INSTRUCTION AND MAINTENANCE HANDBOOK

Wing Type XP 17

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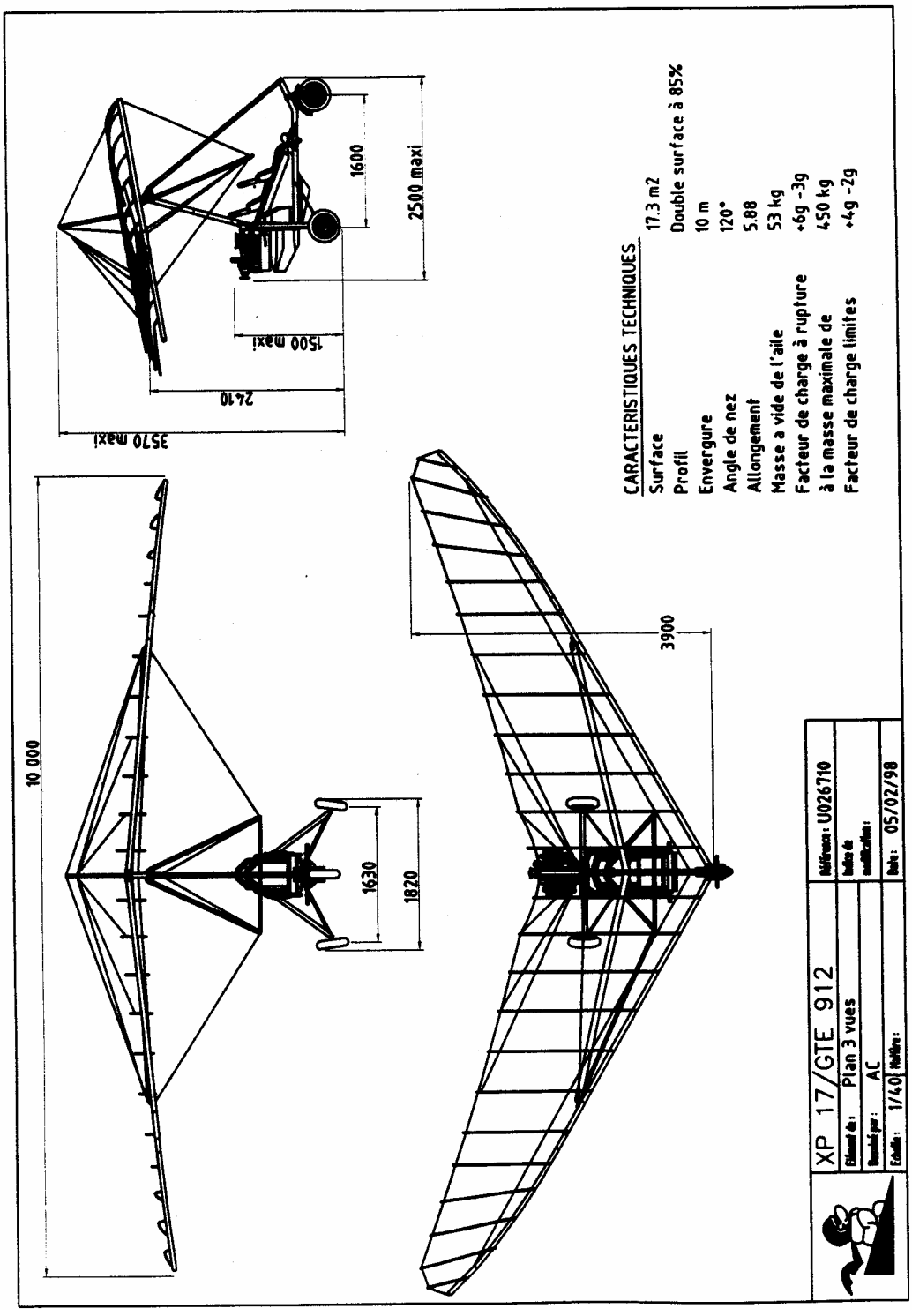
AIR CREATION Aérodrome de Lanas - 07200 AUBENAS - France
Tél. : 33 (0) 4 75 93 66 66 - Fax : 33 (0) 4 75 35 04 03 - Internet : www.aircreation.fr

