X-AIR F

GENERAL MAINTENANCE AND FLIGHT MANUAL

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GENERAL MAINTENANCE AND FLIGHT MANUAL

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Chapter 1- INTRODUCTION

Dear fellow pilot,

Our congratulations and our thanks, for choosing our new **X-AIR F** Ultralight. We wish you many pleasant hours of flight.

This maintenance and flight manual will help you achieve safe flying conditions.

Please read it attentively and follow all the instructions concerning assembly, preflight inspection, in-flight operation and maintenance.

Feel free to contact your dealer for any additional information about your ultralight, and for any remark you wish to make to improve the quality of this document, the service we can offer, or the general safety of your flights.

This ultralight is an aircraft, and as such must be flight-tested by a certified instructor. All test flights to be conducted in still air.

Never forget that you alone are responsible for the safe handling of your **X-AIR F**.

Constant vigilance and attentiveness are essential.

Your own safety, the safety of your passenger and other fliers, as well as the future of ultralight flying are at stake.

Many happy flights!

Chapter 2- WARNING

WARNING

Even in the best of conditions, ultralight flying may be hazardous. The user of this ultralight acknowledges the existence of such hazards.

Before his first flight, the user must pledge to read this manual. He shall follow exactly the instructions given.

He should be advised that the weight of any additional equipment increases the empty weight of the aircraft and decreases its useful load accordingly -- since maximum weight cannot be exceeded.

The user pledges to carry out all the mandatory alterations specified in Rand Kar's regular newsletters.

Any alterations or repair other than those specified by the manufacturer, or carried out without the manufacturer's agreement shall void the warranty.

The user must be a licensed Ultralight pilot.

Rand Kar Sarl cannot be held responsible for any incidents or accidents caused by improper assembly, or reckless use of the ultralight, particularly when flying in bad weather, performing aerobatics maneuvers, or maneuvers exceeding the flight envelope of the aircraft.

At : ....., date: .....

signed:

Owner's name and address: .....
.....
Type of aircraft:

Serial number:

Chapter 3- TO MAKE WARRANTY EFFICIENT, THIS FORM HAVE TO BE RETURNED TO DEALER

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At : ....., date: .....

signed:

Owner's name and address: .....
.....

Type of aircraft:
Kit N°:
Engine:

This form to be filled and returned to:

RAND KAR sa
Canal de la Martinière
F - 44320 FROSSAY
FRANCE

WEIGHT SHEET

To be filled and sent back to Randkar

C.of G calculation method.:

Aircraft must be horizontal

Weighing operation must be done with 3 similar weighing machines located each under every wheel of the aircraft.

acceptable limit of C G = from 4,5 to 18 (cm)

		Weight (kg)
Front wheel	A	
Main gear : left wheel	B	
Main gear : right wheel	C	
TOTAL		

$$CG = \frac{146 \times A}{(A+B+C)} = \text{--------}$$

Date:

Place:

Type of aircraft :

Serial Number

Identification sheet:

Max. empty weight :

Owner : Signature :

To be filled and sent back to :
RANDKAR
canal de la martiniere **44320FROSSAY - FRANCE**

Chapter 4-GENERAL REQUIREMENTS AND LIMITATIONS

4.1 REQUIRED PILOT COMPETENCY

Student pilot license and orientation flight
Three-axis ultralight pilot license and further necessary training, as needed (an orientation flight is mandatory in any case).

4.2 FLYING CONDITIONS ALLOWED

Day VFR, no icing conditions.

4.3 CERTIFICATIONS (France only)

X-AIR F comes under Class II of the Ultralight Aircraft Certification of June 17, 1986, regulating flight authorization of Ultralights.
Certificates stipulated in sections R133-1 and following of the Code de L'Aviation Civile are not required for ultralights, which are therefore exempted of any certification.

Each ultralight pilot must realize that he, and only he is responsible for the safe operation and maintenance of his aircraft.

The **X-AIR F** can be used under such varied and diverse conditions that it is impossible to give strict and all-inclusive instructions for its maintenance.
However, our present experience of the aircraft makes it possible to offer a realistic maintenance program.
When in doubt, the owner should always seek advice from a competent professional.
Needless to say, we at RANDKAR welcome all your remarks; we will be pleased to answer all your questions.

IMPORTANT FACTS

I / MAXIMUM TAKE OFF WEIGHT

Like any aircraft, an ultralight has a maximum take off weight. This must never be exceeded.

Maximum take off weights:
450kg for the T versions (992lbs)
400kg for the LT versions (896lbs)

The builder will in no circumstances be held liable should these weight limitations be exceeded whatever the origin or nature of the additional or accessory equipment carried on the aircraft.

This manual includes all the information required for the use and maintenance of the aircraft.
This manual is specific to the aircraft it describes, and must be read by all users, as stated in Parts 1and 2 of June 17, 1986 ruling.

II / CHANGES MADE TO THE AIRCRAFT

Each owner is required to inform his local branch of the District Aéronautique and the regulating authority in charge of specification files (SFACT) of any changes made to the aircraft's characteristics as recorded in its type certificate - engine, propeller or any other part -- as per sections 8 and 10, Part II, paragraph VI of June 17,1986 ruling.

Chapter 5- DESCRIPTION AND GENERAL CHARACTERISTICS

5. 1: GENERAL DESCRIPTION

X-AIR F is a three-axis ultralight of simple design and rugged tube-and-fabric construction, with a tricycle landing gear. It is flown, and handles, very much like a light airplane.

5. 2: DESCRIPTION OF BASIC MODEL

Depending on the type concerned, the basic **X-AIR F** is comprised of the following:

- complete structure and fabric envelop (aluminum and Dacron) with ailerons, flaps, elevator and rudder.
- instrument panel with all flight and engine instruments, depending on model
- full dual controls on three axes and engine
- tricycle landing gear, no brakes
- 25 liter fuel tank (5.5 Imp. gallons, 6.6 US)
- windshield
- tractor engine
- reduction drive
- propeller

This is a non-exclusive list : many options are available.

Chapter 6- PREFLIGHT INSPECTION

This is where a safe flight begins.
A preflight inspection should be carried out before every take off.

6.1 ENGINE

Stand facing the engine and check:

- condition of propeller and propeller bolts and nuts
- reduction drive (no leakage, or excessive play in gears)
- engine hold down bolts (check that rubber mounts are seated flat against the base plate)
- coolant circuit (for water-cooled engine) and level of coolant liquid
- proper operation of blower and condition of blower belt (for air-cooled engine)
- condition of coil support plate
- condition of spark-plug caps
- condition of fuel line
- water- and/or oil-radiator retaining bolts, intake muffler rubber mounts (optional)
- exhaust muffler hold down, condition of rubber mount and muffler holding strap
- the exhaust system for apparent or incipient cracks

6.2: AIRFRAME

Starting from the left, facing the aircraft, check all fastenings

- of leading edge tube between the two plates
- of all tubes converging on the foot rest
- the wheel and the tyre pressure
- of the stainless steel wing strut straps
- of both wing strut clevises
- check along the length of the wing struts
- check the condition of the wing leading edge
- check safe and firm positioning of wing tip fairing

Walk around to the trailing edge and check:

- upper rear strut fitting
- compression tube fittings
- through the lower surface inspection window, check the forward fittings of the compression tube and the drag wires
- trailing edge attach clevis
- safety rings on all three aileron clevises, and aileron pushrod fastening
-- safety rings on all flaps clevises, and flaps pushrod fastening

Walk back along the fuselage and check:

- linkage on elevator bellcrank
- fastenings of elevator flying wires
- clevises on pushtubes to elevator bellcranks
- elevator attach fittings
- hinges of elevator and rudder
- condition of fabric on tail surfaces
- shackles on rudder cables
- fastenings of rear fuselage section
- support plate for aileron and elevator pulleys, and cables

Walk over to the right side and check:

- elevator hinge on right side
- upper fastening of elevator wire
- general condition of tail surfaces

Move forward and check:

- trailing edge fastening
- aileron fittings and turnbuckles, and cable
- flaps fittings
- under the two layers of fabric, the presence of safety rings on all clevises
- proper condition of seat bolts
- shackle safetied
- condition and tension of aileron cables and linkages
- rudder cables (must cross)
- tank vents open and tanks properly attached
-footstep and ends of fuselage tubes
-wheel fastening and tyre pressure
- stainless steel straps to landing gear axle
- clevises at base of both wing struts

Follow rear strut and check:

- upper clevis
- compression tube clevis
- wing along trailing edge
- proper placement of batten pocket ends
- wing along leading edge
- forward strut upper clevis
- upper fastening of forward fuselage tube

Walk around to cockpit and check:

- throttle cable at throttle lever and normal operation of throttle
- choke, gas filter, gas line, and electric pump if fitted
- airspeed indicator operation, AGL or MSL setting on altimeter
- fuel level
- weel work of flaps control

Now you may go on to: starting the engine

Chapter 7- PHASES OF FLIGHT

7. 1 : STARTING THE ENGINE

Please follow the following procedure for easy, smooth engine starts.
Before any engine starting action, it is essential to check there is nobody around the aircraft, especially in the propeller area.

