



## **INSTRUCTION AND MAINTENANCE HANDBOOK**

### **Wing Type FUN 14**

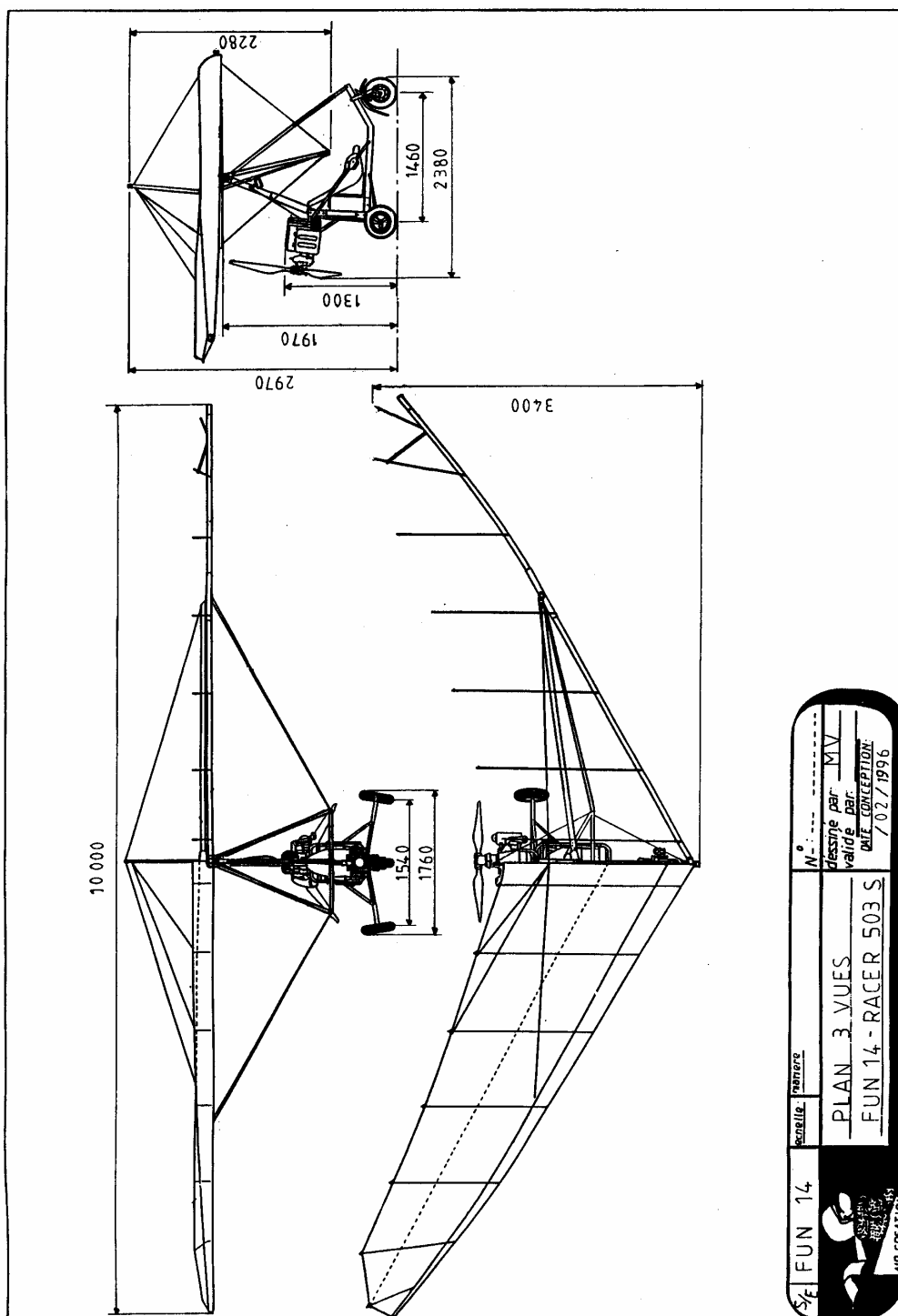
**I) Drawings**

**II) Technical specifications - Performances**

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## I) Drawings



S/E	FUN 14	échelle : 1/1000	N°	dessiné par	MV
				validé par	
PLAN 3 VUES			DATE CONCEPTION		
FUN 14 - RACER 503 S			7/02/1996		

