Aeros-2/Cross Country ultralight

OWNER /SERVICE MANUAL

Wing: STINGRAY

Engine: Rotax 912 UL/Rotax 912 ULS

Manufactured by:

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Introduction

Thank you for purchasing the Aeros-2/Cross Country/Cross Coutry ultralight.

The Aeros-2/Cross Country/Cross Couuntry ultralight is an advanced product of Aeros Ltd. It has been developed to provide the economy and durability combined with maximum safety and comfort. The success of our ultralights based upon a high standard of product quality, innovative design engineering and exceptional standards of reliability and performance that have been established since 1991.

Please read and be sure you thoroughly understand this manual before operating your Aeros-2/Cross Country/Cross Country ultralight. Be sure you are thoroughly familiar with the ultralight and the contents of this manual before initial operation.

Regular maintenance is required to keep your ultralight in a safe condition. Maintenance requirements are outlined in the Wing maintenance and Trike maintenance sections of this Manual. Please reference these sections to ensure your ultralight is maintained correctly.

The operating procedures outlined in this Manual are the result of Aeros knowledge and experience gained since 1991.

Aeros data packages will be revised from time to time. It is therefore important that you visit us regularly at http://www.aeros.com.ua

In case of any doubts or questions contact your local dealers or Aeros.

We wish you a safe and enjoyable flying career.

Aeros Ltd.

AMENDMENT RECORD SHEET

Amendment Date	**Affected Sections**	**Affected Pages**	**Date Inserted**	**Signature**

1. GENERAL INFORMATION

1.1 Symbols Abbreviations and Terminology

In this Manual:
CG means the centre of gravity.
IAS means the airspeed indicated on the cockpit mounted airspeed indicator.
Landing Approach Speed means the airspeed that allows control in turbulence, wind gradient or sudden engine failure during landing.
Maneuvering Speed means the indicated airspeed above which the pilot may not make full or abrupt control movements.
QNH means the pressure setting, that if set on the subscale of a sensitive altimeter, will cause the altimeter to indicate the correct local altitude above mean sea level.
Stall Speed means the indicated airspeed at which an uncontrolled downward pitching motion of the ultralight occurs or the forward control bar limit is reached.
Take Off Safety Speed means the airspeed that allows control in turbulence, wind gradient or sudden engine failure during the climb following take-off.
Trim Speed means the indicated airspeed at which the ultralight remains in a stabilized condition without pilot input.
Trike in this Manual means fuselage of the weight shift controlled powered aircraft with a power plant and a tricycle undercarriage.
Ultralight in this Manual means weight shift controlled powered aircraft with tricycle base (trike) and a flex wing.
VNE means the indicated airspeed that the ultralight is never to exceed.

1.2 Definitions

Definitions used in this Manual such as WARNING, CAUTION and NOTE are employed in the following context:

WARNING
OPERATING PROCEDURES, TECHNIQUES, ETC. WHICH IF NOT FOLLOWED CORRECTLY, MAY RESULT IN PERSONAL INJURY OR DEATH.

CAUTION
OPERATING PROCEDURES, TECHNIQUES, ETC. WHICH IF NOT STRICTLY OBSERVED, MAY RESULT IN DAMAGE TO THE ULTRALIGHT OR ITS INSTALLED EQUIPMENT

NOTE
Operating procedures, techniques, etc. which it is considered essential to highlight.

WARNING
THE OWNER AND OPERATOR MUST UNDERSTAND THAT DUE TO INHERENT RISK INVOLVED IN FLYING A MICROLIGHT/ULTRALIGHT/TRIKE/POWERED HANG GLIDER, NO WARRANTY IS MADE OR IMPLIED, OF ANY KIND, AGAINST ACCIDENTS, BODILY INJURY OR DEATH OTHER THAN THOSE, WHICH CANNOT BE EXCLUDED BY LAW.
THE SAFE OPERATION OF THIS ULTRALIGHT RESTS WITH YOU, THE PILOT.
WE BELIEVE THAT IN ORDER TO FLY SAFELY YOU MUST MATURELY PRACTICE AIRMANSHIP.
OPERATIONS OUTSIDE THE RECOMMENDED FLIGHT ENVELOPE SUCH AS AEROBATIC MANOEUVRES OR ERRATIC PILOT TECHNIQUE MAY ULTIMATELY PRODUCE EQUIPMENT FAILURE. YOU ARE REFERRED TO THE OPERATING LIMITATIONS IN SECTION 2 OF THIS MANUAL
THE SETTING UP AND BREAKING DOWN OF A MICROLIGHT/ULTRALIGHT/TRIKE/POWERED HANG GLIDER, TRANSPORTATION AND FLYING WILL HAVE AN EFFECT OVER TIME ON ITS STRUCTURAL INTEGRITY.
THE ULTRALIGHT WILL REQUIRE MAINTENANCE AS OUTLINED IN THE APPLICABLE MAINTENANCE MANUALS.

LIKE ANY ULTRALIGHT, SAFETY DEPENDS ON A COMBINATION OF CAREFUL MAINTENANCE AND YOUR ABILITY TO FLY INTELLIGENTLY AND CONSERVATIVELY.
WE HOPE THAT YOUR ULTRALIGHT WILL PROVIDE YOU WITH MANY HOURS OF SAFE AND ENJOYABLE FLYING.

1.3 Two View Photos *(fig.1 and fig. 2):*

Figure 1

Figure 2

1.4 General Dimensions

DIMENSIONS	METRIC		IMPERIAL	
Wing span	9.52	m	31.21	ft
Wing area	12.85	sq m	138	sq ft
Aspect ratio	6.95			
Wing weight (with hang bracket and trim device, without bags)	63.6	kg	140.2	lbs
Wing length (packed)	5.4	m	17.64	ft
Wing length (short packed)	3.8	m	12.13	ft
Trike width	1.9	m	6.22	ft
Trike length	2.75	m	9	ft
Wheel track	1.65	m	5.41	ft
Wheel base	1.67	m	5.48	ft
Trike height (without wing)	2.57	m	8.43	ft
Cockpit width	0.8	m	2.62	ft

1.5 General Description

1.5.1 Trike

The Aeros-2/Cross Country trike is a two seat (in line) weight shift controlled ultralight. A Rotax 912 four-stroke engine producing 80/100 HP powers the base. It is attached to the wing by way of a universal joint which allows the free movement of the trike in pitch and roll by which control is affected. The trike includes the tricycle undercarriage, power plant and cockpit.
The engine is mounted to the engine platform at the base of the engine. The fuel tank is mounted beneath the engine platform.
The pilot cockpit is designed to allow for various size pilots.
The cockpit has a windscreen for improved wind deflection.

1.5.2 Wing
The Sting Ray wing is the result of continued refinement of Aeros trike wings over the years since 1991. Sting Ray is a kingpostless two-seater trike wing with 86 % double surface, designed for the experienced pilots who want to have fun in powered flying.
Sting Ray wing was designed as a supplement to our kingpostless Profi TL wing to have more fun when flying in rough air. With similar to Profi TL flying characteristics, Sting Ray has superior handling. Yet, it is very stable and comfortable to fly in turbulence.
On landing approach Sting Ray is very easy to slow down which makes it fairly easy to land.

No kingpost means that you can store the wing in a hangar while it remains fixed to the trike. This allows storing the trike with the wing on it in a really limited space in a hangar or even in a garage. Setting the wing that already attached to the trike up for flight is fast and easy.
The structural strength of the Sting Ray is sufficient for different flight conditions with defined wing load.

1.5.3 Ultralight
The Aeros-2/Cross Country combined with the Sting Ray wing has proven to be an excellent combination. The total fuel capacity is 48 litres and combined with the Rotax 912 delivering a smooth 80/100 HP allows long cross country flights.

2. LIMITATIONS

2.1 General
The limitations section of this Manual outlines the various operating limitations, instrument function and placards necessary for the safe operation of this ultralight, engine and standard equipment.

2.2 Airspeed Limitations

SPEED	km/h	mph	COMMENTS
Vne (never exceed speed)	160	100	Do not exceed this speed in any operation
Va (maximum maneuvering speed)	130	81	Do not make full or abrupt control movements above this speed

2.3 Power Plant Limitations

2.3.1 Engine
Manufacturer: Rotax Bombardier
Model: Rotax 912 UL 2 (4 Stroke) or Rotax 912 ULS
Gearbox ratio: 2.43: 1

ENGINE LIMITATIONS	Metric		Imperial	
Engine speed				
Take off (Max 5 minutes)	5800	rpm	5800	rpm
Maximum (continuous)	5500	rpm	5500	rpm
Power output				
Take off power	59.6/74.5	kW	80/100	hp
Maximum continuous power	58/71	kW	78/95	hp
Oil pressure				
Normal (at 5500 rpm)	4	bar	58	psi
Maximum	5	bar	72	psi
Minimum (at 2800 rpm)	1.5	bar	22	psi
Oil temperature				
Normal	90 - 110	Deg C	190 - 230	Deg F
Maximum	140	Deg C	285	Deg F

Minimum	50	Deg C	120	Deg F
Cylinder head temperature				
Maximum	150	Deg C	300	Deg F
Exhaust gas temperature				
Normal temperature	800	Deg C	1472	Deg F
Maximum at Max continuous power	850	Deg C	1560	Deg F
Ambient start and operating temperature				
Maximum	47	Deg C	116	Deg F
Minimum	-25	Deg C	13	Deg F

WARNING:
This is **non-certified** aircraft engine , the possibility of engine failure exists at all time. Do not operate this egine over densely populated areas.Do not operate this engine over terrain where a safe, power off landing cannot be performed.

NOTE
Minimum Oil Temperature of 50 deg C should be reached before take off. Operate for 2 min at 2000 rpm continue at 2500 rpm until minimum temperature is reached.

2.3.2 Fuel
Fuel type En 228 Premium / Regular. Super grade gasoline, lead free, min RON 90.

2.3.3 Lubricating Oil
The 912 UL/912 ULS engine has an external sump, and the entire system is standard to the Rotax 912 engine. The oil specification is given in the Rotax Operators Manual, Section 10.2.3, Lubricants. In general use only synthetic or semi synthetic oil, API classification .SF. or .SG. or later quality oils. Mulitigrade is recommended. These oil types are detergent types.

Oil Capacity: 3 Litres Max, 2 Litres Min, and Consumption 0.06 Litres/Hr Max.

Two oils, which are recommended by the Rotax Service instruction 18, UL 97 are:
SHELL, Advance VSX 4, APISG, SAE 15W-50
VALVOLINE, Dura Blend Synthetic, APISJ, SAE 10W-40

2.3.4 Cooling System
Water-cooling system capacity is 2.5 l. See maintenance manual for further details.

2.4 Weight limits

	Metric	**Imperial**
Maximum take off weight	472.5 kg	1050 lbs
Empty weight (with Emergency Rescue System)	232.5 kg	517 lbs
Permitted range of pilot weights		
Front seat	55-100 kg	122-222 lbs
Rear seat	0-100 kg	0-222 lbs
Total maximum crew weight	200 kg	444 lbs

2.5 Operational Limits

2.5.1 Centre of Gravity limits
Centre of gravity limits are not critical on the trike of a flex wing ultralight. Having the trike unit attached to the wing with a universal bracket, variations of cockpit loading and fuel loading cannot influence the ultralight's balance. The Aeros-2/Cross Country is therefore not critical in regards to centre of gravity although the distribution of load in the trike has an affect on the in-flight attitude of the ultralight.

2.5.2 Maneuvering Limits
All aerobatic maneuvers including spinning are prohibited.
Aerobatic manoeuvres including stalls, stalled spiral descents and negative G manoeuvres are not permitted. It must be emphasized that a stall, spiral descent or negative G manoeuvre can never be conducted safely. These manoeuvres put the ultralight outside the pilots control and put both the ultralight 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 limit the fore and aft movement of the control bar respectively.
Do not make steep turns at high speed.

2.5.3 Bank Angle
Do not exceed 60 degrees of bank angle. In roll there is no stop for the control movement. When performing the pre flight procedure check that the wing moves freely by lowering each wing to within 10 cm of the ground (on ground
level).

2.5.4 Flight Load Factor Limits
Max positive maneuvering load factor: 4.0 G.
Negative load factors prohibited.
Load factors below 1.0 G to be avoided.

2.5.5 Kinds of Operation Limits
The ultralight 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 required by the engine manufacturer.
Additional equipment may be required for some foreign operations.

