied via a small tank mounted on the top right hand side of the engine. The tank has a maximum fill level with a capacity of 60 mL of oil. The oil has the same specifications as the oil injection system.

Oil Specifications
Oil used is Super two stroke ASTM/CEC standards, API-TC classification (consult your Rotax dealer for a recommended oil to suit your operating environment).

2.5.8 Gearbox Lubrication

	503 UL	582 UL
Gearbox lubricating oil.	C type 120 ml	E type 180 ml

Table 11 Section 2. Engine Lubrication Oil

Gearbox Lubricating Oil Specifications
Gear oil API-GL5 or GL6, SAE 140 EP or 85W – 140 EP

2.5.9 Cooling System

WARNING

DO NOT OPEN THE COOLING SYSTEM WHEN THE ENGINE IS HOT. SEVERE SCALDING AND OTHER INJURIES MAY RESULT.

The Rotax 582 powerplant uses a water-cooling system, with coolant capacity of 4.0L. See maintenance manual for further details.

Coolant Specification
Rotax specifies use of: 50% antifreeze concentrate with additives against corrosion and 50% pure water, or use of an equivalent premixed coolant.

AirBorne has had satisfactory results using the brand Nulon Red which is silicate free and is a Mono Ethylene Glycol product containing 1040 gm glycol per litre.

The Rotax 503 powerplant is air cooled.

2.5.10 Propeller

2.5.10.1 Brolga Propeller

Manufacturer: Aerofibre Industries

Model: 68" x 4 BROLGA

Type: 4 Blade Composite, ground adjustable using pitch blocks

Diameter: 1727mm +/- 5mm

Pitch: determined by pitch block installation

Hub Manufacturer: Competition Aircraft

Hub Type: Ultra-Prop

Engine Model Applicable Aircraft	Rotax 503 – UL X Series Redback	Rotax 582 - UL X Series Outback and Classic
Approved Propeller BROLGA 68" x 4 Blade Ground Adjustable	Pitch Setting 14° pitch blocks	Pitch Setting 17° pitch blocks

Table 12 Section 2. Brolga Propeller Specifications

2.5.10.2 Warp Drive Propeller

Manufacturer: Warp Drive Propellers

Model: 68 INCH

Type: 3 Blade Composite ground adjustable

Diameter: 1727mm +/- 5mm

Pitch: Standard pitch is given in Table 13.

Hub Type Warp Drive HPL-R 914 Pattern

True Propeller size: 67.7" (1720mm)

Engine Model Applicable Aircraft	Rotax 503 – UL X Series Redback	Rotax 582 - UL X Series Outback and Classic
Approved Propeller	Warp Drive Pitch Setting 10° blade tip, reference to rear face of hub.	Warp Drive Pitch Setting 16° reference to rear face of hub.

Table 14 Section 2. Warp Drive Propeller Specifications

2.5.10.3 Bolly BOS Propeller

Manufacturer: Bolly BOS

Model: 68 INCH

Type: 3 Blade Composite ground adjustable

Diameter: 1727mm +/- 5mm

Pitch: Standard pitch is given in Table 15

Hub Type Bolly BOS 3 blade, 582 Pattern

True Propeller size: 67.7" (1720mm)

The maximum propeller speed of 1960 RPM has been determined by test. The maximum propeller speed occurs when the engine RPM reaches 6800 RPM.

Engine Model Applicable Aircraft	Rotax 503 – UL X Series Redback	Rotax 582 - UL X Series Outback and Classic
Approved Propeller	Bolly BOS 3 Blade Pitch Setting 10° reference to rear face of hub.	Bolly BOS 3 Blade Pitch Setting 16° reference to rear face of hub.

Table 16 Section 2. Bolly BOS Propeller Specifications

2.6 Weight limits

	Streak Wing with Edge X Base	Wizard Wing with Edge X Base
Max number of occupants	2 persons	2 persons
Max empty weight Edge & Edge E series base	188 kg	188 kg
Max empty weight Edge X series base	191 kg	191 kg
Max take off weight	401 kg	401 kg
Max landing weight	401 kg	401 kg
Min total occupant weight	65 kg	65 kg
Max total occupant weight	180 kg.	180 kg
Max positive manoeuvring load factor	4.0 G	4.0 G
Negative load factors	Prohibited	Prohibited
Load factors below 1.0 G	To be avoided	To be avoided

Table 17 Section 2. Weight Limits

Empty weight is defined in section 6.2.