7. 1. 1 : ENGINE COLD

- check open tank vent
- give the squeeze bulb a few pumps, or start the electric pump (optional), to fill the carburetor bowl
- check switch is "OFF"
- pull the propeller through 10 -15 turns (20 to 25 in very cold weather)
- choke lever "ON", throttle : closed

Note: fitting the optional priming set spares you this procedure.

- turn ignition "ON", clear all spectators from front and sides of propeller
- pull starter rope; the engine should start at second pull

This may be done while seated. Place left foot on rudder bar and hold starter handle in both hands.
If this feels inconvenient, start from outside but make sure you have a competent helper in the cockpit, ready to keep the aircraft from moving forward.

- as soon as engine is running, throttle to 3000RPM and warm up for a few minutes, moving choke to "OFF" gradually.

7. 1. 2 : ENGINE WARM

- if the engine has been running quite recently, simply turn ignition "ON", choke "OFF", throttle closed, and pull. The engine will start instantly.
- if more than 15 minutes have passed since the engine was stopped, start same as just above, but with choke "ON".

Move choke to "OFF" immediately engine starts.

CAUTION!

NEVER TAKE OFF WITH CHOKE "ON":

This would make the engine lose power very quickly and might result in engine stoppage on take off, with foreseeable consequences!

If the engine will not start cold, your spark plugs probably need replacing. Otherwise, refer to the manufacturer's manual.

7. 2 : BEFORE TAKE OFF

- altimeter set
- check controls move freely and to the stops
- trim tab : centered
- both seat belts fastened
- parachute: control box plugged and tested (optional)
- enough fuel in tank: never take off with less than 10 liters (2,64 US gals, 2,2 Imp.)
- Clearance: approach and runway clear
- radio check if required

7.3 : TAKE OFF AND CLIMB OUT

- Runway clear, and of sufficient length
- Run up at half RPM; temperatures: water 50° C, cylinder head, 100°C
- Check both ignition circuits at 3000 RPM. Drop should not exceed 300 RPM
- electric fuel pump "ON" (option)
- brake "ON" for full throttle test. (less if aircraft moves forward)
- throttle closed all the way : engine should not stop
- apply full throttle gradually
- stick slightly back to ease nosewheel up
- check you are tracking straight
- slowly rotate at about 60 km/h (approx. 40 mph)
- maintain 80 km/h through climb-out (approx. 50 mph)
- maintain full throttle to 150 m (500 ft)
- electric fuel pump "OFF" ("ON" may cause excess fuel consumption)
- to use the flaps on take off allows a reduction of minimum speed of:
  5 km/h (approx 3 mph) in the first position (do not exceed 100 km/h with flaps in the first position)
  10 km/h (approx 6 mph) in the second position (do not exceed 90 km/h with flaps in the second position)

7. 4 : THE CLIMB

- maintain air speed at 80 km/h (approx. 50 mph)
- check temperatures (water 70°C, cylinder head 100°C)
- do not exceed specified limits

7. 5 : TURNS

The aircraft enters turns easily and without much adverse yaw.
Control your angle of bank at all times, and at first, use little amounts of bank: 10° in final to begin with.
Never forget that stall speed increases with bank.
You will soon come to enjoy the aircraft's excellent maneuverability. However, always keep in mind that aerobatic flight in ultralights is PROHIBITED!

7. 6 : FLYING IN TURBULENCE

At first, fly only in calm air or light winds. Flying in turbulence is advised only after a certain degree of experience has been achieved. Keep your airspeed reasonable: 70 to 75 km/h (44 to 48 mph) is the recommended speed for comfortable flying in these conditions. Do not counter all the aircraft's excursions away from a perfectly level attitude. **X-AIR F** has enough sweep-back and dihedral to give it positive stability.

In high winds, keep in mind the gradient effect, which may lower wind speed close to the ground, and the inertia encountered upwind and downwind in the turn. Keep a reasonable angle of bank, and your airspeed at or above 80 km/h (50 mph).

7. 7 : THE STALL

The best way to get to know your aircraft is to practice the stall. You will first have to climb to a safe altitude, minimum 250m (820ft), clear the area by doing a 180-degree turn, and begin the stall, engine at idle.
Practicing the stall and recovery will help you acquire the proper reactions and reduce altitude lost in an unexpected stall.

7. 7. 1 : STALL, POWER OFF (IDLE)

First of all, make sure you are pointing upwind and the area is clear. When you come to the stall speed indicated in the specs sheet, corrected as per load and density altitude, the aircraft's handling becomes mushy, as the stick is pulled back slowly, keeping the wings level and flight symmetrical.

Recovery is attained very simply by reducing wing incidence (release back pressure), and adding power slowly.
As speed increases past 80km/h (50 mph), pull back and level off gently.
Make sure you do not reach excessive speeds during recovery.

7. 7. 2 : STALL, POWER ON

With power on, stall is achieved at a higher angle of attack and the break occurs more abruptly; recovery in two seater configuration will lose you 30m (150ft).

7. 8 ; THE CRUISE

Choose the desired power setting for level flight between 80 and 120 km/h (approx. From 50 to 75mph), depending on model and load.

7. 9 : DESCENT / LANDING

To descend, reduce power for 80km/h (50 mph) at full load.

- to use the flaps on take off allows a reduction of minimum speed of:
  5 km/h (approx 3 mph) in the first position
  10 km/h (approx 6 mph) in the second position

Keep in mind that speed is controlled with the stick and angle of descent with the throttle. If you are going too fast, pull back on the stick, and vice-versa.

Keep a safe margin and end your approach with a power off (idle) descent, then flare off.
In off-field landings, this procedure will allow you to retain enough altitude until the last moment to avoid a hidden object, such as a fence or large rock....

A flat approach, airplane style, should be reserved to airfields with a well cleared, open approach.
The flare-out itself is straightforward. Keep some power on for comfort, and keep the aircraft tracking straight.
Remember: on an ultralight, the rudder remains effective down to very low speeds.

Once the main wheels are on the ground, keep pulling back on the stick until the nosewheel touches down also.

This will slow down the aircraft faster and will keep the nosewheel from hitting a bump too hard.

If your landing seems a bit chancy, never hesitate to add full power and go around.

The following is the easiest method to calculate best approach speed (V.A) for short field landings:

V.A = (Vmin x 1,3) + 1/2 windspeed +(Vgusts - Vwindspeed)

Vmin is indicated in the specs sheet.
For example, at full load : WIND : 25 km/h (15 mph) ; GUSTS : 35km/h (22 mph)

V. A = (60x1,3) + 12,5 + (35-25)
V.A = 100,5 km/h (62,5 mph)

7. 10 : CROSSWIND

Never take off with a 90° crosswind higher than indicated in the specs sheet: 25km/h (15 mph) unless you are thoroughly experienced on your aircraft.

In crosswind landings, lower your wing into the wind, and add enough opposite rudder to keep your aircraft straight down the strip (side slip).

Keep heading straight, touchdown with the upwind wheel first, then decrease your angle of bank and lower the other wheel slowly.
This maneuver can be used with a minimal amount of practice.

IMPORTANT NOTICE:

Always keep in mind that any aircraft may experience unexpected engine failure.

Hence, make sure you always have enough altitude to be able to pick as safe an emergency field as possible.
Never overfly built up or hostile areas such as forests, swamps, etc... without an added margin of altitude to be able to reach safer terrain in case of engine failure.

The same applies to your choice of maneuvering speed, especially in phases of flight which allow no room for improvisation (take off, climb out, landing).
Give yourself an ample safety margin; you will never regret it.

7. 11 : STOPPING THE ENGINE

On the ground:
Let the engine cool down for 30 seconds at half RPM before turning off the ignition.

- parking brake on
- radio and intercom: off
- all switches: off
- never close the fuel shut off (if fitted).

7 . 12 : PARKING

(It is preferable to keep the **X-AIR F** parked inside a hangar)

If the **X-AIR F** has to be left outside unattended:

- point the aircraft into the wind, and put the brake on
- attach the stick with both safety harnesses
- immobilize the rudder with a control lock or other
- tie down the wings from the top of the struts to a "corkscrew "anchor in the ground
- similarly, tie down the propeller shaft
- block the wheels
- in Summer, shade the instrument panel with an aluminum/Mylar film.

Chapter 8- EMERGENCY PROCEDURES

8. 1 : ENGINE FAILURE

8. 1. 1 : BEFORE TAKE OFF, DURING TAXIING

- throttle down
- brake
- cut off engine ignition

8. 1. 2 : AFTER TAKE OFF

-set airspeed at 75km/h (approx.47 mph)
- land straight ahead; only minor course changes should be made, to avoid obstacles.
- do not attempt to fly back to the runway: more often than not, you do not have enough height above ground to do so safely.

8. 1. 3 : IN FLIGHT

- check to see if the engine did not stop because of inadvertent action on:
    - engine ignition switch
    - throttle
    - fuel shut off
- try to use the emergency fuel pump (black bulb) or start the electric fuel pump (if fitted)
- airspeed: 80 km/h (50 mph)
- look for a suitable landing field
- if you have enough altitude, flying down wind will allow to cover a greater distance, increasing your chances of finding a suitable field.
- If the field is flat, land into the wind

Note: In a 15 km/h wind (8 knots), the energy to be absorbed by the brakes will be 2,5 higher landing downwind than upwind.