I) Drawings



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II) Technical Specifications - Performances

a) Technical specifications

Area	186 sqft (17,3 sqm)
Airfoil type	Double surface 85%
Span	32,80 ft (10 m)
Nose angle	120°
Aspect ratio	5,88
Empty weight	115lbs (53 kg)
Tested structured strength	+ 5463 lbs (2472 kg) - 2731 lbs (1236 kg)
Ultimate load factors	+ 6g - 3g
Maximum take-off weight	992 lbs (450 kg)
Limit load factors	+ 4g - 0g (- 2g under gust)

b) Maximum added load / trikes adjustment

The maximum load that may be added under the wing is **877 lbs (398 kg)**. The following chart defines the useful load of our various trike models with the XP wing.

	Useful load
TWIN 503 (503 SL)	290 kg 641 lbs
TWIN 582 SL (BUGGY)	277 kg (268 kg) 612 lbs (592 lbs)
GTE 503 S(SL)	277 kg (282 kg) 612 lbs (623 lbs)
GTE 582 S(SL)	267 kg (271 kg) 590 lbs (601 lbs)
CLIPPER 582 S	257 kg 568 lbs
GTE 912 (CLIPPER)	251 kg (241 kg) 555 lbs (533 lbs)

Any trike, built by an amateur or in series production, of a total maximum weight under 877 lbs (398 kg) may be fixed under the wing. In any case, some progressive tests will have to be done to check the adaptation wing / trike. The necessary engine power for safe two-seater flight should be at least 40 HP. Check when fitting whether the trike propeller stays clear of the lower rear longitudinal cables and the keel. A minimum clearance of 10 cm should be respected when the wing is in its most rearward position.

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c) Performance at maximum take-off-weight

Trike	TWIN 503	GTE TWIN 503 S - SL	GTE/TWIN 582 S - SL (CLIPPER BUGGY)	GTE 912 (CLIPPER)
Max. take-off weight	995 Ibs - 450 kg	995 Ibs - 450 kg	995 Ibs - 450 kg	995 Ibs - 450 kg
Stall speed	33 mph - 53 km/h	33 mph - 53 km/h	33 mph - 53 km/h	33 mph - 53 km/h
Minimum level flight speed	37 mph - 60 km/h	37 mph - 60 km/h	37 mph - 60 km/h	37 mph - 60 km/h
Take-off run	195 ft - 60 m	210 ft - 65 m	195 ft - 60 m	185 ft - 55 m
49 ft clearing distance	490 ft - 150 m	510 ft - 155 m	460 ft - 140 m	395 ft - 120 m
Climb rate	390 ft/mn-2 m/s	390 ft/mn-2 m/s	490 ft/mn-2,5 m/s	790 ft/mn-4 m/s
Landing distance from 50 ft height	575 ft - 175 m	575 ft - 175 m	575 ft - 175 m (590 ft - 180 m)	575 ft - 175 m (590 ft - 180 m)
Max L/D ratio	8	8	8 (8.5)	8 (8.5)
Max glide ratio speed	46 mph - 75 km/h	46 mph - 75 km/h	46 mph - 75 mp/h-	46 mph - 75 km/h
Side wind limits	18 mph - 30 km/h	18 mph - 30 km/h	18 mph - 30 km/h	18 mph - 30 km/h
V.N.E. (Speed never to be exceeded)	87 mph - 140 km/h	87 mph - 140 km/h	87 mph - 140 km/h	87 mph - 140 km/h
V.man (never to exceeded)	59 mph - 95 km/h	59 mph - 95 km/h	59 mph - 95 km/h	59 mph - 95 km/h
Roll rate at 120 % min. flying speed (45°/45°)	5 s	5 s	5 s	5 s