2.5.6 Fuel Limitations
Tank capacity 48 liters (14.3 US Gal)

2.5.7 Maximum Passenger Seating Limits
One passenger maximum allowed.

2.5.8 Minimum Pilot Weight
The microlight ultralight must only be flown solo from the front seat. Minimum pilot weight flown solo shall not be below 55 kg. Maximum power at minimum take off weight can cause an abrupt climb rate that, if uncorrected, may cause climb angles of greater than maximum of 45 degrees.
Approximately 2/3 of maximum take off power is considered comfortable for a minimum take off weight.
Take off distance will be extended at reduced power.

2.5.9 Other Limitations
Maximum Cross Wind - 6m/s
Maximum Wind Strength - 12m/s
Maximum Ambient Operating Temperature + 40 …-10 deg C

No person who is untrained or unqualified in weight shift controlled flight or, who is unfamiliar with the wing and trike combination, should ever attempt to pilot the ultralight unless under professional instruction.
The effect of light rain on the ultralight 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 ultralight 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 ultralight be flown solo first to ensure all excess moisture is removed.
Continued operation in heavy rain is not recommended due to the abrasive effect of raindrops on the propeller.

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

3. ULTRALIGHT & SYSTEMS DESCRIPTION

3.1 General

This section provides descriptions of the ultralight and its systems as well as methods of operation where appropriate.
Information on the ultralight flight controls is detailed in this section, but it is mandatory that you receive professional training prior to any solo flight.

3.2 Ground / Flight Control

Ground / flight Controls are as follows:
- Push left pedal = Taxi steering right
- Push left toe = Brakes on
- Ignition switch forward = Switch on
- Choke forward = Choke on

- Control bar move left = Right turn
- Control bar move right = Left turn
- Control bar push out = Pitch up
- Push right toe = Throttle open
- Hand throttle forward = Throttle open

3.3 Trim device operation

Aeros-2/Cross Country ultralight could be equipped with the trim device mechanism for trimming the ultralight in pitch.

Specifications of the Wing Trim Device

Voltage supply	9 – 14 V
Nominal force	300 kg
Maximum force	1000 kg
Consumption current at nominal force	10 A
Travel	92 mm
Emergency travel	100 mm
Complies with	IP54
Moving speed	15 mm/sec.
Operating mode	Short-term, repeated
Temperature range	-15…+55 °C
Time to failure	
relay	500000 turn-ons
terminal switch	100000 turn-ons
electric motor	1000 hours
Dimensions	Diam. 48 x 371 mm
Weight	1.425 kg

NOTE:
In the power supply system of the trim device it is necessary to have a 15A safety fuse.

For take off and landing the trim device position is 25 – 30 mm from most aft position (visual check).
For cruise trim the ultralight on desired cruise speed with the trim device.
The travel range of 92 mm is sufficient for trimming the ultralight in the horizontal straight flight at the speed range of 65 – 100 km/h.
After the trim device has reached the most forward or rear positions its travel automatically stops.

WARNING:
THE TRIM DEVICE IS DESIGNED TO OPERATE IN HORISONTAL FLIGHT, DURING TAKE OFF AND LANDING ONLY.

WARNING:
IT IS NOT RECOMMENDED TO USE THE TRIM DEVICE IN MOST FORWARD POSITION IN TURBULENT AIR IN ORDER TO AVOID EXCEEDING MAX. LOAD FACTOR.

CAUTION:
DO NOT LEAVE THE TRIM DEVICE ON IN MOST FORWARD AND AFT POSITION FOR LONG PERIOD OF TIME. IT MUST NOT REACH 10MM TO ITS END POSITIONS.

The trim device consists of:
- travel mechanism;
- rear bracket;
- front bracket;
- joint unit;
-electric wiring with connectors, control switch and safety fuse.

The control switch is mounted on the right side of the cockpit (Aeros-2 trike) *(fig. 3)* or on the seat frame bottom bracket (Cross Country trike).

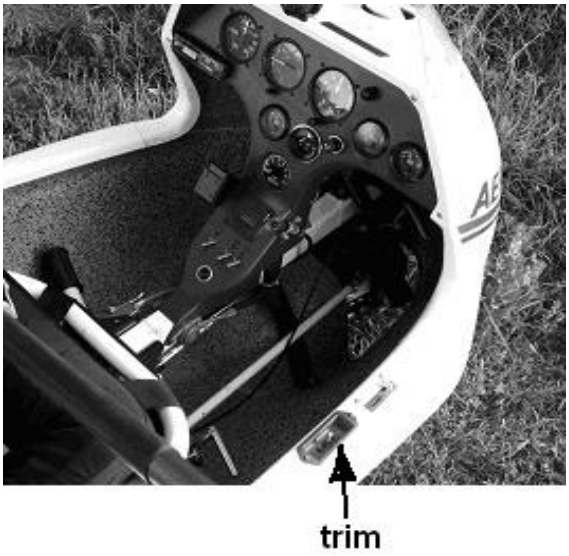


Figure 3


Figure 4

NOTE:
In case of the trim device failure in most forward position it is recommended to use flat, with no obstacles landing field which is long enough for landing due to increased landing approach speed.

3.4 Instrument panel

The instrument panel may consist of:
- air speed indicator;
- variometer;
- altimeter;
- oil pressure gage;
- oil temperature gage;
- head temperature gage;
- engine operation time counter;
- fuel gage;
- tachometer;
- compass.

The instruments possible arrangement is shown on the photo *(fig. 4).*
The Pitot static gage supplies ram air pressure to the air speed indicator from the nose of the cockpit.

The static pick up is at the rear of the instrument under the dash.
The power switch, ignition switches and the starter button can be found on the bottom side of the dash.

3.5 Occupant restraint Harness

Both front and rear seats are fitted with a restraint harness system.
When flying the trike solo it is important to fasten the rear seat belt to prevent contact with hot engine components in flight.

3.6 Engine

The power unit is a Rotax 912 UL 80hp 4-stroke engine designed and built in Austria. The Rotax engine is fitted with a gearbox, which delivers smooth thrust via a reduction drive. This power unit is complemented with a ground adjustable propeller giving the ultimate in performance and reliability. The engine is fitted with Bing carburettors with an external dry filter.

3.7 Propeller

Manufacturer: Aerolux.
Model: _AL-C3L.
Type: 3 Blade Composite ground adjustable.
Diameter: 1750mm.
There may be a different propeller installed on the trike.
The maximum propeller speed occurs when the engine RPM reaches 5800 RPM.
For the propeller pitch seting refer to the propeller Manual. Settings outside the specification, outlined in this manual have an unknown effect on the Ultralight performance, and are not approved.

3.8 Manifold air heating system

The system is designed for:
-minimizing risk of carburetor icing;
- manifold pressure noise reduction;
- manifold pressure equalizing.
The working medium in the system is intake air which warms up from the exhaust pipe and transfers to the manifold receiver by manifold pipes.

Figure 5


Figure 6

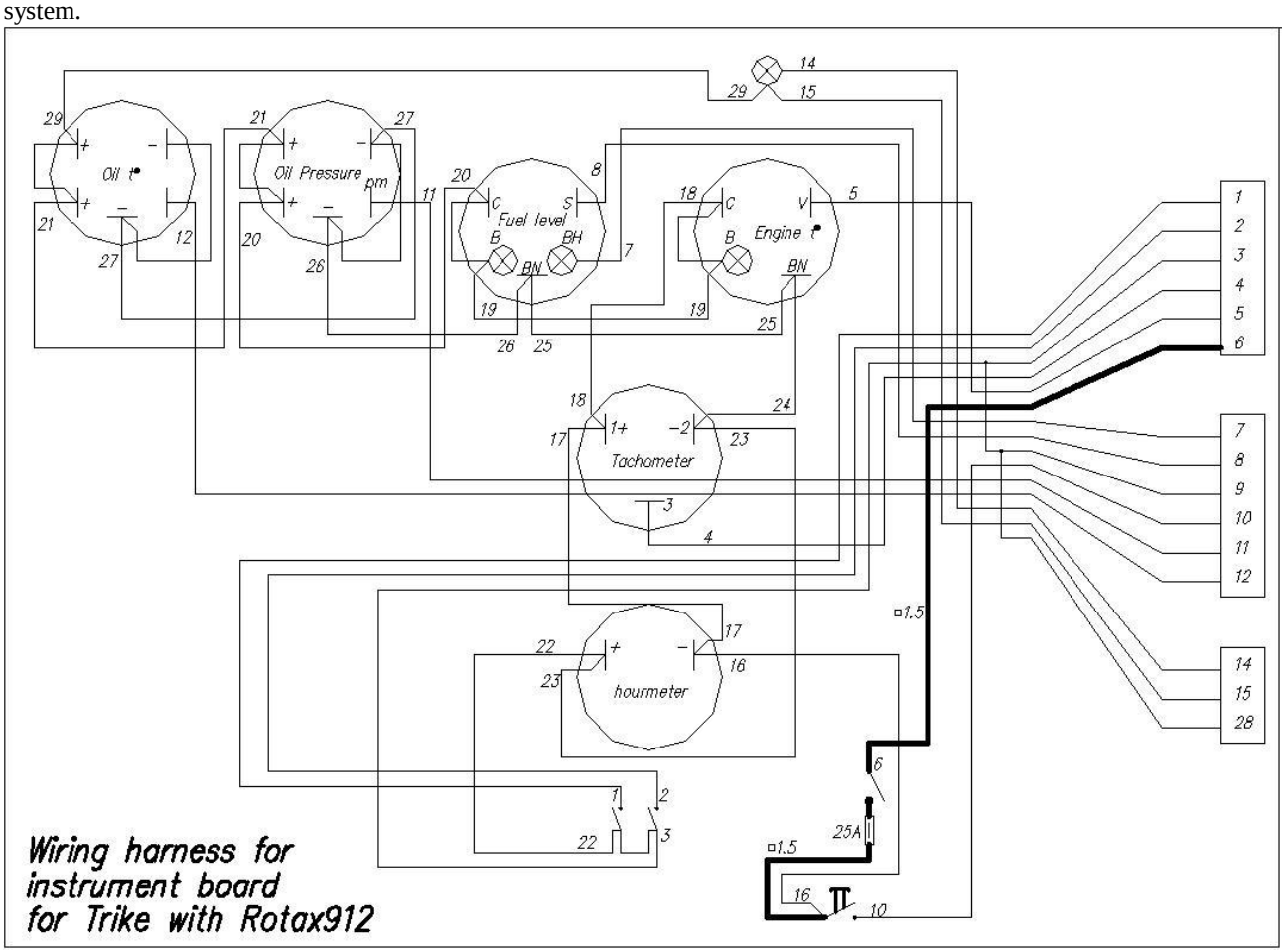
The manifold receiver is attached directly to the carburetor and has two flap valves which are connected to the control arm *(fig. 5).* The control arm of the receiver has two positions:
- flap valves are open;
- flap valves are closed.
Open flap valves enable the warm intake air to supply into the carburetor.
Closed flap valves restrict the warm air intake and open the ambient air to supply into the carburetor.
Control switch is mounted on the right side of the cockpit (Aeros-2 trike) *(fig. 6)* or on the central part of the dash (Cross Country trike).