- brake hard

8. 2 : FIRE

8. 2.1 : ENGINE FIRE IN FLIGHT

- close the fuel shut off (if fitted)
- stop the electric pump if it is on (if fitted)
- open full throttle
- cabin heating: off (if fitted)
- if possible, ask for help on the ground (fire brigade)
- land as soon as possible

8. 2. 2: FIRE IN THE COCKPIT

- close heating and ventilation
- cut off auxiliary electric supply
- if necessary, cut off engine ignition
- land as soon as possible

8. 2. 3: ELECTRIC FIRES

- close heating and ventilation
- cut off auxiliary electric supply
- if necessary, cut off engine ignition
- land as soon as possible

8. 3: BATTERY REGULATOR FAILURE

Failure of the battery regulator may cause overheating of the battery and gas release.

- pull out the charge fuse
- open the doors
- land as soon as possible

8. 4 : LANDING WITH ELEVATOR INOPERATIVE

- control the aircraft with the trim tab
- move the throttle very slowly while trimming with the tab
- pick a fairly long landing field
- set airspeed at 80 km/h (50mph) and 1,5m/s (300ft/mn) for final approach (depending on wind and turbulence, a higher airspeed may be needed)
- flare with the trim tab, keeping off the ground as long as possible, without throttling back
- immediately on touchdown, cut power

8. 5 :EMERGENCY LANDING POWER ON

(due to weather conditions or imminent lack of fuel)

- look for an appropriate landing site: check for possible obstacles (trees; power lines, fences); observe the slope of the field
- make a full 360° turn over the field; the amount and direction of drift during the turn will indicate the speed and direction of the wind.
- overfly down low, into the wind, to make a thorough inspection of the field
- seatbelts tight, helmets secured
- make a normal landing
- immediately on touch down, cut engine ignition
- brake hard

8. 6 : EMERGENCY LANDING POWER OFF

- look for an appropriate landing site: (obstacles, slope, condition of terrain, wind direction)
- seatbelts tight, helmets secured
- come in high, upwind, on final approach
- use side slip freely to increase your rate of descent
- make a normal landing and brake hard
- if the ground is reasonably level, putting stick forward all the way will shorten your run
- if braking distance is restricted, full rudder into the wind
- if your aircraft is fitted with a parachute and the field is on a slope or has dangerous obstacles, you can open you parachute when reaching ground level.

However, this has never been tested on **X-AIR F** and should be viewed only as a possible alternative.

(Notably, opening the parachute could create a strong pitch-up force, which might cause a sudden climb, followed by a stall. This might happen due to the parachute being attached above the C.G.)

8. 7 : EMERGENCY LANDING ON WATER

CAUTION : it is difficult to judge height above water!!

Get your passenger and yourself psychologically prepared for landing on water, and try to pick a landing course that will make swimming ashore easiest.
Unlock the doors
prepared to unfasten your safety harness. (Same for your passenger)

Touch down nose-up, as slowly and gently as possible.
Once in the water, stay calm; leave the aircraft without taking anything with you. **X-AIR F** is made up of water resistant materials, so that it will almost always be possible to retrieve it and get it in the air again with a thorough rinse in fresh water and a good dry out.

8. 8 : EMERGENCY LANDING IN TREES

Prefer one or several low, bushy trees. Belts and helmets tight.

Keep some speed on in final, as the air is often turbulent next to the trees. Pull up sharply to break your speed as soon as you hear contact with the branches. Good luck!

8. 9 : FLYING IN HEAVY RAIN

If the windshield fogs up, wipe with a soft cotton rag.
Throttle down to limit wear on the propeller.
Try to fly away from the rain.

8. 10 : FLYING IN ICING CONDITIONS

Although flying in icing conditions is prohibited; you may be caught in such conditions. Proceed as follows:

- carburetors heat: "ON" (if fitted)
- -turn around or change altitude for a less critical air temperature
- increase power to reduce icing to minimum
- plan on landing on the nearest airfield; if ice is building up fast, land off-field
- ice on the leading edge increases your stall speed
- approach speed depending on thickness of ice: 80 to 90 km/h (50 to 56 mph); fly a shallow, "airplane" type descent, with engine at high revs.

8. 11 : UNVOLUNTARY SPIN

Use the following procedure to recover from an involuntary spin:

- opposite rudder, release when rotation stops
- let stick move freely (to neutral pitch, slight roll with the spin)
- pull out gently, staying within the flight envelope.

IMPORTANT NOTE

At very low speed, control the aircraft with rudder only.

8 12 : USE OF THE PARACHUTE

the parachute is the last solution to save lives or limit injuries of pilot and passenger of the airplane.
Its use can be necessary in extreme emergency situations like: collision in flight, structure or control failure, faintness or incapability of the pilot, engine failure over very hostile land, etc…

Use -
- check : safety harness tight
- engine off
- press parachute handle immediately
- close fuel shut off (if fitted)
- radio you position

If you cannot get radio contact, switch to 121,50 MHz (emergency channel), and give your position.

IMPORTANT : Never forget to remove the safety pin from the handle before take off and to replace it after landing.

(For models fitted with a parachute)
If you are unable to regain control of the aircraft (collision, airframe failure) :

NOTE CONCERNING BALLISTIC PARACHUTES

Speed at opening exerts extremely high strains on the parachute.
The user should inquire from the parachute manufacturer if the characteristics of parachute(s) are compatible with the performances of the airplane

Maintenance : Follow instructions of maintenance manual of parachute manufacturer.

Chapter 9- PERFORMANCE AND CHARACTERISTICS

9. 1 : WEIGHTS

The empty weight of your **X-AIR F** can be found by adding basic airframe weight (107,5 kg ; 237 lbs.), weight of engine and weight of optional equipment. (see annexes and chapter 10 : "weight of options")

Basic airframe weight without engine (all tubes and Dacron fabric)	**kg**	**lbs.**
	107,5	237

-included : dual controls (throttle, rudders, sticks)
windshield
fuel tank , 25 l. (6 US gals, 5,5 Imp gals)
basic instrument panel

- not included: engine
suspension
pod and windshield
rear cabin fairing
trim tab
cabin door
brake
wood floor

Weights :	**kg**	**lbs.**
Airframe with three wheels	17,2	37,9
Wings (both) fabric	8,5	18,7
Complete structure	28,6	63
Batten set	5,6	12,4
Ailerons (both, installed)	4,8	10,6
Flaps	3,8	8,3
Struts (complete assembly)	9,6	21,2
Elevator controls	2,4	5,3
Elevator	3	6,6
Stick, rudders and throttle assembly	6,6	14,6
Rudder	1,8	4
Stabilizer	4,2	9,3
Seats (both)	5,4	11,9
Rudder control cable assembly	0,8	1,8
Fuel tank (1, 25 l: 6,6US, 5,5Imp. gals)	3	6,6
Windshield	2,4	5,3
Instrument panel	1,2	2,7

9. 2 : SPECIFICATIONS

Length	5,65 m
Height	2,55 m
Span	9,40 m
Mean chord	1,58 m
Wing area	14.32 m²
Dihedral angle	1,2°
Sweepback angle	8°
Washout	4°
Area of vertical surfaces	0,73 m²
Area of rudder	0,63 m²
Area of stabilizer	1,51 m²
Area of elevator (2)	0,88 m²
Aspect ratio	5,94
Landing gear, track width	1,60 m
Landing gear, wheelbase	1,46 m

9. 3 : WEIGHTS AND BALANCE

Thanks to the design of the aircraft and the weight distribution of optional equipment, the C.G. range cannot be exceeded as long as maximum take off weight and installation instructions are observed.
Position of C.G. on **X-AIR F** varies with the optional equipment and quantity of fuel, between 4,5 and 18 cm forward of main wheels axle (3,54 in. to 7,48 in.) .

Aircraft in Level attitude
Acceptable C G = 4,5 to 18 from datum 0 (cm)
Datum = Axel of main wheel axel

	Weight (kg)
Nose Wheel	A
Main Wheel Right + Left	B + C

$$CG = \frac{146 \times A}{(A+B+C)}$$

Sample Problem with private flying **X-AIR F** (with all thing in the plane: Intercom Fuel, Doors, electric starter and etc etc) without pilot and copilot.

Private **X-AIR F** with Options and Fuel	Nose Wheel	Main Wheel Right	Main Wheel Left	Total Weight (A+B+C)	C G
X-AIR F + 503 Rotax + Options	30	109	112	251 kg	17,45
X-AIR F + 582 Rotax + Options	30	122	124	276 kg	15,86

9. 4 : PERFORMANCE

The performance figures found in the following annexes represent averaged measured values.
However, take into consideration that performance will vary with the power plant fitted on each aircraft.

Performance at take off is greatly influenced by air density. Higher altitude and/or temperature will affect results.

To clear 15m (approx.50ft) after take off, it is best to reach 75-80 km/h(47-50 mph) before you come back on the stick. This will mean a longer roll, but will eventually result in a shorter distance to clear 15m (50 ft).