III) Instruction for use

a) Assembling - Dismantling

- Open the wing bag, make sure that the 'A' frame is on top, remove fastenings and packing.
- Assemble the 'A' frame with the push-pin. Cables must not pass through the inside.
- Turn the wing over, and carefully open the two half wings to their maximum extend.
- Fit the king post onto its locating lug, take care that the tensioning cables do not entangle and that they pass on each side of the king post.
- Carefully slide the upper sail battens in their respective pockets and secure them with the doubled ropes. Do not force the battens during the assembly.
- Place the two straight battens of the wing tips on the lug on the leading edge. Carefully check the correct framing (sail tensioning screw in the tip struts axle) of the pivoting sleeves of the leading edge before to tighten the cords.
- Slip the cross tubes swan catch tensioner through the opening upper surface at the king post rearwards, pull to hook it on the rail screw tensioning at the keel tip. To simplify the operation

carefully centralize the 'A' frame and ensure that the heat shrink covering of the lower lateral cables does not get stuck in the sail opening at the cross tube-to-leading edge connection.

- Pull down the swan catch tension lever and fix it in the rail with the push-pin. Ensure that the pin is locked.
- Raise the nose of the wing and lift it on the 'A' frame.
- Fix the front lower longitudinal cables in the locating rail under the nose plate with the tension lever and the push-pin. Ensure that the pin is locked.
- Lower the wing onto its nose. Slip bottom surface battens in their pockets and secure them with the rubber bands.
- Place the tip struts into the locating sockets on the leading edges by extending on the retaining rubber bands. Slide your arm in the wing opening at the end of leading edge and lift up the sail to simplify the operation.
- Close the sail opening at the wing tip with the closing parts and their Velcro straps.
- When connecting the trike, slip the security fastening cable in the security strap at the king post level, make a turn backward around the king post, slip it again through the security strap, then fix it on the upper beam of the trike. The security cable should pass under the tensioning cables. This operation secures connecting of the trike as well as fastening of the crossbar tensioning system, in the event of violent shock-failure.
- Fix the nose bonnet with the **Velcro straps (essential point see "c" flying characteristics).**

Dismantling is carried out in reverse order of the assembling operations. ***Before folding up the two half-wings,*** make sure that the tensioning device lever doesn't get stuck in the opening upper surface forward the king post in order to avoid to hook one of the units of the sail or the structure when closing the leading edges.

With the option **" Pack V max "**, take out the kingpost head to avoid sharp curves in the upper cables.

b) Preflight-check

A preflight check is <u>essential</u> before lifting the wing above the trike. To that effect, position the wing horizontally after having connected the trike.

- Check the camber of the two leading edges and correct attachment of the nose bonnet.
- Check the thimbles and nicopress of the front lower longitudinal cables and the correct fastening of the tensioning device and push-pin.
- Slide your hand along the leading edges to check for possible defects.
- Check the crossbar/leading edges connection by unzipping the lower surface access. Check fastening of the lateral cables is correct, the condition of these cables and their nicopress and the sail is not snagged on a metallic part.
- Check the fastening of the sails at the wing tips as well as the correct positioning of the two sleeves (the two screws should be positioned directly in line with the tip strut), the placement of the tip struts and the closing of wing tips.

- Check whether the battens and their fastening rubber bands are securely positioned, check the condition of the reflex bridles and their fastening to the sails.
- Check whether any of the upper cables is looped round the king post and if the reflex bridles are correctly positioned in the pulley on the rear upper longitudinal cable.
- Check the thimbles and nicopress of the rear lower cables at the keel tip.
- Check tensioning of the crossbar cables, the correct positioning of push-pin and its safety, as well as condition and fastening of the strap retaining the keel pocket.
- Slide your hand along all the lower cables to detect signs of wear.
- Check the connection of lower cables onto the 'A' frame, the condition of these cables and their nicopress, the push-pin of the control bar.
- Check the hang point device, the condition and positioning of the tension cables. Ensure they are not crossed and check the restraining strap is forward of the king post.
- Check the hang point piece (fatigue), condition and positioning of connecting bolt, its butterfly nut and its safety ring.
- Check the connecting of the hang point trike safety cable is correct, which must imperatively be below the tensioning cables in the loop of the retaining strap, place a round behind the king post and pass again in the loop before fixing it onto the upper beam of the trike (this system ensures the fastening of the trike as well as tensioning of the crossbars in case of failure of one of the main components).