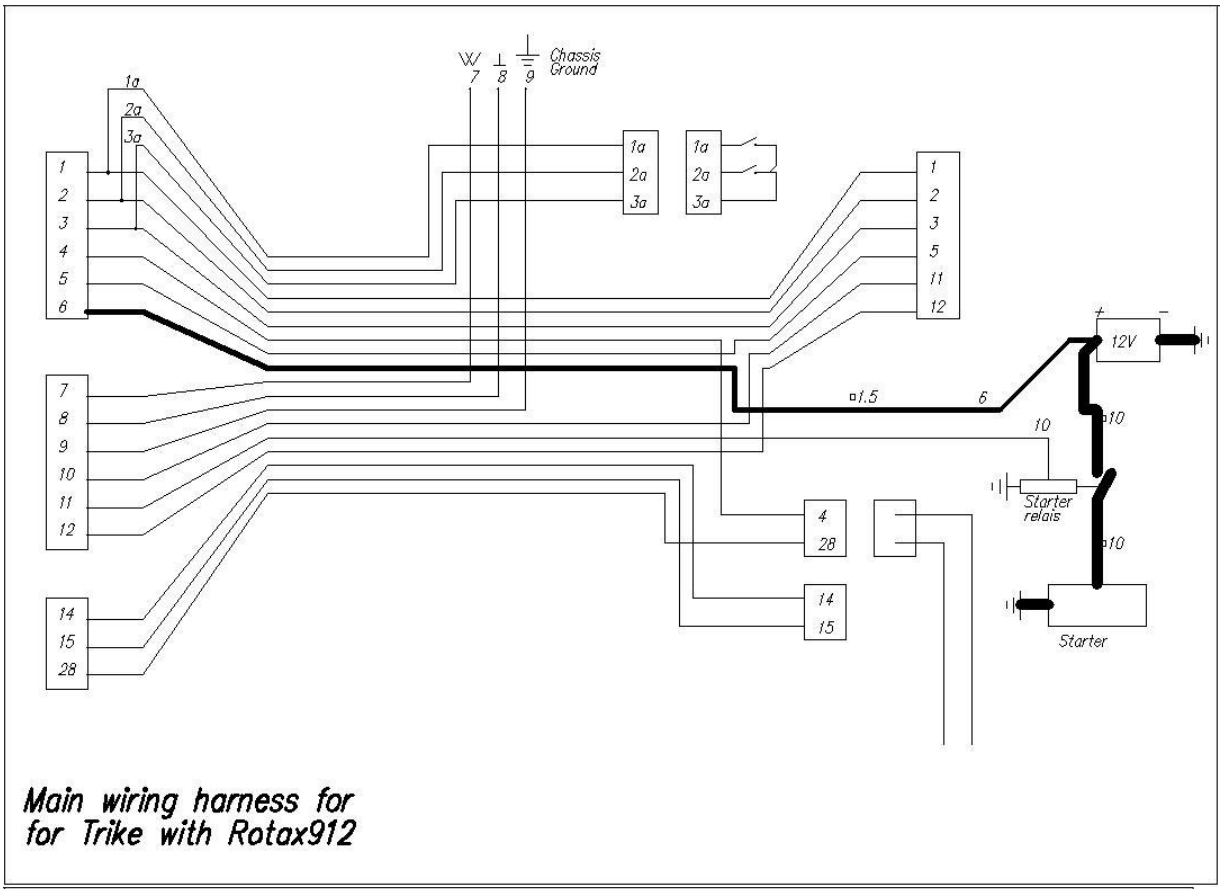
3.9 Brake System

A front wheel disk brake system or rear wheels hydraulic disk brake system is used on the ultralight.
Parking brake operating:
-in case of the front wheel disk brake system, press the brake lever, lift up the rack and fix the brake lever;
-in case of the rear wheels hydraulic disk brakes, press the brake lever, lift up the brake valve handle.
Depressing the brake lever on the left hand side of the front footrest actuates the brake(front wheel disk brake system)or lowering the brake valve(in case of rear wheels hydraulic disk system).

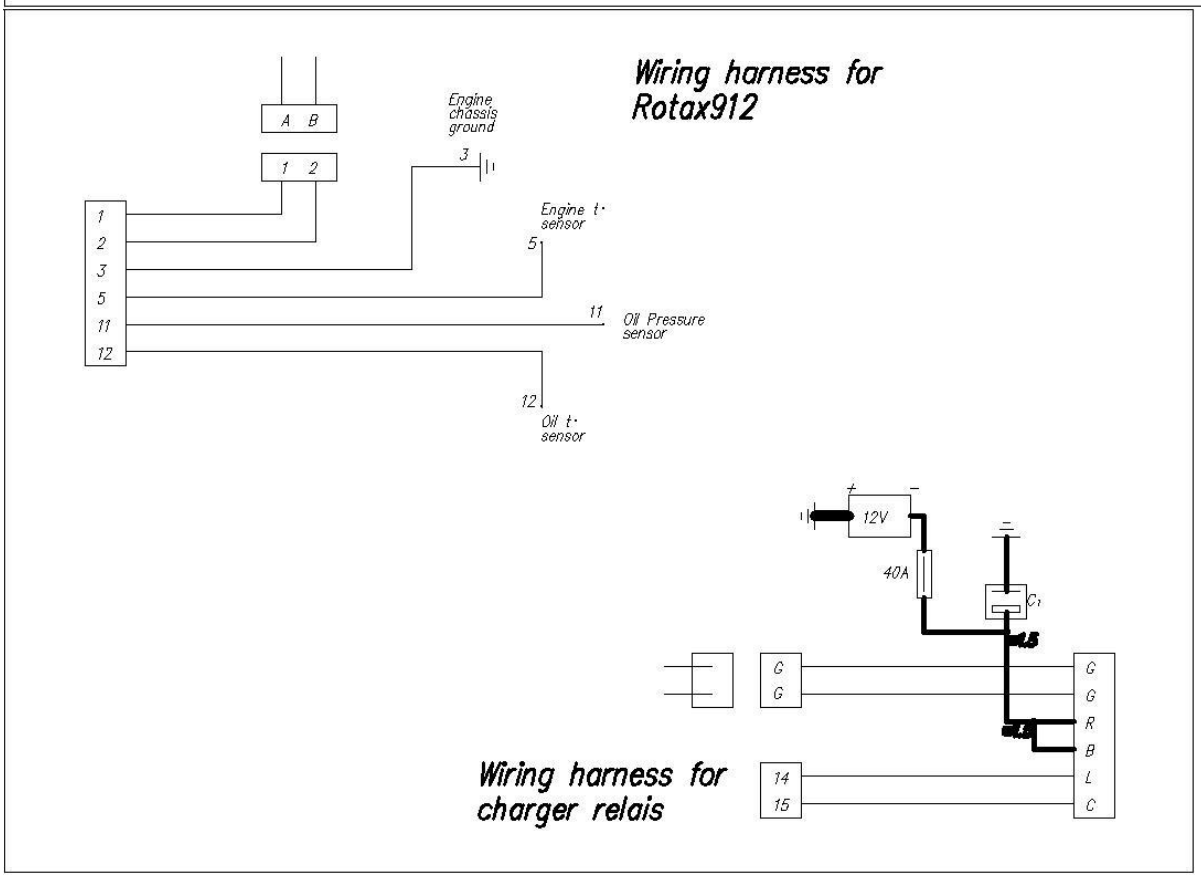
3.10 Electrical System

Electrical schematic for the ultralight is shown in the diagrams.
The Electrical circuits comprise:
· instrumentation circuit. The 12 V DC supply is protected by a 25 amp fuse at the battery. The master switch on the dash, when in the off position, disables the DC power socket, flight instrument and the electric start push button;
· engine management circuit;
· ignition circuit.
It should be noted that the ignition circuit is a fail-safe system whereby the engine will run in the event of the ignition circuit becoming disconnected. Switching the coil to ground stops the engine.
When stopping the engine both switches on the dash should be switched off. The master switch on the dash should then be turned to the off position to remove supply to the accessories.
Refer to the Rotax manual for more details for the engine electrical system.





Main wiring harness for
for Trike with Rotax912



3.11 Emergency Rescue System.

The ultralight is fitted with emergency rescue system MAGNUM 450 (made in Czech Republic). The rescue system provides for landing in case of emergency without the necessity for the pilot to leave the ultralight in the air.
It is necessary to remove the safety lock before each flight and the safety lock must be replaced before the pilot alights from the ultralight.

4. ULTRALIGHT ASSEMBLY PROCEDURES

4.1 Wing Reassembly After-Sipping Procedure

The following sequence of procedures assumes that the wing is packed up. If the wing and base are already assembled this section is not required.

Your instructor should demonstrate the correct assembly and disassembly procedures for your ultralight. This section is intended as a reference only and assumes prior knowledge of assembly Aeros ultralight.

4.1.1 Unzip the wing bag. Undo the Velcro straps. Remove battens, the control bar and the outer leading edge tubes from the wing bag. Remove all packing material.

4.1.2 Unfold the sail along the leading edge to its full length. Attach the outer leading edge tubes to the front leading edge tubes according to the markings: L-left, R-right. The triangular marking on the leading edge tube #3 and the triangular marking on the leading edge tube #2 should match together (fig. 7, shown without the sail). Working on one wing at a time and working with the appropriate leading edge # 3, fold the outer sprog, which is attached to the outer leading edge tube, forward. Slide the inboard end of the leading edge tube # 3 into the sail. Align the outer leading edge properly so that the sprog bracket is on the inside of the leading edge, and slide the outer leading edge tube forward carefully until it engage completely on the front leading edge tube, allowing the sprog end to come outside the sail at the access zipper *(fig.8 and fig.9).*

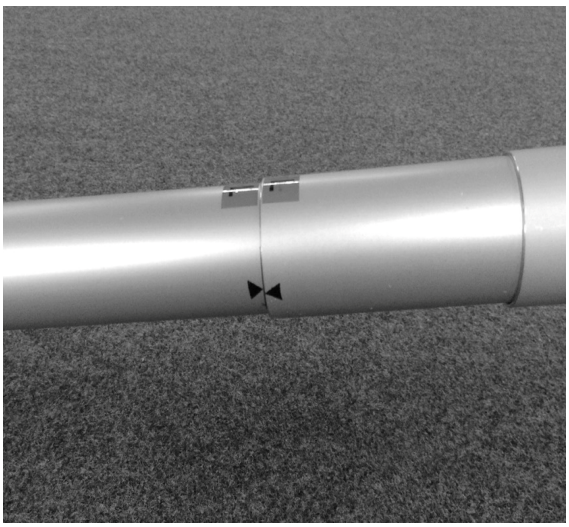


Figure 7

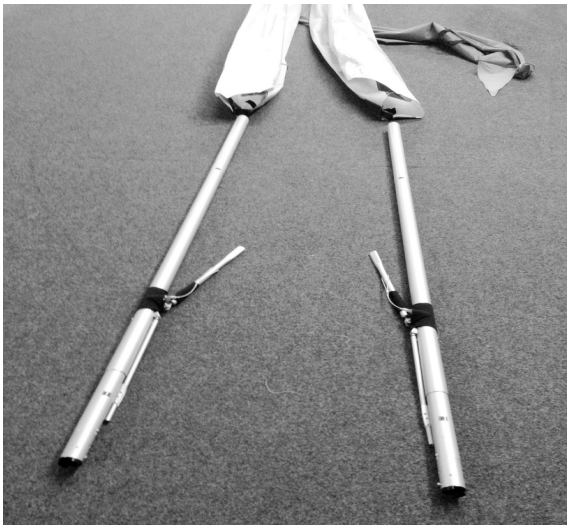


Figure 8

Figure 9

Figure 10

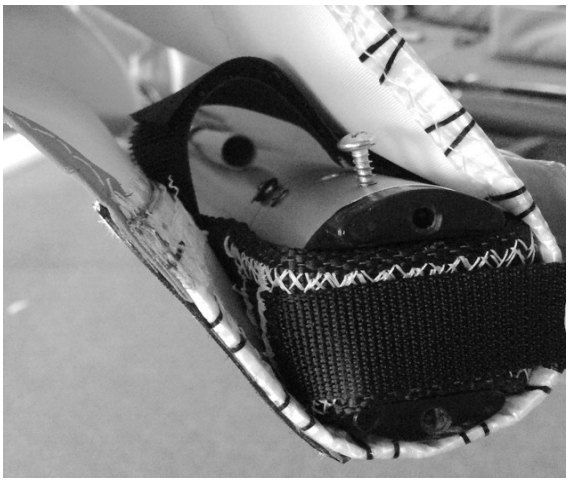


Figure 11

4.1.3 Tighten the sail along the leading edge by putting the sail mount webbing into the slot in the end cap of the outer leading edge tube. Secure the sail mount webbing to the outer leading edge with the sail mount webbing Velcro *(fig.10 and fig.11).*

4.1.4 Turn the wing on one side and spread the control frame down tubes. Install the control bar according to the markings. Fix the control bar with bolts and nuts so, that fixing nuts are pointing backwards, against the direction of flight *(fig.12).*