Fuel consumption may vary with the mixture setting. Range will be estimated from the amount of fuel in the tank, the wind and a minimum safety reserve of 30minutes.

Best gliding speed is lower if weight is lower. If the actual weight is 30% below maximum, the best gliding speed will be 15% lower than normally specified.

Landing distance (to clear 15m) can be considerably shortened by side slipping, with stick into the wind and opposite rudder. Practice with a qualified instructor is mandatory.

9. 5 : LOAD FACTOR AT MAXIMUM WEIGHT

Maximum load permissible: on the control surfaces:

Rudder	1380 Newton
Elevator	480 Newton
Aileron	1300 Newton
Flaps	960 Newton

On the airframe:

Limit: +4 G / -2 G

CAUTION : Load factor changes in the turns

Angle of bank:	15°	30°	45°	60°	70°
Load factor:	1,04	1,15	1,41	2	3

9. 6 : SPECIFICATIONS

WINGS

Leading edge	64 x 2 mm (60 * 2 sleeve)
Trailing edge	50 x 2 mm (46 * 1,5 sleeve)
Compression tube	38 x 1,5mm
Tensioning cable	3 mm galvanized
Wing tip	25 x 1,5mm
Strut	73 x 25 mm Rajhamsa airfoil
Batten	11 per wing , 13 x 1,3 mm
Fabric	Dacron polyester 170 gr / m2 (0,56 oz/sq ft)

AILERONS

leading edge	38 x 1,5 mm
Trailing edge	12,7 x 1,2 mm
Airfoil	10 x 1 mm riveted

FLAPS

leading edge	38 x 1,5 mm
Trailing edge	12,7 x 1,2 mm
Airfoil	10 x 1 mm riveted

FUSELAGE AND AFTER SECTION

keel assembly	64 x 2 mm sleeved with 60 x 2 mm
Forward tube	28 x 2 mm and 10 x 1,2 mm
After tube	25 x 1,5 mm

SEAT

Foam padded composite

LANDING GEAR

Wheels : aluminum alloy

Drum brake (optional)

Tires : 3,50 x 8, 4 ply

Hydraulic suspension

Drum brake on nose wheel (optional)

CONTROLS AND RUDDER

Conventional three axis controls

Rudder controlled by pedals linked to nosewheel, acting on rudder through cables

Sticks	Dual, in front of each seat
Throttles	Dual, on the left of each seat
Elevator	By push-pull tube
Ailerons	By cables, diameter, 3 mm
Flaps	By push-pull tube

MISCELLANEOUS

Nuts and bolts	All high quality 8,8 bichromate steel
Fastenings	Stainless steel, thickness : 3 mm
Paint	Epoxy

Chapter 10- WEIGHT OF OPTIONAL EQUIPMENT

This **must** be taken into account when considering total empty weight of your **X-AIR F**.

OPTIONS WEIGHT in:		**KG**	**LBS**
(Weight to be added when fitting an option or replacing a standard part)			
Twin composite tank		5,2	11,46
Brake on main wheels		5,6	12,35
6 ply tires (1kg x 3)		3	6,6
Battery and wiring		13,5	29,76
Two blade DUC propeller		0,2	0,44
Three blade DUC propeller		1,5	3,3
Arplast three blade propeller		1,2	2,65
Helium three blade propeller		1,8	3,97
Pod		8	17,64
Large instrument panel		2	4,4
Padded seat		1,2	2,65
Rear cockpit fairing with frame and fastenings		3,8	8,38
Suspension and shocks on all three wheels	6	13,23	
Two Lexan doors		3	6,6
Fiberglass mud gard, per wheel		0,8	1,76
Safety harness (two)		1,5	3,3
Elevator trim with controls		2	4,4
Basic twin float set with fastenings and rudder		45	99,2
Amphibious twin float set with retract gear and fastenings	54	119	
Hull with retract gear and sponsons		66	145,5
Snow skis with fastenings		9	19,84
Ballistic parachute with fastenings	12	26,45	
Complete agri-spray set with fastenings		37	81,57
Microspray for agri-spraying		18	39,68

Total empty weight of X-AIR F is the sum of :

- Airframe empty weight : 107,5 kg , (237 lbs.)
- Weight of options
- Weight of equipment (instruments, intercom, radio ...)
- Weight of powerplant

To obtain total loaded weight, you must add :

- Weight of crew (pilot and passenger)
- Weight of fuel (0,72 kg, (1,59 lbs.) / liter)
- Weight of baggage

Total loaded weight must be less than, or equal to 450 kg (992 lbs.)

11. 1 : Airframe Maintenance (to be carried out periodically as per table below)

Nota: these maintenance periods concern only the aircrafts flying under a continental climate and being stocked under hangar. The aircrafts submitted to other conditions will have to be more frequently checked.

	1 mo 50 h	6 mo 150 h	1 yr 300 h	2 yrs 600 h	5 yrs 900 h
Fabric on wings, control and tail surfaces:			***V***		***C***
Landing gear and fork					
Tire pressure (1.8 bar)	***V***				
Tire wear	***V***				
Brake wear	***V***				
Shocks on fork and main gear	***V***				
Canopy		***V***			
Controls					
Aileron cables on pulleys	***V***	***L***			***C***
Throttle cable	***V***		***L***		***C***
Stick axle	***L***				***C***
Rudder cables	***V***		***V***		***C***
Elevator cables	***V***		***V***		***C***
Flaps ball and socket joint	***V***				***C***
Electric circuits and fuel lines					
Check electric wiring and fuel hoses through airframe					
Electric cables		***V***			
Battery		***V***			
Fuel line	***V***				***R***
Squeeze bulb	***V***			***R***	
Fuel filter	***V***	***R***			
Fuel tank		***V***			
Stabilizer / trim tab / moving parts					
Grease axles	***L***				***C***
Bellcrank / quick links		***V***			***C***
Trim cable	***L***				***C***
Bolt			***V***		***C***

NOTA : V = check and replace if necessary
R = replace
L = lubricate / check and replace if necessary
C = Control by a competent professional and replace if necessary

11. 2 : ENGINE MAINTENANCE

See "engine manual"

11 . 3 : TUNING :

The following components may require tuning (for engines, see " engine manual").

Elevator control

To adjust the position of the stick relative to the pilot, the elevator control tube has three holes drilled to allow length adjustment .

Choose the suitable hole and insert the bolt.

Add loctite.

Tighten nut to close fit.

Ailerons

Tuning is achieved by turning the turnbuckles supplied.

This will alter the position of the ailerons, which are normally lined up with the wing lower surface.

If the ailerons have a strong inverse slope (trailing edge higher), the aircraft will tend to nose up.

If the slope is smaller (trailing edge lower), the aircraft will tend to nose down.

Flaps

Lined up with the wing lower surface.

Chapter 12- TAKE DOWN, ASSEMBLY AND TRAILORING

Generally, you are advised to operate on grass, to avoid staining the fabric and scratching the metal parts.

12 1 : TAKE DOWN

- Take out the lower surface battens, beginning with the shorter ones, and the jury struts; store them.
- Disconnect the aileron control cables.
- take off the center wing cover and store.
- Untie the wing tensioning webbing.
- Disconnect the flaps
- Pull out the upper clevises from the wing struts and lower the wing, and the struts to the ground.
- Pull out the wing clevises (leading edge and trailing edge). Temporarily holding the wing level will help with this.
- Lay the wing on the ground, lower surface facing up to allow for easier take down later.
- proceed the same way with the other wing.
- Remove the wing struts and reinsert the clevises with their safety rings, and store.
- The wings may be placed on a roof rack, with the forward end tied to the front bumper, for instance.

12. 2 : ASSEMBLY

Assembly is achieved in the opposite order.
You are advised to use help for assembly, as this might cause damage to the wings.

Slightly tensioning the wing first allows easier threading of the battens. This is done symmetrically, from the roots to the tips, to maintain airfoil shape.

Once this is done, it is important to tension the wing properly, using a ratchet strap on the three middle webbing points of the upper surface before attaching the webbing that will keep the wing under tension.

Chapter 13- DESCRIPTION OF ACCESSORIES AND OPTIONS

NOTE : Since RAND KAR is constantly developing new accessories, we reserve the right to alter the design and specification of our products. We also reserve the right to substitute or withdraw any kind of equipment presented in this document without any prior notice.

For complete, up-to-date information, contact RAND KAR or your **X-AIR F** dealer for the latest comprehensive list of accessories.

13. 1 :LIST OF MANUFACTURER-AUTHORIZED OPTIONS AND ACCESSORIES FOR OTHER, SPECIALIZED USES OF X-AIR F (Ch 4, G1 of 17/06/86 ruling)

The two-seater model can be used for the special applications, professional or not, to be found in the following, non exclusive list:
- Floats, hull, amphibious hull, snow skis, all surveillance missions, aerial photography, video or cinema, teledetection, towing of advertising banners, agri-spraying of products in liquid or powder form, transportation of medical supplies or casualties, pilot training or recreational flights, rental for diverse uses; the aircraft may be equipped with a great number of accessories designed to increase comfort or safety.
No restriction need be applied in the fitting of special use accessories and options, other than those mentioned in the installation manuals of those options.