The microlight aircraft must **only** be flown **solo** from the **front seat.** Minimum pilot weight flown solo is determined in section 2.7.9.

All aircraft operations may be carried out whilst solo, as when the aircraft is flown dual. With lighter aircraft AUW the full-power setting may have to be reduced to get a safe climb angle after lift off.

The approved combination of microlights are designed to carry a maximum cockpit weight of 180 kg with maximum fuel capacity of 44 litres (30.8 kg) for Edge X series bases.

Having the trike unit attached to the wing from a single universal bracket, variations of cockpit loading and fuel loading cannot influence the aircraft's balance. The Edge X is therefore not critical in regards to centre of gravity although the distribution of load in the trike base effects the in-flight attitude of the trike base. This change in attitude of the trike base has a secondary influence on aircraft pitch control.

Edge series trikes should **only** be attached to the wing using the bracket and connecting bolt supplied. The bracket on the wings is designed with three trim settings allowing the trim to be preselected.

The rear CG position must only be used with MTOW of less than 340 kg.

2.7 Operational Limits

2.7.1 Centre of Gravity limits

Centre of gravity limits are not critical on the base of a flex wing microlight. Having the trike unit attached to the wing from a single universal bracket, variations of cockpit loading and fuel loading cannot influence the aircraft's balance. The Edge X is therefore not critical in regards to centre of gravity although the distribution of load in the trike base has a minor affect on the in-flight attitude of the trike base.

The wings have three attachment points on the universal bracket. The forward setting will increase the trim speed and the aft setting will decrease trim speed.

The variation of attachment point has been designed to allow the pilot to pre-select the centre of gravity position prior to flight.

Under normal operations the trike base should be attached to the wing in the middle position. The rearward trim position must be used with MTOW of 340kg or less. In flight the only noticeable difference is the control bar pitch pressure, which increases as the hang point is moved rearward.

The fuel capacity must always be considered when measuring the AUW of the aircraft. Remember that fuel is measured at 0.7 kg per litre and may slightly alter the aircraft's performance during take off and landing.

The table below are the minimum and maximum allowable CG range for AirBorne wings. The CG position should not be outside of these dimensions.

Base Suspension Range - Measured from the line joining the leading edge nose bolts to the suspension point.	**MAXIMUM REARWARD CG**	**MINIMUM FORWARD CG**
STREAK WING	1260 mm	1210 mm
WIZARD WING	1630 mm	1580 mm

Table 18 Section 2. Centre of Gravity Limits

2.7.2 Manoeuvring Limits

All aerobatic manoeuvres including spinning is prohibited.

Aerobatic manoeuvres including whipstalls, stalled spiral descents and negative "G" manoeuvres are not permitted. It must be emphasised that a whipstall, spiral descent or negative G manoeuvre can never be conducted safely. These manoeuvres put the aircraft outside the pilots control and put both the aircraft and its occupants in extreme danger.

Do not pitch nose up or nose down more than 45 degrees from the horizontal. The front support tube of the trike and the pilot's chest limits the fore and aft movement of the control bar respectively.

2.7.3 Bank Angle

Do not exceed 60 degrees of bank angle. In roll there is no stop for the control movement. For the purpose of pre-flight check of control freedom; check by lowering each wing to within 10 cm of the ground (on ground level).

2.7.4 Flight Load Factor Limits

Max positive manoeuvring load factor	4.0 G
Negative load factors	Prohibited
Load factors below 1.0 G	To be avoided

Table 19 Section 2. Flight Load Factor Limits

2.7.5 Flight Crew Limits
Minimum flight crew is 1 person (Front Seat)

2.7.6 Kinds of Operation Limits
The aircraft is only to be flown under visual flight rules (VFR), and the minimum equipment required to operate under VFR conditions are an air speed indicator, altimeter, and instruments as required by the engine manufacturer.

In Australia, when operated at a public aerodrome or on a cross country flight, a compass and reliable time piece are required. Additional equipment may be required for some overseas operations.