## II) Technical Specifications - Performance

### a) Technical Specifications

Area	13.5 sqm
Airfoil type	40% double surface
Span	10 m
Nose angle	122°
Aspect ratio	7.4
Empty weight	38 kg
Tested structured strength	+ 1,350 kg - 650 kg
Ultimate load factors	+6g -3g
with max weight	250 kg
Limit load factors	+ 4g -0g (-2g under gust)

### b) Maximum added load

The maximum load which may be added under the wing is 212 kg. The following chart defines the useful load of our different trike models.

	RACER 447	RACER 503	RACER 503 SL	RACER 503 S
Maximum useful load	140 kg	135 kg	129 kg	125 kg

Any trike, built by an amateur or in series production, of a total maximum weight under 212 kg may be fixed under the wing. The necessary engine power for a safe flight should be at least 25 CV. Check when fitting whether the trike propeller stays clear of the lower rear longitudinal cables and the keel. A maximum clearance of 10 cm of should be respected since the wing is its most backward position.

### c) Performance with maximum weight

TRIKE	RACER 447	RACER 503	RACER 503 S-SL
Stall speed	38 km/h	38 km/h	38 km/h
Minimum level flight speed	40 km/h	40 km/h	40 km/h
Take-off run	40 m	35 m	40 m
15 m clearing distance	100 m	85 m	90 m
Climb rate	5,5 m/s	7 m/s	7 m/s
Landing distance from 15 m height	140 m	140 m	140 m
Max L/D ratio	6	6	6
Max glide ratio speed	45 km/h	45 km/h	45 km/h
Side wind limits	30 km/h	30 km/h	30 km/h
V.N.E. (speed never to be exceeded)	110 km/h	110 km/h	110 km/h
V.man (never to be exceeded in very turbulent air)	80 km/h	80 km/h	80 km/h

### III) Instruction for use

#### a) **Assembling - Dismantling**

- Open the wing bag, make sure that the control 'A' frame is on top, remove fastenings and packing.
- Assemble the 'A' frame with a push-pin. Cables must not pass through the inside.
- Turn the wing over and centralize the 'A' frame underneath. Carefully open the two halves to their maximum extend. Take care not to snag cables.
- Fit the king post into its locating lug, taking care that the tensioning cables do not entangle and pass naturally to each side of the king post.
- Carefully slide the top sail battens in their respective pockets, and secure them with the retaining rubber bands or with strings for those situated at back-up ropes level. Do not use force during the initial assembly and start from the keel outwards.
- Ensure the end of the smallest batten is located on lug on leading edge.
- Ensure side flying wire connections at leading edge are not twisted then pull the cross-bar swan catch tensioner to the back of the keel. Restrain the wing moving back by kneeling behind the 'A' frame.
- Fasten the swan catch on its locator situated on the end of the keel and secure with a push-pin. To simplify the operation carefully position the keel in the middle of the 'A' frame and again ensure that the heat shrink coverings of the lower lateral cables do not get stuck in the sail opening at the level of the cross-bar/leading edges link.
- Pull down the swan catch tension lever and fix it in position with a push-pin.
- 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 device lever and a push-pin.
- Lower the wing onto the nose. Place the tip struts in the locating sockets on the leading edges. Push them well into their sockets and twist. Check that they are firmly locked in position by pulling them to the rear. Lift the sail to make the operation easier. The wing is now ready for flight.
- Fix the nose bonnet with the Velcro.

#### **Attaching the wing to the trike**

Ensure wing is resting on 'A' frame and nose. Line trike unit with wing keel on nose. Push front wheel over base bar of 'A' frame. Ensure propeller is horizontal. Remove monopole securing bolt at engine mount. Move rear seat back rest support forwards. Turn rear seat around. Remove bottom compression strut bolt, washers, keeping and butterfly nut. Take out compression strut, lower to ground. End of compression strut should be about 300mm from nose of wing on ground. Lift nose of wing and fix hang point to monopole. Fit hang bolt, washers, nut and split pin. Fit back up cable through strap, in front of the king post, under tension wires, around the king post, again through the strap, then fix to other side. Sit on the trike keel. Ensure control bar is about 100 mm from front tire. Apply tire brake. Lift control bar upwards. Locate compression strut in pocket and fit bolt, wing nut. Ensure all wing nuts are fitted to R.H.S. of aircraft when sitting in it.