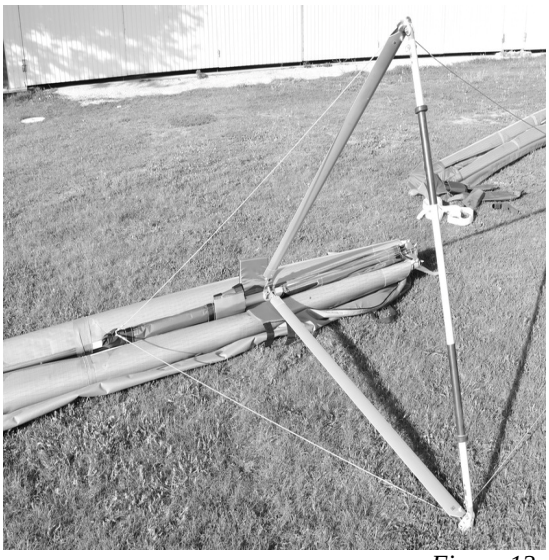


Figure 12

Figure 13

4.1.5 Lift the wing upright on the control frame *(fig.13).*

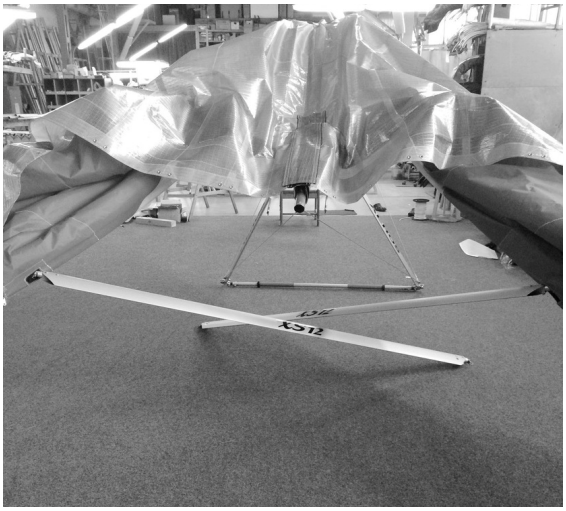


Figure 14

4.1.6 Spread the wings approximately 50% from fully open. Attach the struts according to the markings. L-left, R-right marks must be on the control frame side of the struts, on top. Attach the upper part of the strut first, together with the strut safety wire *(fig. 14).* Tighten the nut and secure with a safety ring *(fig. 15).* Attach the strut to the control frame bracket. The clevis pin head should be pointing forward *(fig. 16).* Do not attach the strut safety wire to the base tube for now.

Figure 15

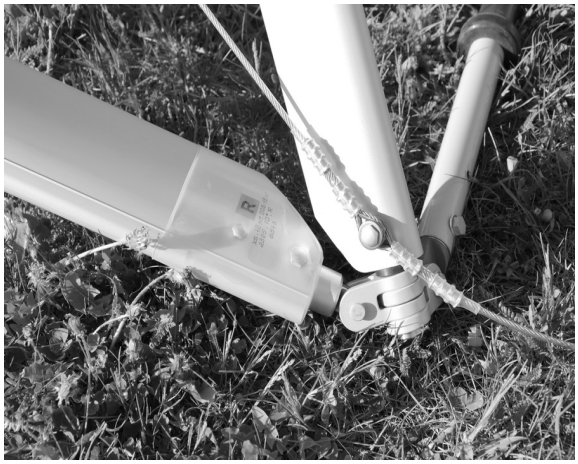


Figure 16

4.1.7 Attach the bottom front wires and secure the nose catch of the bottom wires on the nose junction channel using the clevis pin and the safety ring *(fig. 17).*

Figure 17

Figure 18

4.1.8 By lifting up and back of the nose batten strings, push the nose battens fully back into the sail so that the batten tips rest in the holes on top of the keel tube *(fig. 18).*

4.1.9 Check that the sail mount webbing is in proper position in the slot of the outer leading edge tube end cap. Open the main sprog access zipper and look inside, making sure that the leading edge #3 stays in place and the triangular markings on the leading edge tube #3 and on the leading edge tube #2 matches together.

4.1.10 Carefully spread the wings all the way, lowering the nose of the wing on the ground. Once the nose of the wing is on the ground the wings spread themselves *(fig. 19).* You will need an assistant to perform this procedure.

Figure 19

Figure 20

4.1.11 Pass the rescue system bridle through the corresponding hole in the sail and all the way through the rescue bridle flap on the top surface of the wing. Pass the rescue system bridle through the keel pocket palms.

4.1.12 Attach the strut safety wires (left and right) to the base tube. Tighten the nut and secure with a safety ring *(fig. 20).* Attach the control frame corner protection cover with Velcro.

4.1.13 Wheel the trike behind the wing, rolling the front wheel over the control bar. Check that the ignition switch and the key are in off position. Rotate he main pylon of the trike down.

4.1.14 Connect the trike pylon to the hang bracket of the wing. Insert the heart bolt, tighten the nut firmly and secure with a safety ring. Connect the back-up loop, making u-turn around the keel tube. Connect the rescue system bridle.

4.1.15 Lift the nose of the wing to allow for the front wheel to be rolled rearward over the control frame so that the base tube is in front of the cockpit and the rear of the keel tube rests on the pylon. Make sure the protection pad on the main upper pylon is in proper position and protects the pylon against bottom rear wires.

4.1.16 Install all cambered battens in the sail.

4.1.17 Remove the auxiliary bungee from the pull back wire shackle and the hook.
Check that the pull back (cross tube tensioning) wires are not twisted. Take the shackle with one hand. At the same time with another hand pull the crossbar backwards – this will considerably help attaching the shackle of the pull back wires on the hook, placed on the keel tube. Attach the shackle on the hook.

4.1.18 Fix all battens with the **double tensioned** ropes and rubber bands.
Install the tip folded battens.

4.1.19 Install the undersurface battens.

4.1.20 Deploy both the inboard sprogs and the outboard sprogs and secure them in position.

4.1.21 Fix the sail mount tangs at the nose part of the sail to the wing bolts. Do not over tighten the mount nuts. When the fixing nut is properly tightened, the sail mount tang rotate freely on the fixing bolt *(fig.21).*

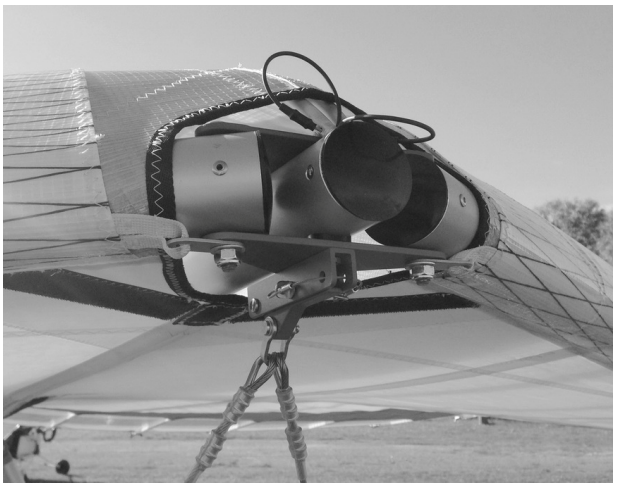


Figure 21

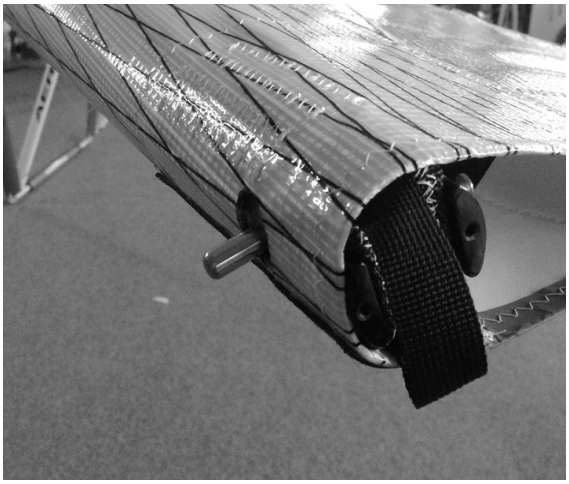


Figure 22

4.1.22 Take the winglets and find the winglet fixing rods packed inside. Install the winglets fixing rods to the leading edges #3 *(fig. 22).*

4.1.23 Install winglets.

4.1.24 While the base tube of the trike is still on the ground install the nosecone.

4.2 Wing Set Up Procedure From the Package 6 Meters Long

4.2.1 Lay the wing on the ground, with the bag zipper up. Lay the struts and the winglets next to the wing.

4.2.2 Undo the bag zipper and take out battens and the control bar.

4.2.3 Untie Velcro straps. Open the control frame apex protection bag *(fig. 23).*

4.2.4 Turn the wing on one side and spread the control frame down tubes. Install the control bar according to the markings. Fix the control bar with bolts and nuts so, that fixing nuts are pointing backwards, against the direction of flight *(fig. 24).*

4.2.5 Raise the wing upright on the control frame by grasping the nose assembly, holding the front cables at the same time. Try to place the control bar on a level surface.

Figure 23

Figure 24

4.2.6 By lifting up and back of the nose batten strings, push the nose battens fully back into the sail so that the batten tips rest in the holes on top of the keel tube *(fig. 25).*

Figure 25

Figure 26

4.2.7 Remove protection bags from the keel, from the control bar apex, from the hang bracket and from the crossbar central unit.

4.2.8 Remove all Velcro ties and spread the wings approximately 50% from fully open *(fig. 26).*

4.2.9 Attach the struts according to the markings. L-left, R-right marks must be on the control frame side of the struts on top *(fig. 27, fig.28 and fig. 23).* Attach the upper part of the strut first, together with the strut safety wire. Tighten the nut and secure with a safety ring *(fig. 28).* Attach the strut to the control frame bracket. The clevis pin head should be pointing forward *(fig. 29).* Do not attach the strut safety wire to the base tube for now.

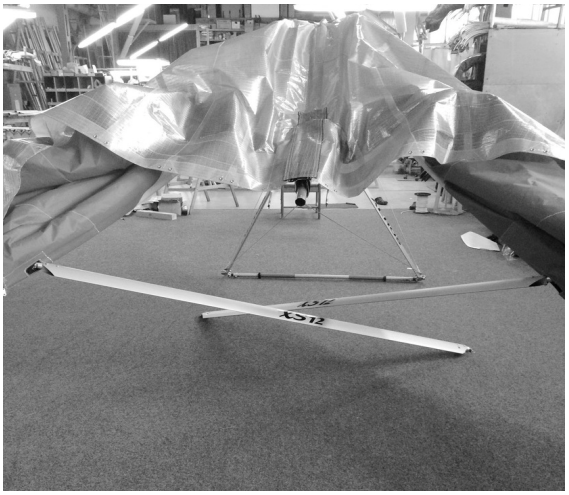


Figure 27

Figure 28

4.2.10 Attach the bottom front wires and secure the nose catch of the bottom wires on the nose junction channel using the clevis pin and the safety ring *(fig. 30).*

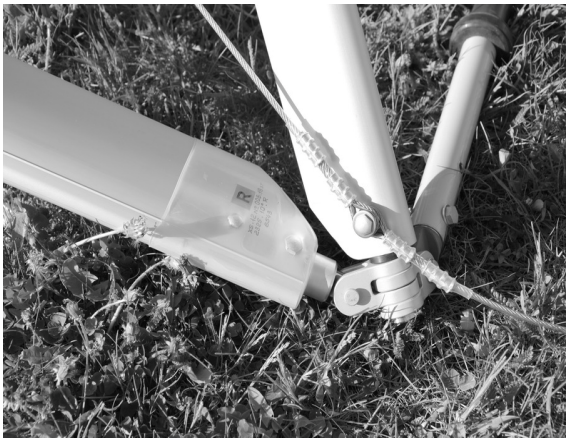


Figure 29

Figure 30

4.2.11 Carefully spread the wings all the way, lowering the nose of the wing on the ground. Once the nose of the wing is on the ground the wings spread themselves *(fig. 31).* You will need an assistant to perform this procedure.

4.2.12 Position the wing on its control frame, facing into the wind, with the nose on the ground *(fig. 32).*

Figure 31

Figure 32

Figure 33

4.2.13 Attach the strut safety wires (left and right) to the base tube. Tighten the nut and secure with a safety ring *(fig. 33).*

4.2.14 Pass the rescue bridle through the corresponding hole in the sail and all the way through the rescue bridle flap on the top surface of the wing *(fig. 34).* Close the bridle fla cover. Pass the rescue system bridle through the keel pocket covers *(fig. 35).*

Figure 34

Figure 35

4.2.15 Wheel the trike behind the wing *(fig. 36),* rolling the front wheel over the control bar. Check that the ignition switch and the key are in off position. Tilt the main pylon of the trike down.