2.7.7 Fuel Limitations

Minimum Usable Fuel (note 1)	37 litre	9.8 US Gal
Maximum Usable Fuel (note 2)	43 litre	11.4 US Gal
Fuel tank sump capacity Edge X Series	350 millilitres	12 oz

Table 7 Section 2. Fuel Limitations

CAUTION

SIGHT GAUGE 10 LITRE GRADUATIONS INDICATE TOTAL FUEL, NOT USABLE FUEL. ZERO USABLE FUEL IS INDICATED WHEN THE FUEL IS LEVEL WITH THE BOTTOM OF THE SIGHT GAUGE

Note 1. The minimum useable fuel is defined by the first evidence of engine malfunctioning occurring at the full power setting, climbing at the safety take off speed with minimum aircraft weight.

Note 2. The maximum useable fuel is defined by the first evidence of engine malfunctioning occurring at the power setting established for level flight in the cruise configuration with maximum weight.

2.7.8 Maximum Passenger Seating Limits

One passenger maximum allowed. Maximum pilot weight is 100kg per seat.

2.7.9 Minimum Pilot Weight

The microlight aircraft must only be flown solo from the front seat**.** Minimum pilot weight flown solo shall not be below 55 kg. Maximum power at minimum TOW can cause an abrupt climb rate that, if uncorrected, may cause a wing attitude of greater than the placarded maximum of 45 degrees. Approximately 2/3 of maximum take off power is considered comfortable for a minimum weight takeoff. should not be below 55 kg. If the pilot weight is below 55 kg it may be necessary to carry ballast in water bags. Ensure the bags are watertight and safely secured in the soft side pockets. Take off distance will be extended at reduced power.

2.7.10 Other Limitations

Maximum Cross Wind	12 knots	13 mph
Maximum Wind Strength	20 knots	23 mph
Maximum Ambient Operating Temperature	50 deg C	120 deg F

Table 8 Section2. Other Limitations

No person who is untrained or unqualified in weight shift controlled flight or, who is unfamiliar with the wing and base combination, should ever attempt to pilot the aircraft unless under professional instruction.

The effect of light rain on the aircraft can increase the stall speed. It is extremely important to maintain speeds in excess of the take off and landing safety speeds when the wing is wet. If the aircraft has been left out in the rain or heavy dew it is necessary to wipe the wing down prior to take off. It is also recommended that the aircraft be flown solo first to ensure all excess moisture is removed. A chamois or sponge is recommended to remove the water.

Continued operation in heavy rain is not recommended due to the abrasive effect of raindrops on the propeller. Do not use waterproofing agents on the wing as the consequent beading of water droplets can significantly increase the stall speed.

CAUTION

MOISTURE ON THE WING CAN INCREASE STALL SPEED AND SHOULD BE REMOVED PRIOR TO TAKE OFF.

2.8 Placards

The placards on the aircraft are designed to provide information regarding general aircraft limitations and other details for the safe operation of the aircraft. Listed on the following pages are details of the placards fitted to the aircraft.

2.8.1 Flight Limitations Placard

62mm

AIRBORNE WINDSPORTS Pty. Ltd.
Newcastle. NSW. Australia

AIRCRAFT TYPE: *EDGE*

FLIGHT LIMITATIONS

DO NOT PITCH NOSE DOWN
OR NOSE UP MORE THAN
45 DEGREES FROM HORIZONTAL
OR EXCEED 60 DEGREES OF BANK

NO NEGATIVE G

NO AEROBATIC MANOEUVRES

NO WHIPSTALLS
NO STALLED SPIRAL DESCENTS

ENGINE LIMITATIONS

FUEL/OIL MIXTURE RATIO	*50:1*
MAXIMUM RPM	
CHT NORMAL (Deg C)	
CHT MAXIMUM (Deg C)	

LOADING LIMITATIONS

EMPTY WEIGHT			
TRIKE BASE	EDGE WING	STREAK WING	WIZARD WING
kg	*53 kg*	*49 kg*	*47 kg*
TOTAL	kg	kg	kg