13. 1. 1: FLYING WITH SKIS

During preflight inspection, pay special attention to the sandow attachments and those holding the skis in approach position.

During take off, make sure the runway does not have too much lateral slope, which might cause the aircraft to deviate from the centerline.

Before landing, beware of faulty estimation of height above snow-covered terrain. The absence of contrast, termed "white out", tends to give a deceptive impression of height.

13. 1. 2 : FLYING WITH FLOATS

At take off, choose a course as closely upwind as possible. Keep tracking straight as you give power slowly. The stick must be kept at neutral, avoiding any wave-induced oscillations.
When taking off in a swell, choose a course that gives you the best compromise between the wind direction and that of the waves.
In the hull version, keep the wings level when fast taxiing on water, to keep the sponsons from hitting the water. For take off, stick back all the way, power on slowly, to full.
The aircraft will "climb on the step" in a few yards. Then bring the stick forward to level the aircraft.

Once the aircraft has reached a stable take off attitude, maintain this during acceleration, observing the flight attitude rather than the position of the stick.
When **X-AIR F** has reached lift off speed, it will take off on its own. Do not try to unstick it from the water, this could prove very ... wet! After accelerating in ground effect, start a normal climb.
In flight, no noticeable difference is felt. However, keep in mind the aircraft in hull version is often heavier than the land version. Take this into account when selecting your approach speeds.

When landing, come in a little faster than with the land version, and prefer power-on to power-off landings.
After the flare off, skim the water, with the same attitude as you had for take off, always keep some power on and let the aircraft settle slowly rather than bringing it to the stall.
As soon as the hull touches down, reduce power to idle and try to maintain the same attitude until the aircraft stops.
When landing with power on, throttle down slowly to avoid burying the nose.

In case of engine failure, set up 90km/h (56mph) and land upwind with the shallowest angle possible.
Wind direction can be seen easily, since moored boats always face into the wind when there is no current.
In all cases, take the direction of the swells into account.

When docking, never step on the forward part of the floats: if the aircraft is still moving, this is sure to make it flip over!
A capsized aircraft should always be moved very slowly. Damage in this case occurs almost always during towing or pulling out of the water.

Have the aircraft facing the shore, with the propeller parallel to the wings.
Attach ropes to the landing gear and the after end of the keel assembly, then pull very slowly until the aircraft is back on its floats.

Immediately rinse off the airframe and the fabric parts in fresh water, and the engine in diesel oil. The airframe's aluminum alloy is remarkably resistant to salt water, as long as you observe correct seaplane maintenance procedures daily, and especially after a capsize.

Before a flight to altitudes greater than 500m (1600ft) loosen the access hatches to avoid problems during descent; pressure differential in the floats or hull might cause damage on landing.

A few words on porpoising, dreaded by the novice seaplane pilot : it is an oscillation happening mainly on take off, which tends to increase and may even cause the aircraft to flip over.
It is generated by faulty pitch control (too much nose up or down) at the moment when the aircraft climbs on the step.
To stop porpoising, you must either abort take off, or increase the pitch deliberately before reducing it to normal.

Never try to "hunt" with the stick (countering the pitch, up, then down). This would only amplify the oscillation.

13. 1. 3 : BANNNER TOWING

Make sure the tow hook is properly secured on the centerline.
Two techniques are possible for towing:

- Direct pick up of the banner at take off, with a minimum rope length of 70m (230 ft) The banner is stretched in front of you along the center of the runway.
As soon as the banner leaves the ground, level off and accelerate, and stay prepared to release all through take off.

- Banner pick up with a hook :
This is a more complex maneuver, but it is safer than the one described above. (Engine failure during take off while towing a banner requires lightning reflexes).

Line up at 80km/h (50mph) to pick up the banner, and watch for any drift of the hook. Climb immediately after the banner has been picked up.

While towing, maintain 70-80km/h (45-50mph) to keep the letters nicely spaced.

In case of engine failure, release the banner as soon as you are over a vacant zone.

13. 1. 4 : AGRI-SPRAYING

All information concerning maintenance of this equipment will be found in the relevant manual.

The increased drag due to this equipment lowers your maximum speed by +or- 15km/h (9mph).
You are advised to take on no more than 120 liters (32US, 26 Imp gals). Keep in mind that low flight is the most difficult and dangerous kind of flying.
Before spraying, check all the obstacles along the flight path.

13. 1. 5 : PHOTOGRAPHY, MOVIE AND VIDEO EQUIPMENT

No heavy outside equipment shall be installed outboard of the upper wing strut fitting. Please contact RAND KAR for any such installation.
No additional safety recommendation is needed.

However, note that for all uses calling for photo, movie or video equipment, we advise that it be very safely secured, as it might cause serious damage or injury if it came loose at landing or in flight.

13. 2 : EFFECT OF THE EQUIPMENT MENTIONED IN 13. 1 ON FLIGHT PARAMETERS AND PERFORMANCE OF THE AIRCRAFT

Windshield, pod and rear fuselage fairing

Top speed is improved by 5 km/h (3mph) and consumption slightly decreased.

Snow skis

Top speed is approximately 10km/h lower (6mph).

Floats or hull (only with engines of more than 60 cv)

Top speed at maximum load in decreased by approximately 10km/h (6mph) due to additional drag.

Take off distance at maximum load	80 m (262 ft)
Maximum speed.....	90km/h (56mph)
Minimum sink	4m/s (780ft/mn) at 70km/h (43mph)

Banner towing set (with engines of more than 60 cv only)

Banner towing is basically a question of practice. The effect of a banner depends on its size.

Agri-spraying equipment (with engines of more than 60 cv only)

Top speed at maximum load is lowered by approximately 10km/h (6mph).

Ballistic parachute

IMPORTANT NOTE : Installation of the parachute must be done under supervision by, and with the express agreement of RAND KAR. We reserve the right to ask for removal of this equipment in case of faulty installation by the user.
You are strongly advised to send RAND KAR photographs of your installation.

Using additional options and accessories decreases the useful load.
Always make sure you do not exceed the maximum load at take off.

In general, when flying at maximum load you should always observe the mandatory airspeed compatible with the load and prevailing weather conditions (altitude, atmospheric pressure, temperature).

Chapter 14- X-AIR F PACKING LIST

DESCRIPTION, CRATE N°1 :

dimensions : 365 x 74 x 46 (12ft x 2ft x 1,5ft)

gross weight : 201 kg (443,2 lbs)
net weight : 146 kg (321,9 lbs.)

CONTENTS	QUANTITY		
- keel assembly, forward (n°201)		1	
- keel assembly, aft (n°202)			1
- Wing leading edge - left and right - (n°203)		2	
- Wing trailing edge - left and right - (n°204)		2	
- Forward struts (n°205)		1	
- After struts (n°206)		1	
- Elevator control tube (n°207)		1	
- Nose wheel tube and fork (n° 208,209,210)		1	
- Main axle (n°211)			1
- Back seat tube (n°212)		1	
- Main gear leg - left and right (n°213)		2	
- Compression tube L and R (n°214)		1	
- Long jury strut - left and right (n°215)		1	
- Short jury strut - left and right (n°216)		1	
- Elevator forward tube (n°217)		1	
- Elevator control fork tube (n°218)		1	
- Fin trailing edge (n°219)			1
- Batten set (n°220)			1
- Aileron L and R + extension tube (n°222)	2		
- Fuselage frame (n°223)		2	
- Electric wiring set (n°225)		1	
- Trim tab control cable (n°226)		1	
- Choke and throttle cable (n°227)	1		
- Brake cable (n°228)		1	
- Nose wheel (n°229)		1	
- Main wheel (n°230)		2	
- Elevator left and right (n°231)		2	
- Rudder (n°232)		1	
- webbing kit (n°233)		1	
- Cable set (n°234)			1
- Tube and hose kit (n°235)		1	
- Fabric for wings, left and right, fin and fuselage (n°236)	1		
- Wing tip tube (n°237)		1	
- Engine mount tube (n°238)		1	
- Airframe tube, forward (n°239)		1	
- Airframe tube, aft (n°240)		1	
- Fin support tube (n°241)		1	
- Floor tube (n°242)			1
- Under seat tube (n°243)		1	
- Fin upper tube (n°244)		1	
- Fin lower tube (n°245)		1	
- Fletner (n°246)		1	
- Rivet set, plastic cable ties (n°247)		1	
- Main gear shocks (n°248)			1
- Rudder Pedals LHS + RHS (n°258)			1
- Control Stick Assembly (n°259)			2
- Throttle (n°260)			1
- Jury strut center (n°261)			1
- Flap control fork assembly (n°262)			1
- Flap assembly (n°263)			2

DESCRIPTION CRATE N°2

dimensions : 175 x 130 x 46 (5,74ft x 4,26ft x 1,5ft)

gross weight : 97 kg (213,90 lbs)
net weight : 51 kg (112,44 lbs)

CONTENTS	QUANTITY	
- Pod (n°249)		1
- Floor (n°250)	1	
- Seat (n°251)		2
- Stabilizer, left and right (n°252)	2	
- Windshield, two parts (n°253)	1	
- Leading edge foam, left and right (n°254)	2	
- Instrument panel, top (n°255)	1	
- Instrument panel, front (n°256)	1	
- Pod and windshield fastenings ,windshield gasket (n°257)	1	
- Fuel tank, left and right (n°224)	2	

Chapter15 Airframe Maintenance (to be carried out periodically as per table below)

Nota: these maintenance periods concern only the aircrafts flying under a continental climate and being stocked under hangar. The aircrafts submitted to other conditions will have to be more frequently checked.