c) Flight specifications

WARNING :

The wing has not been designed for aerobatic flying.
Flight envelope's respect is imperative
- **Pitch attitudes is limited to + or - 30°**
- **Roll banking limited to 60°**
- **Inverted flight is forbidden**
- **V.N.E. (speed never to be exceeded) : 87 mph (140 km/h)**
- **Stalls authorized only in glide path with a progressive speed reduction and throttle to idle position.**

Over these limits, some stability problems, loss of control, structural failure or irreversible "tumbling" motions can occur.

Better handling will only be reached after about 10 flying hours and roll control will be more difficult during the first flights.

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- **Control bar** :
  Pushing the control bar forward causes the wing to pitch nose up ,which increases the angle of attack (the aircraft will climb) - primary effect, and a decrease in air speed- second effect.
  Maneuvering the control bar laterally causes the trike to shift in the opposite direction of your movement, so as to change the center of gravity of the aircraft. It produces a roll movement in the direction of the trike displacement.

- **Short take-off and landing techniques :**
  The minimum take-off roll distance is reached by increasing R.P.M. to full power with brake, and raising the wing to its maximum from the very start of rolling. The control bar should be brought backwards immediatly when the wheels are in the air to obtain a climbing speed of 43 mph (70 km/h or 38 knots). A short landing needs a slow approach speed of about 43 mph (70 km/h or 38 knots) and raise the nose a few meters before touching the ground, in order to touch the wheels at stalling speed. Brake and pull the control bar in order to reach a better aerodynamic braking once the rear wheels have touched ground.

- **Behavior during stalling :**
  Stalling point is reached by pushing away gently the control bar. When stall angle of attack is reached the control bar starts pushing back forcefully. By simple allowing this downward tendency for a moment, the wing will return to correct speed. In that case the loss of altitude will be less than 33 ft (10 m). If the control bar stays pushed out in spite of the warning signs, the wing will stall and the loss of altitude may easily reach some 100 ft (30 m). An asymmetrical start on one wing is possible, particularly during the running-in of the sail (first 50 flying hours). **To avoid tumbling risk, the stalling exercises must be imperatively carried out with engine at idle, with a slow decreasing speed obtained by a progressive control bar pushing out.**

- **Banking :**
  Banking of the wing has to go along with a progressive pushing out of the control bar in order to make easier the maneuver and to balance the banking. By doing the opposite, pulling in of the control bar, will allow horizontal return more quickly at recovery of banking.
  With a low cruise speed adjustment, some increase in speed is necessary before the wing is put into banking to avoid stalling of the lower wing. An increase in engine power is also advised to maintain the flight level during banking.

- **Behavior in strong wind :**
  - When stationary on the ground
    Park the aircraft perpendicularly to the direction of the wind, with its windward wing lowered. Fix the 'A' frame on the front tube of the trike with the velcro used for packing the sails and put chocks under the three wheels. Take down the wing off the trike and put it flat on the ground windward, if the aircraft is not going to be used immediately.
  - Groundruns
    Keep the sail flat into a headwind.
    Push the control bar against the trike front strut with a tailwind. This will avoid tipping over.
    Slightly lower the windward wing with a side wind. It may be difficult to hold the 'A' frame in its position. Never let the wind lift the wing up.

– Take-off and landing
As ground run distances are considerably decreasing by strong wind, try to place yourself into wind. Should this not be possible, perform the take-off and landing maneuvers with greater speed than you normally do, in order to reduce the drift angle and counter the effects of the gradient. Keep to the axis of the runway with the front wheel control.

– **Load effect - dynamic stability :**
An increase of the carrying load will require more effort for pitching and rolling, and create a small reduction of the cruising speed, (control bar released - trim) and an increase in stall speed.
A frequency of about 10 seconds is possible if the control bar is let free after a pitch motion is done.
To counter this inherent phenomenon in behavior under load factors of the flexible sails, it is better to go with the wing movements (one hand on the control bar is enough) in order to create the necessary damping to a progressive return at the cruising speed.