MAXIMUM TAKEOFF WEIGHT (kg)	
MAXIMUM WEIGHT OF OCCUPANTS	*180kg*

FLY SOLO FROM FRONT SEAT ONLY

136mm

PART No.103835

Figure 1 Section2

Location	The flight limitation placard is located on the trike base tube between the steering carrier and the rear passenger foot rest	
Series	Edge X	
Configuration	With Streak Wing	With Wizard Wing
Placard	103835	103835

Table 9 Section 2. Flight Limitations Placards

2.8.2 Aircraft Operating Instructions Placard

Figure 2 Aircraft Operating Instructions Placard Part # 107592

Location	The Aircraft Operating Instructions placard is located on the instrumentation dash
Series	Edge X Series

Table 10 Section 2. Hand Book Placard

2.8.3 Wing V_{ne} ASI Placard

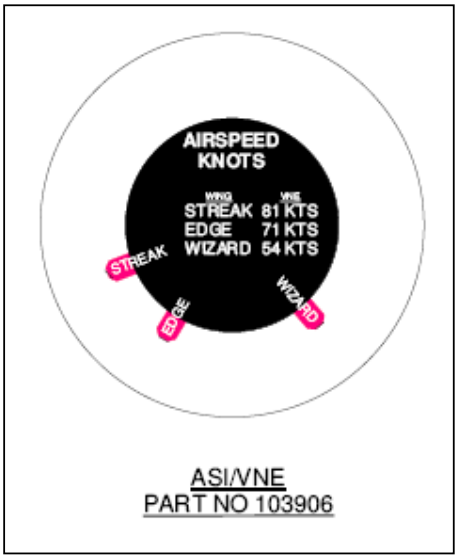

Figure 3 Section 2. V_{ne} Placard

Location	The V_{ne} Placard is located on the air speed indicator on the left side of dash.
Series	Edge X Series

Table 11 Section 2. Wing V_{ne} ASI Placard

2.8.4 Take Off Safety Speed Limitations Placard

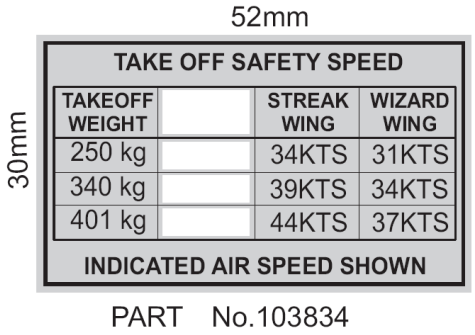

Figure 4 Section 2

Location	The Take Off Safety Speed Placard is located on the dash adjacent to the mast brace tube.
Series	Edge X Series

Table 20 Section 2. Take Off Safety Speed Limitations Placard

2.8.5 Fuel Capacity Placard

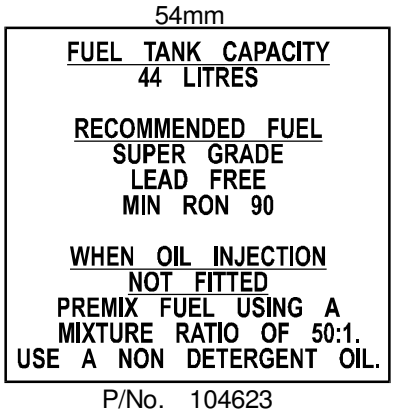

Figure 5 Section 2. Fuel Capacity Placard

Location	The fuel capacity placard is located on the fuel tank adjacent the fill point.
Series	Edge X Series

Table 13 Section 2. Fuel Capacity Placard

2.8.6 Useable Fuel Placard

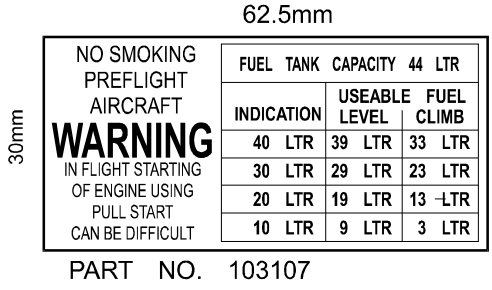

Figure 6 Section 2. Useable Fuel Placard

Location	The fuel useable fuel placard is located on the aircraft dash.
Series	Edge X Series