	1 mo 50 h	6 mo 150 h	1 yr 300 h	2 yrs 600 h	5 yrs 900 h
Fabric on wings, control and tail surfaces:			***V***		***C***
Landing gear and fork					
Tire pressure (1.8 bar)	***V***				
Tire wear	***V***				
Brake wear	***V***				
Shocks on fork and main gear	***V***				
Canopy		***V***			
Controls					
Aileron cables on pulleys	***V***	***L***			***C***
Throttle cable	***V***		***L***		***C***
Stick axle	***L***				***C***
Rudder cables	***V***		***V***		***C***
Elevator cables	***V***		***V***		***C***
Flaps ball and socket joint	***V***				***C***
Electric circuits and fuel lines					
Check electric wiring and fuel hoses through airframe					
Electric cables		***V***			
Battery		***V***			
Fuel line	***V***				***R***
Squeeze bulb	***V***			***R***	
Fuel filter	***V***	***R***			
Fuel tank		***V***			
Stabilizer / trim tab / moving parts					
Grease axles	***L***				***C***
Bellcrank / quick links		***V***			***C***
Trim cable	***L***				***C***
Bolt			***V***		***C***

NOTA : V = check and replace if necessary
R = replace
L = lubricate / check and replace if necessary
C = Control by a competent professional and replace if necessary

Airframe maintenance: every 50 h or 1 month

	1 mo 50 h	**Date control**	**Date control**	**Date control**	**Date control**
Fabric on wings, control and tail surfaces:					
Landing gear and fork					
Tire pressure (1.8 bar)	***V***				
Tire wear	***V***				
Brake wear	***V***				
Shocks on fork and main gear	***V***				
Canopy					
Controls					
Aileron cables on pulleys	***V***				
Rudder cables	***V***				
Stick axle	***L***				
Elevator control	***V***				
Throttle cables	***V***				
Flaps ball and socket joint	***V***				
Electric circuits and fuel lines					
Check electric wiring and fuel hoses through airframe					
Electric cables					
Battery					
Fuel line	***V***				
Squeeze bulb	***V***				
Fuel filter	***V***				
Fuel tank					
Stabilizer / trim tab / moving parts					
Grease axles	***L***				
Bellcrank / quick links	***V***				
Trim cable	***L***				
Bolt					

NOTA : V = check and replace if necessary
R = replace
L = lubricate / check and replace if necessary
C = Control by a competent professional and replace if necessary

Airframe maintenance: every 150 h or 6 month

	6 mo 150 h	**Date control**	**Date control**	**Date control**	**Date control**
Fabric on wings, control and tail surfaces:					
Landing gear and fork					
Tire pressure (1.8 bar)	***V***				
Tire wear	***V***				
Brake wear	***V***				
Shocks on fork and main gear	***V***				
Canopy					
Controls					
Aileron cables on pulleys	***L***				
Rudder cables	***V***				
Stick axle	***L***				
Elevator control	***L***				
Throttle cables	***L***				
Flaps ball and socket joint	***V***				
Electric circuits and fuel lines					
Check electric wiring and fuel hoses through airframe					
Electric cables	***V***				
Battery	***V***				
Fuel line	***V***				
Squeeze bulb	***V***				
Fuel filter	***R***				
Fuel tank	***V***				
Stabilizer / trim tab / moving parts					
Grease axles	***L***				
Bellcrank / quick links	***V***				
Trim cable	***L***				
Bolt					

NOTA : V = check and replace if necessary
R = replace
L = lubricate / check and replace if necessary
C = Control by a competent professional and replace if necessary

Airframe maintenance: every 300 h or 1 Year

	1 Yr 300 h	Date control	Date Control	Date control	Date control
Fabric on wings, control and tail surfaces:	***V***				
Landing gear and fork					
Tire pressure (1.8 bar)	***V***				
Tire wear	***V***				
Brake wear	***V***				
Shocks on fork and main gear	***V***				
Canopy					
Controls					
Aileron cables on pulleys	***L***				
Rudder cables	***V***				
Stick axle	***L***				
Elevator control	***V***				
Throttle cables	***L***				
Flaps ball and socket joint	***V***				
Electric circuits and fuel lines					
Check electric wiring and fuel hoses through airframe					
Electric cables	***V***				
Battery	***V***				
Fuel line	***V***				
Squeeze bulb	***V***				
Fuel filter	***R***				
Fuel tank	***V***				
Stabilizer / trim tab / moving parts					
Grease axles	***L***				
Bellcrank / quick links	***V***				
Trim cable	***L***				
Bolt	***V***				

NOTA : V = check and replace if necessary
R = replace
L = lubricate / check and replace if necessary
C = Control by a competent professional and replace if necessary

Airframe maintenance: every 600 h or 2 Year

	2 Yr 600 h	**Date Control**	**Date Control**	**Date control**	**Date control**
Fabric on wings, control and tail surfaces:	***V***				
Landing gear and fork					
Tire pressure (1.8 bar)	***V***				
Tire wear	***V***				
Brake wear	***V***				
Shocks on fork and main gear	***V***				
Canopy					
Controls					
Aileron cables on pulleys	***L***				
Rudder cables	***V***				
Stick axle	***L***				
Elevator control	***V***				
Throttle cables	***L***				
Flaps ball and socket joint	***V***				
Electric circuits and fuel lines					
Check electric wiring and fuel hoses through airframe					
Electric cables	***V***				
Battery	***R***				
Fuel line	***V***				
Squeeze bulb	***R***				
Fuel filter	***R***				
Fuel tank	***V***				
Stabilizer / trim tab / moving parts					
Grease axles	***L***				
Bellcrank / quick links	***V***				
Trim cable	***L***				
Bolt	***V***				

NOTA : V = check and replace if necessary
R = replace
L = lubricate / check and replace if necessary
C = Control by a competent professional and replace if necessary

Airframe maintenance: every 900 h or 5 Years

	5 Yr 900 h	Date Control	Date Control	Date control	Date control
Fabric on wings, control and tail surfaces:	***C***				
Landing gear and fork					
Tire pressure (1.8 bar)	***V***				
Tire wear	***V***				
Brake wear	***V***				
Shocks on fork and main gear	***V***				
Canopy	***V***				
Controls					
Aileron cables on pulleys	***C***				
Rudder cables	***C***				
Stick axle	***C***				
Elevator control	***C***				
Throttle cables	***C***				
Flaps ball and socket joint	***C***				
Electric circuits and fuel lines					
Check electric wiring and fuel hoses through airframe					
Electric cables	***V***				
Battery	***V***				
Fuel line	***R***				
Squeeze bulb	***R***				
Fuel filter	***R***				
Fuel tank	***V***				
Stabilizer / trim tab / moving parts					
Grease axles	***C***				
Bellcrank / quick links	***C***				
Trim cable	***C***				
Bolt	***C***				

NOTA : V = check and replace if necessary
R = replace
L = lubricate / check and replace if necessary
C = Control by a competent professional and replace if necessary

ANNEX TO

X-AIR MAINTENANCE AND FLIGHT MANUAL

* * *

MANUAL X-AIRF 804 TJ

(JABIRU 2200 engine)

Specifications and Performance of X-AIRF 804T J (Jabiru 2200)

1. 1: AIRFRAME / ENGINE

- X-AIRF 804TJ

- Three axis, tricycle landing gear

- Engine: Jabiru 2200, without intake muffler, with exhaust muffler, carburetor and dual electronic ignition.

- 4 stroke

- Power 80 CV at 3300 RPM

- Air cooled

- Displacement 2209 cm3

- Fuel: Gas 95 Octane or more

- Propeller: composite, three blades maximum 1,75m diam..