WARNING :
Do not fly without the nose bonnet and the removable fastener wings tips. Those streamlining have considerable effect over pitch and roll stability. Their lack create an alteration of the internal pressure of the sail, which may result in considerable modifications of the airfoil shape.

d) Adjustments

Hang point position

Hang point position adjustment is done by moving the hang point piece on the keel. The nylon locking rings of this part should be positioned according to the desired positions (4 positions). The hand-off cruising speed is increased by about 3 mph (5 km/h or 3 knots) if the hang point is moved 0,4 in. (1 cm) forward and vice versa. Each position may be used, the only effect is a change of the cruising speed, without any influence on stability and performances.
However, the hang point should never be brought back to its most backward point on the keel if the total added load exceeds 441 lbs (200 kg). The cruising speed thus obtained would be too close to the stalling speed of the wing. As well as, by using a front maximum position with only one person on board would make piloting uncomfortable, as regards to the too backward position of the control bar when flying and the pitch pressure control decreasing. During the first flights, the hang point position should be left in its original position, which has been designed to take the aircraft easily in hand.

Warning : Any alteration of hang point position means a variation of the 'A' frame tilt and therefore modification of the lower longitudinal cables tension. There are various adjustment holes in the cable fixation rail at the nose of the wing, so as to allow them to keep the correct tension whichever the adopted position of the swan nose catch may be.

Trim option (Pack V-Max)

By pulling the reflex bridles, this option allows, in the air, the adjustment of the hand-free cruising speed. Rotating clockwise the lever reduces cruising speed and inversely.
The faster position, which gives to the wing the natural cruising speed corresponding to the hang-point position, is obtained when the wire becomes free at the end of the trim control. The rotation must be limited so rolling up in the opposite direction and pleating of the cable does not occur.
The trim system pulls the wing nose up, thus it cannot accelerate the natural cruising speed beyond the one obtained naturally in accordance with the position of the trike hang point. It only allows a slowing down. Therefore, it is advisable to install the hang point piece (APR) as far forward as possible on the keel to have the most usable range.
Furthermore, before take-off it is absolutely necessary to check the adjustment of the trim with the indicator set on the uprights. We do not recommend to take off with the trim set in the slow position. Indeed, the control of the wing is more difficult if an engine failure occurs or in turbulent conditions for at low speed the pitch and roll control increase. Opt for a central or neutral position. As well as for landing in heavy turbulence roll control will be uneasy with a slow trim set.
To keep the trim efficient with time, shift the sheath stop on uprights to tighten wire again. Unscrew the holding bolt, then reset according to the desired adjustment and pull down the excess sheath, in the clear part, between the high part of the A Frame and the king post.

Position of the pivot sleeves at the leading edges tips

The two bolts of the tip adjusters have originally been designed to be in line with the tip struts. Their differential pivoting should only be used for rectifying a tendency to turn to one side. Once adjustment has been made, mark with a felt-tip pen the leading edge link with the sleeve or secure it with a pop rivet in order to find the correct position again at each assembling If the wing pulls to the right, turn the left wing sleeve anticlockwise in order to increase the twist, and the right wing sleeve anticlockwise too, in order to decrease the twist. For a wing pulling to the left, turn the two sleeves in a clockwise direction. Should the correction not be enough for a perfect wing adjustment, tension the sail as indicated in the next section.

Sail tension

The sail tension at the wing tip may be altered to rectify dissymetry observed during flying, or to make up for wear of the sails. To perform this adjustment, remove the protecting cap from the wing tips and rotate the bolt placed at its end with a 10 mm wrench. Put the cap back and readjust if necessary the tension of the small ropes or rubbers of the bottom and upper surface of the last wing tip batten, because of the modifications of the sail position on the leading edges tubes.