**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 does not get stuck in the opening of the keel pocket, slip it as far as possible to the front of the pocket, then pull out the king post.

Put wing in bag. Half zip up to keel. Fit keel protective bags. Undo 'A' frame and extend down wing bag. Put all push pins in nose plate. Ensure flying wires are not snagged. Position swan catch lever by 'A' frame. Fit padding under and around hang bracket. Put battens in wing back, tips to middle of bag. Zip up. Air Creation logo on wing back to tip of wing.

## b) Preflight-check

A preflight-check is essential before hooking the wing on the trike. To that effect lift the nose of the wing shoulder high.

- Check the camber of the two leading edges.
- Check the thimbles of the front lower longitudinal cables and the correct fastening of the tensioning device and the push-pin.
- Set the wing on its nose. Slide your hand along the leading edges to check for possible defects.
- Check the cross-bar/leading edges link by unzipping the bottom surface access. Check the fastening of the lateral cables is correct and the sail is not snagged.
- Check the fastening of the sails at the wing tips, as well as the correct positioning of the two pivots (the two screws should be positioned directly in line with the tip strut) and the tip struts.
- Check whether the battens and their fastening rubber bands are securely positioned, check the condition of the back-up cable and their fastening to the sails.
- Check whether any of the upper cables is circled around the king post (watch the off lines).
- Check the fixing of the rear lower cables at the keel end.
- Check the tension of the cross-tube tension cables, the position of the push-pin and its safety-lock, as well as the condition of the loop that holds the sail centered.
- Slip your hand along all the lower cables to detect signs of wear.
- Check the hang point, the condition of the tension cables and ensure they are not crossed, check the buckle which maintains them at the level of the king post and the strap restricting upwards travel of the cross-bars.

## c) Flight specifications

WARNING :

The wing has not been designed for aerobatic flying.

Flight envelope's respect is imperative

- Pitch attitude is limited to + or - 30°
- Roll banking limited to 60°
- Inverted flight is forbidden
- V.N.E. (never to be exceeded) : 110 km/h
- Stalls authorized only in glide path with a progressive speed reduction and throttle to idle position.
- Over these limits, some stability loss or control, structural failure or irreversible "tumbling" motions

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

– **Control bar :**

Pushing the bar forward causes the wing to pitch nose up ,which increases its angle of attack and increases its speed.

Maneuvering the bar laterally causes the trike to shift in the opposite direction of your movement so as the center of gravity of the aircraft. It provokes a pitch attitude in this direction (maneuvering the bar to the left : center of gravity shifted to the right: pitch on right).

– **Short take-off and landing techniques :**

The minimum take-off run distance is reached by pushing the nose up from the very start of the take-off run and keep it thus, until the wheels are airborne. Maintain a speed of 45km/h to climb according to the best climbing angle. A short landing needs a slow approach speed of about 50 km/h. Hold the wing level with the ground until landing. If your trike is not equipped with brakes, pull the control bar to the utmost in order to get better aerodynamic braking once the rear wheels have touched ground.

– **Behavior during stalling :**

Stalling point will be easier reached on the rear trim position. You will feel that it is close when 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 10 m. If the control bar stays pushed out in spite of the warning signs, the wing will drop lower and the loss of altitude may easily reaches some 30 m. An asymmetrical start in 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 throttle down engine, with a slow and steady slackening speed obtained by a progressive control bar pushing out.

– **Behavior in strong wind :**

- When stationary on the ground

Park the aircraft perpendicularly to the direction of the wind, with its windward wing lowered. Block the 'A' frame on the front tube of the trike with the Velcro used for packing the sails and put a wedge under the three wheels. Take the wing off the trike and put it flat on the ground windward, if the aircraft is not going to be used immediately.

- Ground runs

Keep the sail flat into headwind.

Push the control bar against the trike front strut by tailwind. This will avoid tipping over. Slightly lower the windward wing with side wind. It may be difficult to hold the 'A' frame in its position. Never lift the wind lift the wing up.