1. 2: WEIGHTS OF X-AIR BASIC MODEL

The empty weight of your X-AIR can be found by adding basic airframe weight (107,5 kg; 237 lbs.), weight of engine and weight of optional equipment. (See annexes and chapter 10: "weight of options")

Basic airframe weight without engine (all tubes and Dacron fabric) **107,5kg (236,5lb)**

- included: dual controls (throttle, rudders, and sticks)
windshield
fuel tank, 25l. (6 US gals, 5,5 Imp gals)
basic instrument panel

- not included: engine
suspension
pod and windshield
rear cabin fairing
trim tab
cabin door
brakes
wood floor

ENGINE ready to work (with electric starter)	**62,4 kg (137,56 lbs)**
Propeller, wood, two blade basic model	**2,4 kg (5,28 lbs)**
Basic instruments, with senders	**1,8 kg (0,88 lbs)**
Empty Weight of X-AIR 804 TJ, basic model	**172,7 kg (380 lbs)**

Weight of options / basic empty weight: see chapters 9 & 10 of X-AIR general Manual

1. 3: WEIGHT DISTRIBUTION ON TYPICAL X-AIRF, FULLY EQUIPPED

Maximum take off weights	**450 kg**	**990 lbs.**
- Empty weight, equipped (without parachute)	262 kg	576,40
- Fuel 25 l.	18 kg	39,6
- Crew	156 kg	343,20
- Baggage	14 kg	30,80
Additional weight permissible to airframe	**55,9 kg**	**123 lbs.**
(Weight to be added when fitting an option or replacing a standard part)		
Twin composite tank	5,2	11,46
Brake on main wheels	5,6	12,35
6 ply tires (1kg * 3)	3	6,6
Pod	8	17,64
Large instrument panel	2	4,4
Wooden floor	7	15,43
Padded seat (1)	3,4	7,48
Rear cockpit fairing with frame and fastenings	3,8	8,36
Suspension and shocks on all three wheels	9	19,8
Two Lexan doors	3	6,6
Fiberglass mud gard, per wheel 0,8 per wheel	2,4	5,28
Safety harness (two)	1,5	3,3
Elevator trim with controls	2	4,4
Added weight on powerplant	**33,4**	**73,5**
Battery and electric wiring	18	39,6
Intercom, radio and added instruments	6	13,2
Diverse accessories	9,4	20,7
Total weight added to basic model:	**89,3 kg**	**196,46 lbs.**
Weight of 804TJ Model, fully equipped, without parachute:	**262 kg**	**576,4 lbs.**

Parachute: **12 kg** **26,45 lbs.**

2. 1: LOAD FACTOR

Bank:	15°	30°	45°	60°	70°
Load Factor:	1,04	1,15	1,41	2	3

Maximum load Factors: +4 - 2

2. 2: MANOEUVRABILITY

Bank, 30° left to 30° right	2,5 seconds
Bank, 45° left to 45° right	3,5 seconds

2. 3: PERFORMANCE AT MAXIMUM WEIGHT, 450 Kg (990 lbs)

X-AIR F	**JABIRU 2200**	
Manufacturer	Jabiru	
Type	2200	
Coolant	air	
Maximum power	80hp at 3300 RPM	
Fuel:	Gas 95 Octane or more	
Power loading, empty	3,31 kg/ CV	
Power loading at maximum weight	5,69 kg /CV	
V.N.E (Velocity never Exceed)	155 km/h	96mph
Top Speed in Turbulence	75 km/h	46,6mph
Top Level Speed, Cruise	130 km/h	80,8mph
Top Level Speed, Most Economical	110 km/h	68,3mph
Minimum Level Speed	64 km /h	39,7mph
Stall Speed	58 km/h	35,9mph
Climb rate at 70 km /h (43,5mph)	4,5 m/s	886,5 ft/mn
Minimum Sink rate at 70 km/h (43,5mph)	3,5 m/s	689 ft/mn
L/D at 70 km/h (43,5mph), engine off	8/1	
Take off roll, no wind	100 m	305 ft
Distance to clear 15 m (45 ft) at take off	165 m	539,5 ft
Landing roll without brakes with brakes:	140 m 80m	459 ft 262 ft
Distance to clear 15 m (45 ft) at landing	140m	459 ft
Service ceiling	4 000m	11480 ft
Maximum crosswind	15 kts	

Roll rate	30° to 30°	2,5 sec.
	45° to 45°	3 ,5sec.

Fuel consumption:

- Economical cruise	9 l/h	2,37 gals US	1,94 Imp gal
- Top cruise	14 l/h	3,7 gals US	3,02 Imp gal
- Range with 50 l	5h		
- Maximum range in free air	500 km	311 miles	

Noise level (measured according to the French government ruling on Ultralight noise):

- Lm	69 dba	
- LR	70,7 dba	
- H height overhead	60 m	197 ft
- V	2,5 m/s	492 ft/mn
- Lh (noise heard on the ground) with h = 150 m	60,75 dba	

Important note to users: this is the formula used in the measurements above:

Lh = Lm - log h/H

ANNEX TO

X-AIR MAINTENANCE AND FLIGHT MANUAL

* * *

MANUAL X-AIR 502 T

(ROTAX 503 ENGINE)

Specifications and Performance of X-AIR 502 T (503 Rotax Engine)

1. 1: AIRFRAME / ENGINE

- X-AIR 502T

- Three axis, tricycle landing gear

- Engine: Rotax503, without intake muffler, with exhaust muffler, twin carburetor and dual electronic ignition.

- Power 50 CV at 6500 RPM

-air cooled

- Displacement 496 cm3

- Fuel: Gas/oil mix Oil: 2%, type ASTM/CEC Standard API-TC
Gas: regular, 90 Octane or more

Reduction drive: " B " 2,58 / 1

Propeller: wood, two blades

1. 2: WEIGHTS OF X-AIR BASIC MODEL

The empty weight of your X-AIR can be found by adding basic airframe weight (107,5 kg; 237 lbs.), weight of engine and weight of optional equipment. (See annexes and chapter 10: "weight of options")

Basic airframe weight without engine (all tubes and Dacron fabric) **107,5kg (237lb)**

-included: dual controls (throttle, rudders, and sticks)
windshield
fuel tank, 25l. (6 US gals, 5,5 Imp gals)
basic instrument panel

- not included: engine
suspension
pod and windshield
rear cabin fairing
trim tab
cabin door
brake
wood floor

ENGINE 503 basic model	**42,1 kg (92,8lbs)**
- 503 Engine	30,4 kg (66,88bs)
- 2 carburetors	1,8 (3,97lbs)
- Exhaust system	4,9 (10,78lbs)
- dual air filter	0,5 (1,1lbs)
- " B " type Reduction drive	4,5 (9,92lbs)
Propeller, wood, two blade basic model	**2,4 kg (5,28lbs)**
Basic instruments, with senders	**2 kg (4,4lbs)**
Empty Weight of X-AIR 502 T, basic model	**152 kg (334,4lbs)**

Weight of options / basic empty weight: see chapters 9 & 10 of X-AIR general Manual

1. 3: WEIGHT DISTRIBUTION ON TYPICAL X-AIR, FULLY EQUIPPED

Maximum take off weights	**450 kg**	**990 lbs.**
- Empty weight, equipped (with parachute)	242 kg	532,4
- Fuel 50 l.	36 kg	79,3
- Crew + portable equipment + baggage	172 kg	378,3

Additional weight permissible to airframe	**51,9 kg**	**114,42 lbs.**
(Weight to be added when fitting an option or replacing a standard part)		
Twin composite tank	5,2	11,46
Brake on main wheels	5,6	12,35
6 ply tires (1kg * 3)	3	6,6
Pod	8	17,64
Large instrument panel	2	4,4
Wooden floor	7	15,43
Padded seat (the pair)	2,4	2,65
Rear cockpit fairing with frame and fastenings	3,8	8,38
Suspension and shocks on all three wheels	6	13,23

Two Lexan doors	3	6,6
Fiberglass mud gard, per wheel	0,8	1,76
Safety harness (two)	1,5	3,3
Elevator trim with controls	2	4,4
Added weight permissible on the engine	**26,1 kg**	**57,54 lbs.**
Battery and wiring	13,5	29,76
Three blade DUC propeller	1,5	3,3
Intake muffler (with air filter)	1,1	2,43
Electric starter	3,4	7,5
"C" type Reduction drive	3,5	7,72
Intercom and additional instruments	3,1	6,83
Total weight added to basic model:	**78 kg**	**171,96 lbs.**
Weight of 502T Model, fully equipped, without parachute:	**230 kg**	**506 lbs.**
Parachute:	**12 kg**	**26,45 lbs.**

2. 1: LOAD FACTOR

Bank:	15°	30°	45°	60°	70°
Load Factor:	1,04	1,15	1,41	2	3

Maximum load Factors: +4 - 2

2. 2: MANOEUVRABILITY

Bank, 30° left to 30° right	2 seconds
Bank, 45° left to 45° right	3 seconds

2. 3: PERFORMANCE AT MAXIMUM WEIGHT, 450 Kg (990 lbs)

X-AIR 502 T	**ENGINE / ROTAX 503**	
Manufacturer	ROTAX BOMBARDIER	
Type	503	
Coolant	air fan	
Maximum power	50 CV at 6400 RPM	
Fuel: Gas/oil mix	Oil: 2%, type ASTM/CEC Standard API-TC Gas: regular, 90 Octane or more	
Power loading, empty	3,04 kg/ CV	5,69lbs/cv
Power loading at maximum weight	9 kg /CV	19,8lbs/cv
V.N.E (Velocity never Exceed)	155 km/h	90mph
Top Speed in Turbulence	70 km/h	43,5mph
Top Level Speed, Cruise	100 km/h	62mph
Top Level Speed, Most Economical	80 km/h	49,6mph
Minimum Level Speed	55 km /h	34,1mph
Stall Speed	48 km/h	30mph
Climb rate at 70 km /h (43,5mph)	2,5 m/s	492ft/mn
Minimum Sink rate at 70 km/h (43,5mph)	3,5 m/s	689ft/mn
L/D at 70 km/h (43,5mph), engine off	8/1	
Take off roll, no wind	140 m	459,2 ft
Distance to clear 15 m (45 ft) at take off	250 m	820 ft
Landing roll without brakes	140 m	459 ft

with brakes:	80m	262 ft	
Distance to clear 15 m (45 ft) at landing	140m	459 ft	
Service ceiling	3500m	11480 ft	
Maximum crosswind	15 kts		
Roll rate 30° to 30°	2 sec.		
45° to 45°	3 sec.		