Figure 36

Figure 37

4.2.16 Connect the trike pylon to the wing hang bracket *(fig. 37).* Insert the heart bolt, tighten the nut firmly and secure with a safety ring. Attach the back up loop, making u-turn around the keel tube. Connect the rescue system bridle.
Lift the nose of the wing to allow for the front wheel to be rolled rearward over the control frame so that the base tube is in front of the cockpit and the rear of the keel tube rests on the pylon. Make sure the protection pad on the main upper pylon is in proper position and protects the pylon against bottom rear wires.

4.2.17 Remove the wingtip protection bags. Remove battens from the batten bag and check each batten for symmetry against the corresponding batten from the other wing. Align battens at their front tips, and at about the 60% of the chord point. There should be no deviation of more than 3mm (1/8'') from one batten to the other along the full length of battens.
If you choose not to check your battens for symmetry before each flight, you should, at a minimum, check them once a month.
Aeros convention is that the red marked battens go in the left wing and green marked battens go in the right wing. Battens are numbered from the center outwards, and the longest battens in a Sting Ray are designated as the "No. 1" battens. Install all cambered battens in the sail.

CAUTION:

INSERT BATTENS CAREFULLY, SO AS TO MINIMIZE STRESS AND WEAR ON THE SAIL.

Never insert or remove battens with the cross tube tensioned (except for up to the last three on each side) and never insert or remove battens with heavy wind pressure on the top of the sail or in any condition which causes battens to slide with great resistance in their pockets.

Figure 38

4.2.18 Remove the auxiliary bungee from the shackle of the pull back wire and the hook.
Check that the pull back (cross tube tensioning) wires are not twisted. Take the shackle with one hand. At the same time with another hand pull the crossbar backwards – this will considerably help attaching the shackle to the hook, placed on the keel tube. Attach the shackle on the hook *(fig. 38).*

4.2.19 Connect two parts of the tip batten so that the sharp (angled) part of them, when connected, is pointed towards the outer part of the wing. Push the tip batten on the hinge with a hand until the tip batten fixates in the kinematic lock.
Fix all the battens with the **double tensioned** ropes *(fig. 39)* and rubber bands *(fig. 40).*

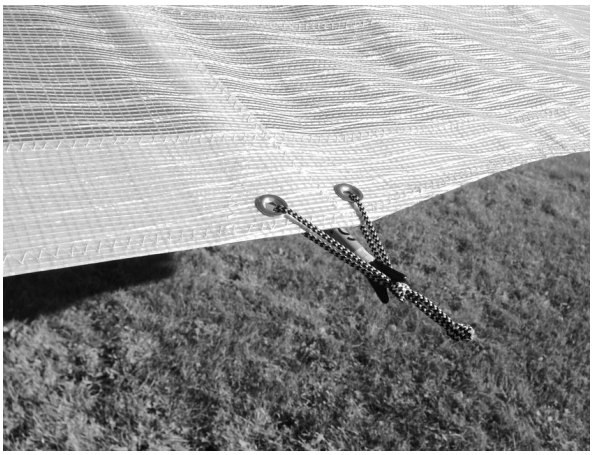


Figure 39

Figure 40

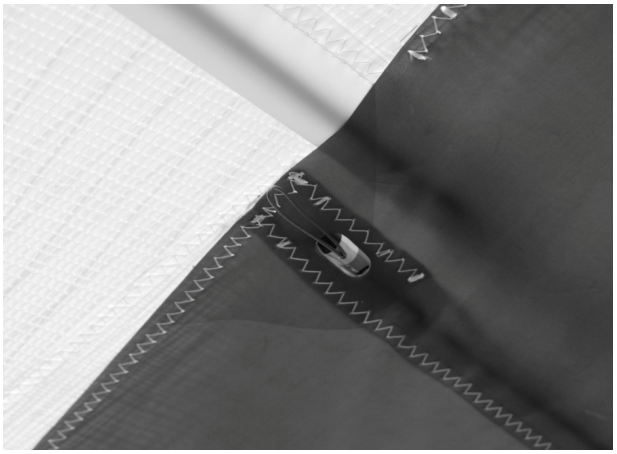


Figure 41

4.2.20 Install the undersurface battens *(fig. 41).*

4.2.21 The next step is to deploy both the inboard sprogs and the outboard sprogs and secure them in position *(fig. 24 and fig. 43)*. Before doing so, working through the sprog access zippers, pre-flight check the following items:

- internal ribs to confirm that they are fully zipped up;
- the sprog hardware, and the sprog cable attachments at both ends of each sprog cable;
- make sure the sprog is not twisted 180º;
- the leading edge / cross bar junction unit is properly secured and has no damage.

To deploy and secure each sprog, swing the sprog away from the leading edge and align it in the center of the rear end of the sprog access zipper.

Fully close the sprog access zipper and this will secure the sprog in the proper position underneath the transverse batten and capture it in position.

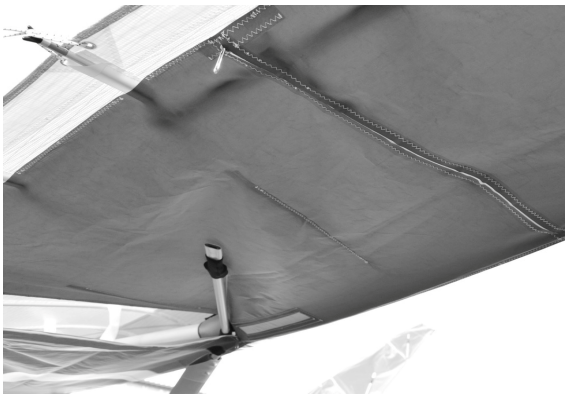


Figure 42

Figure 43

4.2.22 Install the strut / control frame protection cover *(fig. 44).*

4.2.24 Install winglets and secure them with pins and safety rings *(fig 45 and fig. 46).*

Figure 44

Figure 45

4.2.25 When the wing is attached to the trike with the base tube still on the ground install the nosecone, taking care to align it so that it lies flat on top and bottom of the sail *(fig. 47).*

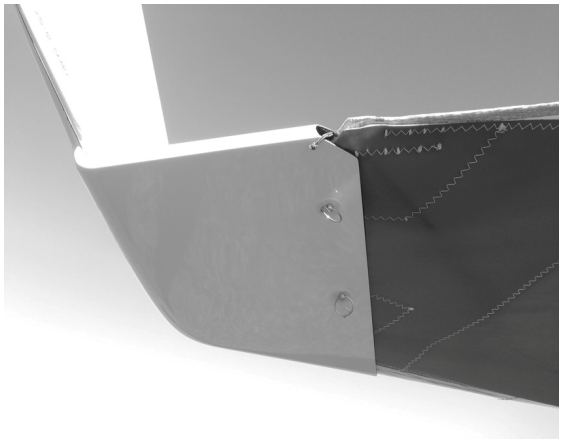


Figure 46

Figure 47

WARNING
DO NOT FLY WITHOUT THE NOSECONE!

4.3 Preflight Inspection of the Wing

Conduct a complete preflight inspection of the wing, checking all assemblies, which have not already been checked. Every bolt, nut, pin, safety ring, and fastener of any kind should be checked during every pre-flight. A full pre-flight inspection should precede every flight you make, not just the first flight of the day.

Carefully check the entire length of the leading edge pocket to insure that the Mylar insert is lying flat in the pocket. If any section of the Mylar is folded under, de-tension the crossbar, remove as many battens as necessary and unfold the Mylar.

At the nose, with the nose cone removed:
Check that the nose junction hardware is tighten, the front wires catch is secured, the nose battens are engaged in the corresponding holes on the keel tube *(fig 48 and fig. 49).*
Don't forget to install the nosecone before raising the wing up on the trike.

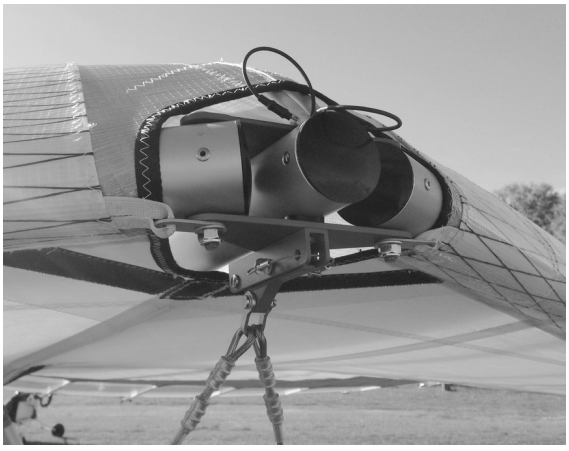


Figure 48

Figure 49

Along the left leading edge:
Open the main sprog access zipper and look inside, making sure that the crossbar, the main sprog and the main sprog wire are properly secured *(fig. 50).*
Check that the strut is properly secured, safety wire is engaged and the safety ring is installed *(fig. 51).*

Check the sprog hardware, and the sprog cable attachments at both ends of each sprog cable. Close the main sprog access zipper.

Open the outer sprog access zipper and check the sprog hardware and the sprog cable attachments at both ends of the sprog cable.

CAUTION

REMEMBER TO SLIDE THE NEOPRENE COVER BACK ON PLACE TO COVER THE JOINT. CLOSE THE ACCESS ZIPPER.

Figure 50

Figure 51

At the left wingtip, with the left winglet removed:

Check that the tip folded batten is properly installed *(fig. 52).*
Check that the sail mounting strap is properly installed and secured with Velcro *(fig. 53).*

Install the winglet back on place.

Figure 52

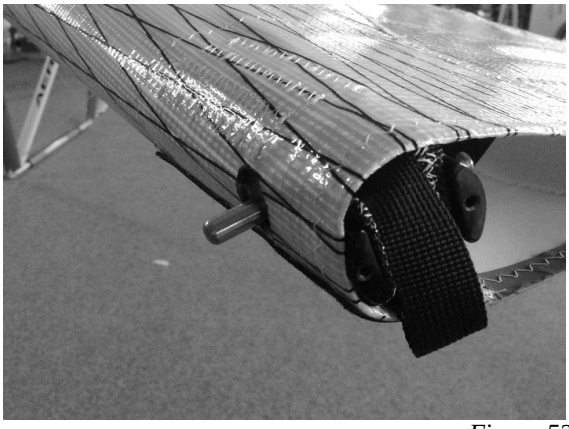


Figure 53

Figure 54

Along the trailing edge, left wing:

Check that there are no tears in the sail material along the trailing edge.
Check that all battens are properly secured.
Check that the inboard and outboard sprogs are properly secured in their position supporting the appropriate transverse battens.
Make sure all zippers are closed.

From the rear keel:

Check that the keel mount webbing and bottom rear wires are safely secured to the keel tube *(fig. 54).*

Check the rear wires cables making sure there are no kinks or twisted thimbles.

Under the wing at the control frame apex:

Check that the cross bar tensioning cables are tight, there are no kinks or twisted thimbles, no signs of wear and make sure that they are secured to the hook on the keel tube.

Check the control frame apex and the hang block bracket hardware. Check the wing to the trike attachment, the back up loop attachment, the trim mechanism attachment, the rescue system bridle attachment *(fig. 55).*

Figure 55

Figure 56

Check the crossbar center channels assembly including the pull-back wires/X-bar junction and the center bolt *(fig. 56).*

Visually inspect the crossbar tubes by sighting along the length of the crossbar tubes looking for any evidence of damage.

Along the trailing edge, right wing: Same as for the left wing.

At the right wingtip: Same as for the left wingtip.

Along the right leading edge: Same as for the left leading edge.

Figure 57

Under the wing at the control bar:

Sight down the downtubes, making sure that they are straight.

WARNING
DO NOT FLY WITH BENT DOWNTUBES!

Check that the strut is properly secured to the control frame and the safety ring is installed.

Look under the protection cover and check for proper installation of all nuts and safety rings at the control bar corners *(fig. 57).*

CAUTION
BEFORE FLIGHT CHECK THAT ALL INSPECTION ZIPS ARE FULLY CLOSED.

4.4 Attaching the Wing to the Trike

4.4.1 Pass the rescue bridle through the corresponding hole in the sail and all the way through the rescue bridle flap on the top surface of the wing *(fig. 58).* Close the bridle flap cover. Pass the rescue system bridle through the keel pocket flaps *(fig. 59).*

Figure 58

Figure 59

4.4.2 Wheel the trike behind the wing *(fig. 60),* rolling the front wheel over the control bar. Check that the ignition switch and the key are in off position. Tilt the main pylon of the trike down.