- Take-off and landing

As ground run distances are considerably lessened by strong wind, try to place yourself into wind. Should this not be possible, perform the take-off or 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.

## d) Adjustments

### Hang point position

Centering adjustment is done by moving the hang point on the keel. The nylon locking rings of this part should be positioned according to the desired centering (3 positions). The cruising speed at natural trim increased by about 2 km/h if the hang point is moved forward and vice versa. Each position may be used, the only effect is alteration of the cruising speed once control has been released, without any repercussions on stability and performance. However, the hang point should never be brought back to its most backward point on the keel, if the total added load exceeds 170 kg. The cruising speed thus obtained would be too close to the stalling speed of the wing, which would make piloting delicate. During the first flights, centering should be left at its original position.

Warning : Any alteration of centering 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 in the nose of the wing, so as to allow them to keep a correct tension whichever the adopted position of the swan nose catch may be.

### **Position of the tip adjusters at the leading edges tips**

The two bolts of the tips 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 pull to the 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 number 10 spanner. 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-sail 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 (2.5mm tension) on each half-sail, 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. The following adjustments are to be carried out during the periodical overhauls. 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.

## IV) MAINTENANCE

### Rigging the wing when folded in 4,5 m :

The following procedure should be followed for assembling the wing.

- Remove the ends of the sail.
- Slide the rear leading edge through the opening of the wing tips and fit them in the front part of the leading edge.

**WARNING : The 2 trailing edges 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 trailing edges by turning them which will line up the tube cut and the connecting plates capscrews 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 order would prevent the setting of the tip struts.
- Slide the wing tips sleeve, onto the sail is fixed, in the trailing edges.
- Fix the sail on the leading edges with the 4 bolts FHC and nylstop nuts. For this, while holding the extremity of the leading edge, pull the sail forward on one of the 2 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 aluminium 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. Moderatly 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 is completely opened and tensionned by pulling the sail forward or by turning it so that the grommets 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.
- Rotate the wing tip sleeves, and line up the capscrews of the wing onto the tip struts 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 6 mm, washers and nystop nut. Close up the leather protection.
- Assemble the wing according to the normal procedure

### **Transportation :**

Bumpy and long drives might damage the wing unless not properly loaded onto the vehicle. 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.

Carry the wing carefully on a ladder covered with foam rubber to avoid precarious overhanging.

### **Storage :**

Keep it in a dry place.

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.

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## **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.

Ageing 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 covered premises. Always put it 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 under the keel pocket. The strip is made from two musters stitched together. During each periodical overhaul, part of the strip is cut off, and submitted to a test of wear and tear. The result of the test determine the moment where replacement of the sail becomes essential for reasons of safety.

### **Every 50 flying hours, check :**

- whether all screw are correctly tightened and that they have not worked loose.
- the condition of the cables
- possible tears in the sail
- whether the symmetry of the batten profiles of the wings compare
- the good condition of the rubber fixations of the battens and the strap maintaining the sail to the tension device. (The tension of the ropes maintaining the four last battens situated at the tip of the sail should be very strong indeed).
- the fastening bolts :
  - o of the cables at the bottom of the 'A' frame.
  - o of the 'A' frame knuckle joints to the control bar
  - o of the cross-bar leading edges link
  - o of the tension device on the keel
  - o of the hang point system
  - o Change them if there are any trace of wear or rust.

**In the event of heavy landing, check :**

- the nose plate and its nuts
- the straightness of the keel
- the lower cables
- the symmetry of the leading edges
- the fastening of the sail at the wing tips
- the seams of the keel pocket on the sail
- the cross-bars and their link with the leading edges
- the screws, the 'A' frame uprights
- the tensioning device at the rear of the keel
- the battens
- the tip nuts
- the fastening of the back-up ropes on the sail
- the strap maintaining the sail at the rear of the keel

**WARNING :**

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

**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

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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 :**

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**Type :** \_\_\_\_\_

**Delivery date :** \_\_\_\_\_

**Wing serial number :** \_\_\_\_\_

**Colors of wing :** \_\_\_\_\_

**Distributor :** \_\_\_\_\_

**Hours flown :** \_\_\_\_\_

**Problems noticed :** (explanations and / or drawing)