- In order to rectify the tendency to pull to one side, tighten the bolt on the leading edge of the "upward" half-wing and loosen the bolt of the "downward" half-sail, if it is not at its minimum tension adjustment already. Do two and a half turns at the utmost (2.5 mm tension) on each half-wing, then test the aircraft. Repeat the operation until the wing is perfectly adjusted.
- To keep the original tension of the sails which slacken by use, it is necessary to draw the sail symmetrically tight again on the two leading edges. The first adjustment should take place **after 50 hours of use**. A retensioning of 5 mm (5 turns) would be necessary to keep the original characteristics of the wing. As a general rule, tension increase on the leading edges means an increase in aerodynamic performance and in pitch stability of the wing. The roll rate, on the other hand, is altered by this operation.

Control of airfoil thickness

The XP wings are made with inner device which allows to control airfoil shape and ensure a balanced behavior when rolling and pitching over all the speed range. In the center of the sail, this devices are adjustable. These adjustments are made in the factory after the first flight of the wing. **The device at this time is definitely got jammed and any modification must be made afterwards, except by the factory in some specific conditions.**

IV) MAINTENANCE

Rigging the wing when folded in 4, 5 m :

The following procedure should be followed for assembling the wing.

- Open out the ends of the sail.
- Slide the rear leading edges through the opening of the wing tips and in the front part of the leading edge.
- **WARNING : the 2 leading edges tubes are different. You will find a mark on the tube which will tell you if it is the right part (D) or the left one (G).**
- Make sure you do not reverse them, it may have bad results because it would modify the tip struts angle entailing positive twist of the wing tips and an important pitch instability.
- Then, install the leading edges by slight turns and pushing motions in order to line up the tube cut and the connecting plates bolts with the cross bars on the front part of the leading edge. Make sure that the tip struts stand inner side and face to face. A reverse position would prevent the setting of the tip struts.
- Slide the wing tips sleeve, in the leading edges.
- Fix the sail on the leading edges with the 4 bolts FHC and the nylstop nuts. For this, while holding the extremity of the leading edge, pull the sail forward on one of the two leading edges with a string which goes through the grommet which is at the extremity of the sail. Install the bolt corresponding to the internal grommet and the most intern drilling of the wing tip sleeve. This process needs two persons. Make sure that the aluminum guide retainer, which adjust the tensioning, is lined up with the cut of the end leading edge sleeve. Install the other bolt after having removed the string. Moderately tight the nylstop nut. Follow this procedure for the other leading edge. If you find it too difficult, first, remove the 2 self tapping screws which fix the sail on the leading edge to the nose wing. This way, the sail will move back easily. Replace those 2 screws once the wing completely opened and tensionned by pulling the sail forward or by turning it so that the grommet are lined up with the drilling. Watch out the position of the fabric around the nose plates and the nose batten in front of the keel when you will open the sail.
- Assemble the wing following the usual procedure. While opening the two leading edges, control the position of the central nose batten and check the wing is not jammed on the connecting screws.
- Rotate the wing tip sleeves, and line up the bolts of the sail attachment onto the tip strut axis. If an adjustment has been carried out before, line up with marks drawn on the tubes.
- Install the control bar on the revolving base fixed to the left trapeze strut with the CHC bolt of 6mm, washers and nylstop nut. Close up the leather protection.
- Assemble the wing according to the normal procedure, check the sail fixations located at the end of the wing. Turn the rotating sleeves in order to line up the fixing bolts with the tip struts axis. Check the negative washout provided by the tip struts on the sail and check the fixation of the control bar.

a) Transportation

Bumpy and long drives might damage the wing unless not properly loaded. Transporting the wing and the trike by road requires that the wing, in particular, is properly braced, cannot shake about and is generally very carefully loaded and tied down, so that no hard points can damage tubes and sail. We suggest to carry the wing carefully on a ladder covered with foam rubber to avoid precarious overhanging.

b) Storage

Keep it in a dry place, protected against U-V rays.
Clean it with fresh water after it has been exposed to sea air. Any grass stain should be washed out with water and household soap.
Open the cover to allow the sail and the structure to dry after transport or use in the rain.