4.4.3 Connect the trike pylon to the wing hang bracket *(fig. 61).* Insert the heart bolt, tighten the nut firmly and secure with a safety ring. Attach the back up loop, making u-turn around the keel tube. Connect the rescue system bridle.
Lift the nose of the wing to allow for the front wheel to be rolled rearward over the control frame so that the base tube is in front of the cockpit and the rear of the keel tube rests on the pylon. Make sure the protection pad on the main upper pylon is in proper position and protects the pylon against bottom rear wires.

4.4.4 Plug in the socket connector of the trim devise to the corresponding jack on the main pylon of the trike.

Figure 60

Figure 61

4.4.5 Install the nosecone, taking care to align it so that it lies flat on top and bottom of the sail *(fig. 62).*

Figure 62

Figure 63

4.4.6 Apply the trike park brake. Go to the nose of the wing. With the front brace tube in one hand and the base tube in the other hand lift the base tube up, rising the wing up. In strong winds maintain a firm grip on the wing *(fig. 63).*

4.4.7. Attach the front brace tube in to position, bolt it and secure with a nut and a safety ring *(fig. 64).*

Figure 64

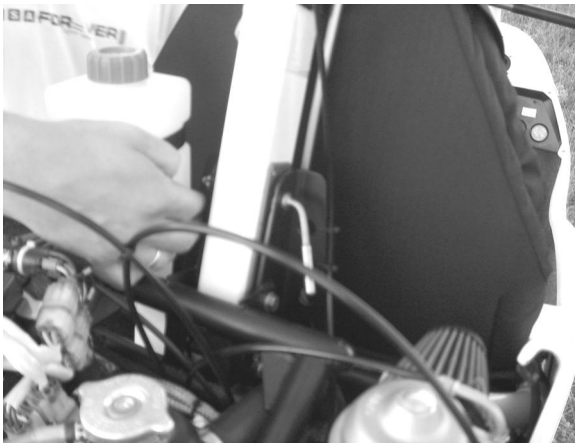


Figure 65

4.4.8.Install the bolt into the main pilon's joint as shown on the picture. Tighten the nut with a spanner, making sure the connection is tight *(fig. 65).*

Figure 66

4.4.9 Secure the base tube with the safety belt.
Park the ultralight in a crosswind position with the wing base tube secured with a safety belt. The wing should be at approx zero angle of attack to avoid the ultralight to be turned upside down with the wind *(fig. 66).*

5. FLIGHT PREPARATION

5.1 General

Prior each flight depending on the purposes of flight it is necessary to work out the flight task:
- prepare flight maps and study the flight conditions;
- study meteorological conditions at the departure airfield, on course and at the arrival airfield;
- estimate the possibility of accomplishment the flight task;
- proceed with all necessary formalities which are relative to given flight;
- estimate the necessary fuel state;
- conduct complete preflight inspection of the ultralight.

WARNING
NO ATTEMPT SHOULD BE MADE TO FLY THE ULTRALIGHT WITHOUT APPROPRIATE ULTRALIGHT FLIGHT TRAINING WITH AN APPROVED INSTRUCTOR.

Speeds for Normal Operation

Trim speed	90-130	Km/h	56-81	mph
Stall speed at maximum take off weight	64	Km/h	40	mph
Take off speed and approach speed with maximum take off weight	80	Km/h	50	mph
Maximum speed in turbulent air	100	Km/h	63	mph
Maximum level speed	130	Km/h	80	mph

5.2 Complete Ultralight Pre Flight Inspection

A full pre-flight inspection should precede every flight you make, not just the first flight of the day.
Daily inspections as outlined in the Rotax Operator's Manual should be carried out in conjunction with the following inspections.
Ensure that the ignition switches are off prior to inspection

5.2.1 Wing preflight inspection
Refer to the section 4.3 for the complete preflight inspection of the wing.

5.2.2 Trike Pre-flight Inspection

- No leaks from fuel system and engine.
- No leaks from oil system and engine
- Fuel filter clean and operational.
- Sufficient fuel for flight.
- Coolant is level.
- Radiator mounts secure and operational.
- Oil level OK
- No splitting, denting or delamination of the propeller.
- Propeller hub assembly secure and tie wired.
- No cracking in tyre treads, or evidence of cracking around the rim. Wheels are secured.
- No bolts bent, fractured or evidence of corrosion.
- Electrical system secure and operational.
- Throttle operation, both foot and hand throttle. Verify free and full movement.
- Seat belt attachments secure.
- All engine components secure - air filter, muffler, plug leads.
- Mechanical components. Rotate propeller anticlockwise and observe for noise or excessive resistance.

5.2.3 General inspection of complete ultralight.
Check that wing and trike universal bracket is secure.
Check that back up cable secure

5.3 Before Starting Engine

Safety is everyone's business. Included are only some important safety tips. Keep a good lookout, be thoughtful and always show your intentions prior to starting.
Prior to flight a thorough pre flight inspection of the ultralight should be carried out. Details of the pre flight inspection are shown earlier in this section. Make sure all engine controls are operative and you understand the on/off positions of the throttle and ignition. These controls are readily accessible and you must be able to operate them instinctively without hesitation.
The primary throttle control is foot-operated and complemented by the hand throttle (rearward for full power and forward for power off). The ignition switches are for the:
- front sit – on the bottom of the instrument dashboard (upward for on and downward for off), and for the:
- rear seat –(if it's mounted) on the right hand side of the cockpit (forward for on and rearward for off).

Never run the engine on the ground with the propeller turning unless you are doing so in a run up area and can observe anyone or anything entering the danger area. It is recommended that the engine not be run for any long periods whilst stationary on the ground. Possible damage to the engine may occur due to overheating.
Before starting your engine you should read and be familiar with the engine manual.

Run through the following checklist prior to starting the engine for each and every flight:
- Passenger briefing has been completed.
- Brakes in On / Park position.
- Tires - inflated and serviceable.
- Full and free movement of the wing when attached to the trike.
- Throttle - full and free movement.
- Wind - check direction and strength.
- Wires - secure and airworthy.
- Mixture - chokes off.
- Pins - fitted and secured.
- Fuel - On and sufficient.
- Instruments - check, set and operational.
- Switches - ignition check (all switches on).
- Chocks - removed (secured in ultralight).
- Harness and Helmet in place and secure.
- Remove a safety lock from the parachute.

Remember that the pilot in command has the ultimate responsibility for the airworthiness of the ultralight.

5.4 Fuelling

Fuel flow is from a single fuel tank fitted with a self-venting tube. The fuel tank has a water drain tap, which is mounted at the bottom of the tank.
Never refuel if fuel could be spilled on hot engine components. Use only safety approved fuel containers and never transport fuel in an unsafe manner.
The fuel system has an in-line fuel filter, which is mounted at the back of the tank. This filter can be easily disassembled for cleaning and inspection

Fuel tank capacity is 48 litres

A fuel gauge is provided on the instrument pannel. Its purpose is to provide the pilot with a visual indication of the quantity of the remaining fuel. The calibration is valid for the ultralight sitting on level ground and indicates total fuel.

WARNING
ENSURE THE ULTRALIGHT IS EARTHED TO AVOID STATIC DISCHARGE IGNITING FUEL DURING THE REFUELLING OPERATION

5.5 Helmet Recommendation

The open cockpit of the Aeros-2/Cross Country exposes the occupants to the elements during flight and exposes them to objects outside of the ultralight in an emergency situation.
Helmets and eye protection are recommended for occupants for protection from precipitation, strike by insects. Helmets are also recommended for risk reduction during an emergency landing of the ultralight. The helmets recommended for use in the ultralight are those certified for air sports.

6. ULTRALIGHT FLYING

6.1 Starting the engine

All controls should be checked with the ignition OFF. Passengers should have seat belts secure and be briefed for the flight.

CAUTION
REMEMBER TO CLEAR PROP!

The engine should be started with the pilot in the front seat.
The following procedure should be used:
- Park Brake is locked in the on position
- Hand and foot throttle off
- Turn the key switch on.
- Switch both ignitions ON.
- Apply full choke unless the engine is hot.
- Check visually that the propeller area is clear and call "Clear Prop" out loud.
- Depress start button. If the engine refuses to start switch off the ignition before investigation.
- When the engine starts, increase the engine RPM to a little above idle and release the chokes.
- Oil pressure should indicate within 10 seconds.
- Warm up the engine. Minimum Temperature should be reached before take off. Operate for 2 min at 2000 rpm continue at 2500 rpm until minimum temperature of 50 deg C is reached.

Keep an ultralight log and enter any unusual engine behavior. Do not fly unless you have corrected a given problem and recorded the correction in the log.

6.2 Taxiing

Taxiing in normal conditions is fairly easy.
With the engine idling the brake lever should be depressed which will disengage the park brake. The control frame should be positioned so that it is in the approximate position for normal trim speed. The pilot's feet actuate

steering on the ground. Left turn occurs when the right footrest is pushed forward.
Right turn occurs when the left footrest is pushed forward.

NOTE
Control sense for turning is opposite to that of a conventional three axis ultralight.
When taxiing in strong wind conditions the following procedures apply:
· Head Wind conditions requires the nose of the wing to be lowered just below the trim position.
· Down Wind conditions requires the nose of the wing to be raised just above the trim position.
· Cross wind conditions requires the upwind tip to be lowered.

6.3 Before take off
Before flight a full-throttle check is to be carried out. During this operation the pilot must be seated in the cockpit and prepared to switch off the ignition at very short notice if an emergency should arise.
The two ignition circuits should be tested with the engine running at 4000 rpm. Ignition one should be switched off and the RPM drop should not exceed 300 rpm. Both ignitions should be in the on position and ignition two should be turned off and the RPM drop should not exceed 300 rpm. Ensure both switches are in the on position after ignition circuit testing.

WARNING
NEVER LEAVE YOUR ULTRALIGHT UNATTENDED WHILE THE ENGINE IS RUNNING.

CAUTION
BEWARE OF LOOSE STONES IN THE RUN UP AREA. LOOSE STONES CAN BE SUCKED UP BY THE PROPELLER AND CAUSE SEVERE PROPELLER DAMAGE IN A VERY SHORT TIME. RUN UPS ARE BEST CONDUCTED ON A CLEAR SEALED SURFACE OR ON GRASS, NEVER ON GRAVEL

Check the trim device operation in most forward and aft position.
During take off and landing the recommended trim device setting is 30 – 35mm from the most aft position.

6.4 Take Off
Aeros trike wings have a neutral static balance allowing a safe take-off that is controllable under all suitable flying conditions.
Take off should be made on full power with only the foot activated throttle used during take off.
During the take-off, the control bar should be held in the forward position with the wings level. Accelerate smoothly to the take off safety speed. If the ultralight is fully loaded you will require full power.
When the ultralight reaches the takeoff safety speed it lifts up and the trike rotates quickly on the main wheels. As the ultralight leaves the ground the control bar must be moved back to the trim position to maintain takeoff safety speed.
Maintain your engine in top condition and assume it’s going to stop running at any time. Leave yourself a way out for an unexpected engine failure.
Never fly your ultralight at locations, airspeeds, altitudes, or under any circumstances from which a successful engine-off landing cannot be attempted.

6.5 Climb
Initial climb out should be made on full power for maximum take off weight. Approximately 2/3 of maximum take off power is considered comfortable for a minimum take off weight. Take off distance will be extended at reduced power. Once climb is established power should be reduced to below maximum continuos power of 5500 rpm. A minimum of takeoff safety speed should be used. At this speed the ultralight would round out nicely into a glide should the engine fail. Avoid pitching the nose of the wing up more than 45 degrees to the horizon. Very steep climbs are dangerous and can result in a stall followed by a severe pitching of the nose forward.

6.6 Cruise
When the desired flight altitude is reached the ultralight may be levelled out and throttle reduced to that required to maintain level flight.

The hand-operated throttle can be used to set engine rpm. Once the hand throttle is adjusted the pressure on the foot pedal may be removed. When the hand throttle is actuated increase power can still be achieved with the use of the foot throttle. The rpm will always return to the cruise setting when foot pressure is removed. If the hand throttle is set a reduction in RPM is not achievable using the foot throttle. The hand throttle must be in the off position to achieve low RPM.

CAUTION
HIGH-ANGLE CLIMB-OUTS NEAR THE GROUND SHOULD BE AVOIDED.

WARNING
AT LOW ALL UP WEIGHTS, THE TAKE OFF CLIMB OUT AT THE TAKE OFF SAFETY SPEED CAN RESULT IN HORIZONTAL PITCH INCLINATIONS IN EXCESS OF THE PLACARDED 45 DEGREES MAXIMUM. THE PILOT MUST BE AWARE OF THIS AND SHOULD KEEP WITHIN THE PLACARDED LIMITATIONS BY LOWERING THE ATTITUDE OR REDUCING ENGINE POWER.

WARNING
REDUCED POWER TAKE OFFS WILL EXTEND TAKE OFF DISTANCE. IT IS THE PILOTS RESPONSIBILITY TO ENSURE THAT THERE IS SUFFICIENT RUNWAY AVAILIABLE TO CLEAR ALL OBSTACLES WHEN CONDUCTING REDUCED POWER TAKE OFFS.

6.7 Descent, Approach and landing

Landing should always be into wind with a long straight approach.
An approach to the airstrip can be made with or without power, but in either case the airspeed should be maintained above the nominated approach speed.
During take off and landing the recommended trim device setting is 30 – 35mm from the most aft position.
The ultralight should be flown on final approach at or above the nominated safety speed. The additional airspeed allows for wind gradient, and to provide greater controllability in the rough air that may lie close to the ground. Maintaining airspeed on final is very important for engine-off landings, allowing a margin for round out before touch down.
The trike is designed to land with the rear wheels touching down slightly before the nose wheel. Once firmly on the ground aerodynamic braking may be achieved by pulling in the control bar, then applying the front nose wheel brake.

NOTE
After a hard landing, your ultralight must be completely checked.

6.8 Cross Wind Landing and Take Off

Pilots with less experience should avoid landing or taking off in conditions with high crosswind components, as skills do not always match the capabilities of the ultralight. Crosswind landings or take off with low wind components up to 3 m/s are quite safe and controllable, even to the inexperienced pilot.

WARNING
NEVER STALL THE ULTRALIGHT WITH THE NOSE PITCHED UP BEYOND 45 DEGREES. MANOEUVRES BEYOND THIS ARE DANGEROUS AND CAN RESULT IN A TAIL SLIDE FOLLOWED BY A SEVERE TUMBLE. REFER TO SECTION 3.3.12 OF THIS FLIGHT MANUAL FOR DETAILS OF THE PROCEDURES FOR RECOVERY FROM UNUSUAL ATTITUDES

The nominated approach speed of 80 km/h should be increased to 90 km/h when landing in cross wind conditions of 5m/s or more.
After touchdown in cross wind conditions the relative airflow over the wing will become increasingly spanwise (From tip to tip) as the ultralight slows down. The upwind wing tip should be lowered slightly (the amount depends on the wind strength), and the undercarriage wheels will retain firm contact with the ground.
Take off procedure is unchanged for the nominated crosswind limit. The upward wing may need to be lowered at the start of the take off procedure in higher cross winds.

6.9 Go Around Landing

During a situation where a go around landing is required, normal take off power and procedures should be used.

6.10 Stopping the Engine

To stop the engine after a period of running, the ignitions should be switched off at idle. Switching off at high RPM floods the engine and makes restarting difficult. If the engine has been running under full power allow the engine to cool at idle, before switching off.

6.11After Landing / Securing

After landing and when in the parking area apply parking brake and lock. Switch the ignition, electrical switch and radio equipment off. The ultralight should be parked in a crosswind position with the base tube secured to the mast brace. The rescue sistem safety pin should be inserted before leaving the ultralight.

7. EMERGENCY PROCEDURES

7.1 General

This section of the Manual describes the procedures to be adopted in the event of an emergency or abnormal situation occurring on this ultralight.
These procedures are arranged in the sequence considered to be the most desirable in the majority of cases. Steps should be performed in the order listed unless a suitable reason to deviate exists.
This section contains operating procedures for flight and system emergency conditions that are essential for the continued safe operation of the ultralight.
Always maintain correct airspeed and altitudes in the circuit area.
Never fly in uncertain weather conditions and always fly within your proven ability. Be sure only to extend your capabilities under planned training situations.
Carry out safe airmanship whilst flying and be aware of possible emergency landing areas along your flight path. If possible check these areas from the ground as you enter the airfield or flying site. This technique is for safety reasons as engines are susceptible to stopping, no matter how reliably manufactured or maintained.
Keep a good lookout for other ultralight, always be thoughtful and show your intentions.
It should be remember that the manufacturer cannot foresee all conceivable circumstances. Particular circumstances such as multiple or unanticipated emergencies, adverse weather etc may require modification to these procedures. A thorough knowledge of the ultralight and its systems is required to analyze the situation correctly and to determine the best course of action.

Maximum maneuvering speed 120 km/h.
Best glide speed (with maximum load) is 80 km/h.

7.2 Engine Failure on Take Off

7.2.1 Engine Failure on Take Off Run

If the engine fails on take off run before the ultralight has lifted off proceed as follows:

- pull the control bar in to prevent the ultralight lifting from the ground;
- use pedals to maintain the ground run direction, using the brake at the same time;
- switch off the ignition.

7.2.2 Engine Failure on Climb Out

If your engine fails on climb out before you have reached 5 meters altitude, land straight ahead. Proceed as follows:

- pull the control bar in further than the trim position to prevent the ultralight from loosing airspeed;
- at 2 – 2.5 meters altitude push the control bar out for the short period of time for flare out and landing in accordance with section 6.7 of the Manual.
- switch the ignition off.

7.3 Engine Failure at Height

If the engine stops while operating at cruise or full power when the ultralight is well clear of the ground, check fuel contents and make sure that ignition is on.
If your engine fails in flight, do not attempt to restart the engine unless one of these items is found to be incorrect and is able to be rectified. Relax and maintain control whilst concentrating on correct forced landing techniques.

7.4 Full Power Engine Shutdown (In Flight)

If the throttle should jam full open in flight proceed as follows:
Maintain Control.
Get height with engine at full power, adjust height and ground position to improve the outcome of forced landing.
Increase airspeed to keep the climb angle less than 30 degrees above the horizontal.
Switch off ignition.
Prepare for forced landing section 7.5.

7.5 Forced Landing

Proceed as follows:
Maintain control and airspeed - nominated approach speed.
Close the throttle.
Switch the ignition off.
Tighten the seat belts.
Carry out final approach and landing as closely as possible to normal power off landing procedure.

7.6 In Air Engine Fire

For fire occurring whilst in flight, the initial procedure would be to maintain control of the ultralight and evaluate the extent of the fire. This emergency is unlikely to occur but to avoid any further problems, use common sense and land the ultralight safely. Proceed as follows:
Maintain Control
Ignition off
Forced Landing
After landing release seat Belt
Release Passenger seat belt
Evacuate ultralight

7.7 On Ground Engine Fire

For fire occurring whilst in motion on the ground proceed as follows:
Maintain control and use remaining speed to clear people, ultralight and buildings.
Close the throttle.
Turn the ignition off.
Evacuate the ultralight.
After stopping release seat belt, than release passenger seat belt.

7.8 Propeller Damage

The indication of propeller damage is usually felt by extreme vibration and lack of thrust. Proceed as follows:
Maintain Control and airspeed.
Close the throttle.
Turn the ignition off.
Prepare for forced landing.
This problem may be avoided if precautions are taken prior to take off. Inspect the strip or ground you are to use as your take off area for sticks, rocks or any debris that may be flicked up by the tyres and sucked through the propeller.
Ensure that all items carried by occupants (such as cameras and sunglasses) are secured so they are not able to come loose and pass through the propeller.

7.9 Sail Damage

If you encounter damage to the sailcloth during flight, the first procedure is to maintain control of the ultralight. If the sail damage is not impairing the flight characteristics of the ultralight, land at the nearest

landing field to inspect the damage.

7.10 Emergency Rescue System

The Emergency rescue system is only to be used in emergency situations as a last resort and when you are certain that:

· the ultralight has suffered structural damage to the extent that control is not possible; or
· if the ultralight is in an irrecoverable situation where structural damage is likely to occur.

To operate the parachute pull the handle at least twenty centimetres for the parachute rocket projectile to be activated. The parachute will allow the complete ultralight to be lowered to the ground.

WARNING

AT FULL ENGINE RPM THE TIP OF THE PROPELLER IS SPINNING AT SPEEDS IN EXCESS OF 650 KILOMETRES PER HOUR.
EVEN SMALL OBJECTS CAN CAUSE SIGNIFICANT DAMAGE TO THE PROPELLER.

WARNING

IT IS IMPORTANT TO REALISE THAT WHILST THE PARACHUTE CONTROLS THE RATE OF DESCENT, THE PILOT WILL HAVE NO CONTROL OVER THE PLACE THE ULTRALIGHT WILL LAND.

For using emergency rescue system proceed as follows:
Close the throttle.
Turn the ignition off.
Tighten seat belts.
Check that emergency rescue system pin is removed.
Deploy emergency parachute
Prepare for the forced landing.

7.11 Ignition Circuit Failure

The Rotax engine requires a short circuit on the ignition circuit to stop the engine. If the ignition circuit is broken using full choke to flood the engine should stop the engine.
Do not restart the engine until the fault has been fixed.

7.12 Stalls

In practice, in level flight it is only possible to induce a nose down stall of the ultralight in level flight at high take off weights. The beginning of stall is indicated by a significant increase in control bar loads. Recovery from a mild stall is very gentle, whether power is on or off. Recovery is quick, with height loss of less than 20 meters.. A stall would have to be forced violently, to induce a danger.
Never stall with the nose pitched up too high. This is a dangerous maneuver and can result in a tail slide followed by a severe tumble. As a guideline, the nose up angle at which the ultralight stalls is about the nose down angle it will recover at.

7.13 Spins and Spiral Descents

Deliberate spinning is prohibited.
A spiral dive may develop after a stall if the bar is maintained at the forward limit and a large roll rate is allowed to develop. If this condition is not corrected it will lead to large and increasing roll attitudes (beyond the 60 degree limit). Increasing attitude, increasing speeds and large control bar feed back forces will occur. Incipient spiral dives can be terminated at any time by rolling wings level. If the spiral dive is allowed to develop to extreme roll attitudes, recovery is expedited by relieving control bar forces before rolling wings level and recovering from high-speed condition.

WARNING

DO NOT ATTEMPT TO SPIN THE ULTRALIGHT.
SPIRAL DIVES SHOULD NOT BE ATTEMPTED.
DURING DESCENDING TURNS ULTRALIGHT ATTITUDE MUST BE KEPT WITHIN PLACARDED PITCH, ROLL AND AIRSPEED LIMITS.

8. ULTRALIGHT DE-RIGGING PROCEDURE

Careful attention to the recommended rigging and de-rigging sequences will protect the ultralight from the risk of unnecessary damage.
The de-rigging procedure is a direct reversal of the rigging procedure. A summary of the procedure follows:

8.1 Removing the Wing from the Trike

See section 4.4 (Attaching the Wing to Trike) and use the reverse procedure.

8.2 Wing Break Down Procedure

Breakdown of the Sting Ray is the reverse of its assembly. Please follow these instructions when braking down the wing. Please read all the instructions for each operation before beginning. Refer to the section **5. Sting Ray Set-Up procedure,** if necessary.

8.2.1 Set the trim device to the aft position and then move it 10mm forward.

8.2.2 Disconnect the socket connector of the trim device from the corresponding connector on the trike.

8.2.3 Remove the bolt from the front support compression tube.

8.2.4 Remove the upper bolt from the main pylon joint.

8.2.5 Lower the wing until the control bar is on the ground.

8.2.6 Remove the nose cone from the wing.

8.2.7 Remove winglets.

8.2.8 Unplug the tip folded battens. Remove the undersurface battens.

8.2.9 Unzip the sprog access zippers all the way to the leading edge end of the zippers and put out the inboard and outboard sprogs.

8.2.10 De-tension the crossbar pull back wires. Attach the auxiliary bungee to the shackle and to the hook.

8.2.11 Remove the top battens except for the top battens #1. Pack battens into the batten bag.

8.2.12 Lower the nose of the wing to allow the front wheel to be rolled forward over the control frame.

8.2.13 Detach the rescue system bridle from the carabiners.

8.2.14 Detach the back up loop.

8.2.15 Unbolt the trike from the hang bracket of the wing and lower the nose of the wing on the ground.

8.2.16 Undo the Velcro of the strut / control frame protection cover and slide the cover towards the middle of the control bar. Detach the strut safety wire from the control bar.