c) Overhauling

IMPORTANT

IN REGULAR CONDITIONS OF USE* A COMPLETE OVERHAUL OF THE WING IS ESSENTIAL EVERY 150 FLYING HOURS AND AFTER ANY HEAVY LANDING. THIS OVERHAUL INCLUDING COMPLETE SAIL AND STRUCTURE DISMANTLING, REPLACEMENT OF ALL SCREWS AND NUTS AND A SYSTEMATIC CONTROL, MUST BE CARRIED OUT IN OUR WORKSHOPS OR IN AN AUTHORIZED TECHNICAL STATION***. IT IS NECESSARY FOR SAFETY.**

* A peculiar use (mountain, tropics, sea environments and rough fields) requires a superior frequency, i.e. every year and every 100 hours.

** Or at least every two years if the wing flies less than 150 hours.

*** Whose operators follow a specific technical training in our workshops. An updated list is available on demand.

Aging of the fabric and seams of the sails may cause an important reduction of the wing resistance. The degradation is principally caused through exposure to ultraviolet rays emitted by the sun and the moon. In order to slow down the process, the sail should be stored folded in its cover, or if it stays rigged, in closed premises. Always put it away in a sheltered place, shielded from the rays of the sun, even between flights. These measures help to lengthen sail life.
A strip of identical fabric as the one used for the top sail is stitched to it in the middle and over the keel pocket. The strip is made from two musters sewed together. During each periodical overhaul, part of the strip must be cut off, and submitted to a test of wear and tear in our premises. The result of the test determine when the replacement of the sail becomes essential for safety reasons.

Every 50 flying hours, check :

- Whether all screws are correctly tightened and that they have not worked loose as well as the reflex bridles links.
- condition of the cables.
- the seams of the upper surface sail and the keel pocket in center of the wing.
- possible tear of the sail and the rubber strap of the bottom and upper surfaces link.
- the maintaining strap of the tensioning cables forward the king post and the one which maintains the keel pocket.
- the correct condition of the ropes of the fixation battens. Reset or replace it again if necessary. The tension of the ropes maintaining the two last tip battens situated at the tip of the sail should be very firm indeed.
- fastening bolts :
    - of the cables at the bottom of the 'A' frame
    - of the 'A' frame knuckle joints to the control bar
    - of the crossbar/leading edges link
    - of the tension device on the keel
    - of the hang point system

  Change them if there are any traces of wear or rust.
- The swan nose catch and leading edges-to-keel connection plates to detect wear or cracks.

In the event of heavy landing, check imperatively :

- the straightness of the leading edges (imperative dismantling of the rear parts)
- the nose plate and its nuts
- the swan nose catch (wear - cracks)
- the straightness of the keel
- the lower cables
- the fastening of the sail at the wing tips
- the seams of the keel pocket on the sail
- the crossbars and their link with the leading edges
- the screws, the 'A' frame uprights
- the tensioning device at the rear of the keel
- the battens (airfoil symmetry)
- the tip struts
- the fastening of the luff-lines on the sail

WARNING :

Every "nylstop" screw must be replaced after each *dismantling* and always tightened with a special glue of the "LOCTITE" type : 243.

All repair work should be carried out in our workshops or at an authorized technical station*

* Whose operators follow yearly a specific technical training in our workshops. An updated list is available on demand.

PERIODICAL OVERHAULS BOARD

Serial number : .....

Date	Hours flown	Company which has carried out the overhaul address and stamp

PERIODICAL OVERHAULS BOARD

Serial number : .....

Date	Hours flown	Company which has carried out the overhaul address and stamp

Notes

WING - QUALITY FORM

Anxious to ensure the perfection of our products, we have set a sequence of controls covering all the steps of production. We are working continuously on their improvement and we are in need of your help.
Please return this reply form accurately filled if you find any mistake or problem concerning your trike, which could affect its quality or finish, even if it is a minor one.

Your name, address and telephone number :

Type :

Delivery date :

Wing serial number :

Colors of wing :

Distributor :

Hours flown :

Problems noticed : (explanations and / or drawing)

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