8.2.17 Install the wingtip protection bags.

8.2.18 Fold the wings approx. 50 % from fully closed rotating and rest the wingtips on the ground.

8.2.19 Detach the front wires from the nose junction channel.

8.2.20 Detach the struts. Disconnect the bottom first, than disconnect the top together with a strut safety wire. Stow the struts in their bag.

8.2.21 Install protection bags on the control frame apex, hang bracket, if it stays on the wing (with the hang bracket positioned down) and on the crossbar central unit.

WARNING
FOLDING THE WING WITHOUT PROTECTION BAGS WILL CAUSE THE SAIL AND TUBES DAMAGE.

8.2.22 Fold the wings completely. Pull the sail out away from the keel until it is even on top and bottom. Roll the sail gently and carefully.

Working from the trailing edge, roll the sail tightly to the leading edge. Finish rolling the sail in the area of the outer sprogs and install the wing tip cover bags.

NOTE
Try to roll the sail in such way that the leading edge portion remains as smooth as possible. Do not attempt to stuff the sail between the Mylar pocket and the leading edge tube at any point where you feel resistance, and do not attach the Velcro ties tight so as to induce creases in the Mylar or leading edge sail material.

8.2.23 Stow battens in the batten bag in the front part of the wing. Install Velcro ties around the wing.

8.2.24 Install the wing bag. Grip the nose junction and lower the wing on the ground, holding the front wires at the same time.

8.2.25 Detach the control bar.

8.2.26 Fold the control frame tubes, install the control frame bags and lay the control frame against the keel. Lay cables between down tubes.

8.2.27 Fit the control bar in the protection bag and stow it between the leading edges in the aft part of the wing. Stow the nosecone under the most forward Velcro.

8.2.28 Zip up the wing protection bag.

9. PERFORMANCE

9.1 General
The performance data in the following section has been computed from actual flight tests with the ultralight and power plant in good condition and using average piloting techniques. It should be noted that piloting techniques, climatic conditions and ultralight condition will cause significant variation to these performance figures.

9.2 Take Off and Landing
Take off and landing distances are specified for maximum take off weight of the ultralight

Take Off
Take off Distance to 15 m altitude is 245m.
Takeoff distance is specified for elevation at the sea level with maximum take off power, a level dry runway with short grass, zero wind conditions and air temperature 15 deg C

There are following factors which will increase takeoff distance:
- Reduced power take off;

- Higher drag runway surfaces such as wet or long grass;
- Tail wind;
- Uphill takeoff;
- Air temperature above 15 deg C;
- Runway elevation above sea level;

The pilot is required to take into account the effect of the above when determining takeoff distance.

Landing

Landing Distance from 15 m altitude is 300m.
Landing distances are specified for elevation at the sea level with maximum take off power, a level dry runway with short grass, zero wind conditions and air temperature 15 deg C.

The following factors will increase landing distance:
- Lower drag runway surfaces;
- Tail wind;
- Down hill landing;
- Air temperature above 15 deg C;
- Runway altitude above sea level.

The pilot is required to take into account the effect of the above when determining landing distance.
Always exercise judgment when selecting locations for take-off and landing. Leave adequate margin for appropriate control action in the event of sudden engine failure or turbulence being encountered.

9.3 Climb

Climb rate with maximum take off weight at 80 km/h is 4.2 m/sec. Climb data is given at sea level elevation and 15 deg C.

9.4 Stall Speeds

Stall speed at maximum take off weight is 65 km/h.
Stall speed at 320kg take off weight is 60 km/h.

9.5 Glide

Glide figures have been determined with the engine off at maximum take off weight with the trim device set in the take-off configuration.
At 80km/h the descent rate is 2,8 m/sec.
Glide distance from 300 meters is 2.4 km.
Glide data is for ISA conditions (Sea Level at 15 deg C)

9.6 Cruise

Cruise speed at maximum take off weight is 100-130 km/h
Fuel consumption at cruise speed is 11 liters per hour.
Range at cruise speed is 460 km

NOTE

Fuel consumption figures are included as a guide only. The consumption figures should not be used for planning purposes. Changes in ultralight configuration, load, altitude, wind strength and direction as well as climatic conditions will cause significant variation in fuel consumption.

9.7 Noise Characteristics

The Aeros-2/Cross Country has been certificated to DULV. Noise levels were recorded at 72 dB(A).

10. HANDLING SERVICE AND MAINTENANCE

10.1 Introduction

This section contains factory recommended procedures for proper ground handling and routine care for your Aeros-2/Cross Country ultralight. Included in this section is relevant information required by the operator.

WARNING

IT IS THE PILOTS RESPONSIBILITY TO ENSURE THAT ALL AIRWORTHINESS DIRECTIVES HAVE BEEN ADDRESSED. IT IS ALSO THE PILOTS RESPONSIBILITY TO ENSURE SERVICING AND MAINTENANCE HAS BEEN PERFORMED AS OUTLINED IN THE APPROPRIATE MAINTENANCE MANUAL AND IN ACCORDANCE WITH THE APPLICABLE AVIATION REGULATIONS.

10.2 Identification Plate

The ultralight has two identification plates. The wing identification plate can be found on the left side of the keel tube next to the control frame apex channel. The wing number can be also found in written on top of the sail at the nose part of the glider. The trike identification plate can be found under the instrument dash on the right side of the lower pylon. The Serial number should be quoted when corresponding with the factory.

10.3 Ultralight Inspection, Maintenance and repair

Maintainer qualifications vary from country to country. The operator / maintainer should be familiar with the local requirements. Maintenance requirements are outlined in the base maintenance manual for the base unit and in the wing maintenance manual for the wing. The following sections have been included because it is considered that the information may be required on a more regular basis.

10.4 Filling Fuel Tank

Initial capacity is 48 liters.

The Aeros-2/Cross Country has a single fuel tank. When the tank is being filled there may be a slight pressure differential between the sides of the tank, causing the fuel cap side to fill slightly faster than the other side. Allow time for the breather valves to equalize the pressure to allow complete filling and, check that both sides are sufficiently full. Fill to the neck of the fuel entrance.

10.5 Fuel Specification

FUEL:

Fuel type En228 Premium/Regular. Super grade gasoline; lead free, min RON 90

Table 1 Section 8. Fuel Specification

Refer to the Rotax manual section 10-10 for engine fuel specifications that apply to the region where the ultralight is being flown.

Use of AvGas requires higher frequency maintenance intervals. If AvGas is used the Rotax web site should be referenced for maintenance requirements. See Rotax service information 18-UL-97-D/E

Refer to section 2.12 for fuel capacities and limitations

10.6 Fuel Sampling

There is a drain cock on the base of the fuel tank, which may be used to check the quality of the fuel, and to drain fuel if necessary, it is especially important to remove any water that may have been introduced from the system. The fuel is checked for water and contaminants by draining a sample of the fuel into a clear glass container. Once a sample has been taken the quality of the fuel can be checked by looking for any water at the bottom of the glass, and checking for any other visual contaminants.

If the fuel has been sitting for an extended period without use it may be advisable to replace it with fresh fuel. For draining the fuel ensure that a suitable receptacle is found for the fuel that is to be drained, position the trike above the receptacle and open the draincock. Ensure that there are no ignition sources and that the fuel is disposed of correctly.

10.7 Engine Oil System Replenishment

The minimum oil level is 2 liters, max 3 litres. This checked and replenished by removing the oil sump lid.

Rotax has provided service instructions, which detail how to check the oil.
Removing the sump plug drains the sump. Ensure that the sump plug is correctly replaced and lock wired prior to refilling the engine with oil. Measure the amount to be replaced, refill, check the level, run the engine and recheck. The opportunity should be taken to replace the oil filter any time that the oil is replaced.
Oil Level Instructions:
Do not overfill the oil system. The difference between the min and max marks on the dipstick is 0.45 litres.

10.8 Lubricating Oil

The 912 UL engine has an external sump, and the entire system is standard to the Rotax 912 engine.
The oil specification is given in the Rotax Operators Manual, Section 10.2.3, Lubricants. In general use only synthetic or semi synthetic oil, API classification .SF. or .SG. or later oils. Multigrade is recommended. These oil types are detergent types. Consult the Rotax manual and Rotax service instruction 18 UL 97, for the correct type and grade of oil for the ambient operating temperature.
Two oils, which are recommended by the Rotax Service instruction 18, UL 97 for use with both Avgas and Unleaded fuels are:
SHELL, Advance VSX 4, APISG, SAE 15W-50
VALVOLINE, Dura Blend Synthetic, APISJ, SAE 10W-40

10.9 Cooling System

Water-cooling system capacity is 2.5 l.
Coolant Specification
A MANDATORY Rotax Directive was issued on the 25th of November 2004, which requires a change in the type of coolant that must be used with the Rotax 912 type engine. The reason for the change is that in some instances conventional coolant (mixture ratio of 50% water and 50% antifreeze) can vaporize or boil before the maximum permissible cylinder head temperature is reached. Rotax Service bulletin SB-912-043, pg # 1.
Some Aeros trikes will have a silicate free type high quality and long life antifreeze coolant (which is yellow), installed in the radiator. This coolant must be changed to the newly recommended coolant.
The directive requires that the new coolant be used, and a sticker be placed on the coolant cap, which prohibits the use of water in the coolant system.
The coolant should be replaced according to the Rotax maintenance manual, current issue. Please refer to the directive, which is available from the Rotax website: SB-912-043, September 04.
Field service Instructions:
If EVANS NPG+ coolant is not locally available, temporarily top off the system with propylene glycol antifreeze and be sure not to add water. Within 15 days the temporary coolant should be completely drained and the system refilled with EVANS NPG+ coolant.. Rotax SB-912-043, Pg # 5.

WARNING
WATER OR WATER CONTAINING COOLANT MUST NOT BE ADDED IN ANY CASE TO THE COOLING SYSTEM WITH THE NEW EVANS NPG+ COOLANT.

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

10.10 Tire Inflation

The recommended tire inflation pressures are 2 Bar for both the front and rear tires. When checking the tire pressures the opportunity should be taken to examine the tires for wear, cuts, bruises, slippage and other defects.

10.11 Circuit Breaker and Fuses

The fuses for the electrical equipment are located in two positions.

1. There is 25 amp fuse located behind the dash.
2. There are two fuses 15 amp (trim device) and 40 amp located at the rear of the trike, on the right hand side of the battery.

For complete information about Aeros-2 maintenance schedule refer to the Aeros-2 maintenance Manual.

For complete information about the Sting Ray maintenance schedule and for the complete wing information refer to the Sting Ray manual.

11. TRANSPORTATION AND STORAGE

With good care and correct maintenance your trike will retain its good conditions for many years.
We recommend that you do not expose your wing to any more direct sunlight than necessary. Do not leave under the sun for long periods of time when you are not flying.
Do not leave your wing on the trike for a long period of time in strong winds. It will decrease the life of the sail, the hang joint and the frame of your wing.
The wing may be transported in its bag in any vehicle that offers protection from mechanical damage, soiling and long exposure to rain. It is not recommended that the wing be carried or transported without its bag.
During transportation, or when stored on supports, the wing must be supported at its center and at two points not more than one meter from each end.
Supports should be softly padded, and any support systems used for transport, such as roof racks, must use attachment straps that are sufficiently secure to eliminate the possibility of damage from vibration and movement.
Avoid damage to your wing by using well-padded racks. As the wing is quite heavy a strong set of racks are required. Flat straps should be used for tie downs to avoid damage to leading edge Mylar.
When transporting the trike use trike and prop covers to protect your ultralight. Tie the propeller to the trike to stop it from rotating at speed.
Store the wing in a dry room off the ground; air the wing out regularly to avoid mildew, and never store wet.
If you fly at the costal area or your ultralight has been exposed to salt water dismount it and rinse with tap water thoroughly before storage. If you fly frequently at the costal area it is necessary to wash the ultralight with tap water at least once a month to prevent all aluminum parts from corrosion.
See your trike wing Manual for detailed description of the trike wing maintenance.
See your Rotax Manual for precautions to be observed if you intend to store the ultralight without use for extended periods.

The recommended storage temperature is from –10 to +25 deg. Centigrade.