Fuel consumption:

- Economical cruise	14 l/h	3,7 gals US	3,02 Imp gal
- Top cruise	18 l/h	4,75 gals US	3,88 Imp gal
- Range with 50 l	3h		
- Maximum range in free air	240 km	149 miles	

Noise level (measured according to the French government ruling on Ultralight noise):

- Lm	67,3 dba	
- LR	67,5 dba	
- H height overhead	95 m	311 ft
- V	2,5 m/s	492 ft/mn
- Lh (noise heard on the ground) with h = 150 m	62,9 dba	

Important note to users: this is the formula used in the measurements above:

Lh = Lm - log h/H

ANNEX TO

X-AIR MAINTENANCE AND FLIGHT MANUAL

* * *

MANUAL X-AIR 602 T

(ROTAX 582 ENGINE)

Specifications and Performance of X-AIR 602 T (582 Rotax Engine)

1. 1: AIRFRAME / ENGINE

- X-AIR 602T

- Three axis, tricycle landing gear

- Engine: Rotax582, without intake muffler, with exhaust muffler, twin carburetor and dual electronic ignition.

- Power 64 CV at 6500 RPM

-Water cooled

- Displacement 580,7 cm3

- Fuel: Gas/oil mix — Oil: 2%, type ASTM/CEC Standard API-TC
Gas: regular, 90 Octane or more

Reduction drive: " B " 2,58 / 1

Propeller: wood, two blades

1. 2: WEIGHTS OF X-AIR BASIC MODEL

The empty weight of your X-AIR can be found by adding basic airframe weight (107,5 kg; 237 lbs.), weight of engine and weight of optional equipment. (See annexes and chapter 10: "weight of options")

Basic airframe weight without engine (all tubes and Dacron fabric) **107,5kg (237lb)**

-included:
dual controls (throttle, rudders, and sticks)
windshield
fuel tank, 25l. (6 US gals, 5,5 Imp gals)
basic instrument panel

- not included:
engine
suspension
pod and windshield
rear cabin fairing
trim tab
cabin door
brake
wood floor

ENGINE 582 basic model (with coolant)	**46,7 kg (102,95lbs)**
- 582 Engine	27,4 kg (60,4lbs)
- 2 carburetors	1,8 (3,97lbs)
- Exhaust system	5,1 (11,24lbs)
- dual air filter	0,5 (1,1lbs)
- dual radiator	2,1 (4,63lbs)
- " B " type Reduction drive	4,5 (9,92lbs)
Propeller, wood, two blade basic model	**2,8 kg**
Basic instruments, with senders	**2 kg (4,4lbs)**
Empty Weight of X-AIR 602 T, basic model	**159 kg (350,53lbs)**

Weight of options / basic empty weight: see chapters 9 & 10 of X-AIR general Manual

1. 3: WEIGHT DISTRIBUTION ON TYPICAL X-AIR, FULLY EQUIPPED

Maximum take off weights	**450 kg**	**990 lbs.**
- Empty weight, equipped (with parachute)	249 kg	543
- Fuel 50 l.	36 kg	79,4
- Crew + portable equipment + baggage	165 kg	364,76
Additional weight permissible to airframe	**51,9 kg**	**114,42 lbs.**

(Weight to be added when fitting an option or replacing a standard part)

Twin composite tank	5,2	11,46
Brake on main wheels	5,6	12,35
6 ply tires (1kg * 3)	3	6,6
Pod	8	17,64
Large instrument panel	2	4,4
Wood floor	7	15,43
Padded seat (2)	1,2	2,65
Rear cockpit fairing with frame and fastenings	3,8	8,38
Suspension and shocks on all three wheels	6	13,23

Two Lexan doors	3	6,6
Fiberglass mud gard, per wheel	0,8	1,76
Safety harness (two)	1,5	3,3
Elevator trim with controls	2	4,4
Added weight permissible on the engine	**26,1 kg**	**57,54 lbs.**
Battery and wiring	13,5	29,76
Three blade DUC propeller	1,5	3,3
Intake muffler (with air filter)	1,1	2,43
Electric starter	3,4	7,5
"C" type Reduction drive	3,5	7,72
Intercom and additional instruments	3,1	6,83
Total weight added to basic model:	**78 kg**	**171,96 lbs.**
Weight of 602T Model, fully equipped, without parachute:	**237 kg**	**522,49 lbs.**
Parachute:	**12 kg**	**26,45 lbs.**

2. 1: LOAD FACTOR

Bank:	15°	30°	45°	60°	70°
Load Factor:	1,04	1,15	1,41	2	3
Maximum load Factors:	+4	- 2			

2. 2: MANOEUVRABILITY

Bank, 30° left to 30° right	2 seconds
Bank, 45° left to 45° right	3 seconds

2. 3: PERFORMANCE AT MAXIMUM WEIGHT, 450 Kg (990 lbs)

X-AIR 602 T	**ENGINE / ROTAX 582**
Manufacturer	ROTAX BOMBARDIER
Type	582-twin carburetor
Coolant	water
Maximum power	64 CV at 6500 RPM
Fuel: Gas/oil mix	Oil: 2%, type ASTM/CEC Standard API-TC Gas: regular, 90 Octane or more
Power loading, empty	2,48 kg/ CV 5,47lbs/cv
Power loading at maximum weight	7,03 kg /CV 15,5lbs/cv
V.N.E (Velocity never Exceed)	155 km/h 90mph
Top Speed in Turbulence	70 km/h 43,5mph
Top Level Speed, Cruise	120 km/h 74,6mph
Top Level Speed, Most Economical	90 km/h 56mph
Minimum Level Speed	58 km /h 36mph
Stall Speed	48 km/h 30mph
Climb rate at 70 km /h (43,5mph)	3,5 m/s 689ft/mn
Minimum Sink rate at 70 km/h (43,5mph)	3,5 m/s 689ft/mn
L/D at 70 km/h (43,5mph), engine off	8/1
Take off roll, no wind	120 m 394 ft
Distance to clear 15 m (45 ft) at take off	220 m 722 ft
Landing roll without brakes	140 m 459 ft

Distance to clear 15 m (45 ft) at landing		140m	459 ft
	with brakes:	80m	262 ft
Service ceiling		4000m	13123 ft
Maximum crosswind		15 kts	
Roll rate	30° to 30°	2 sec.	
	45° to 45°	3 sec.	

Fuel consumption:

- Economical cruise	12 l/h	3,2 gals US	2,6 Imp
- Top cruise	18 l/h	4,75 gals US	4 Imp
- Range with 50 l	3h 30		
- Maximum range in free air	310 km	192 miles	

Noise level (measured according to the French government ruling on Ultralight noise):

- Lm	70 dba
- LR	71,7 dba
- H height overhead	60 m 197 ft
- V	2,5 m/s 492 ft/mn
- Lh (noise heard on the ground) with h = 150 m	62,0 dba

Important note to users: this is the formula used in the measurements above:

Lh = Lm - log h/H

ENGINE GENERAL MAINTENANCE (see engine builder manual)

			2H	10H	12,5H	25H	50H	75H	100H	125H	150H	175H	200H	225H	250H	275H
1	Tighten up the cylinder head nuts	1	X													
2	Tighten up the exhaust pipe screws	1	X													
3	Check the handlestarter rope				X											
4	Check the crown wheel of electric starter						X		X		X		X		X	
5	Check spark plugs				X											
6	Change spark plugs					X	X	X	X	X	X	X	X	X	X	X
7	Check and clean the spark plug covers				X											
8	Check ignition advance	2		X				X						X		
9	Check the contact breakers	2		X				X						X		
10	Check ignition alternator							X			X			X		
11	Change contact breakers and capacitors										X					
12	Check the belt tension			X		X	X	X	X	X	X	X	X	X	X	X
13	Grease exhaust elbow (high temperature grease)					X	X	X	X	X	X	X	X	X	X	X
14	Change exhaust springs							X			X			X		
15	Lubricate the control cables					X	X	X	X	X	X	X	X	X	X	X
16	Check balance and tracking of propeller	3				X	X	X	X	X	X	X	X	X	X	X
17	Change the nuts of the proppeller	4														
18	Clean and oil air filters					X	X	X	X	X	X	X	X	X	X	X
19	Clean fuel filter					X	X	X		X	X	X		X	X	X
20	Change fuel filter								X				X			
21	Check carburettors, adjust idle and throttle cables		X			X		X		X		X		X		X
22	Clean the cabs and check the inside parts						X		X		X		X		X	
23	Change needles and needles jets										X					
24	Clean and check the fuel pump							X			X			X		
25	Check oil level in gearbox					X	X	X		X	X	X		X	X	X

26	Change oil in the gearbox			X					X				X			
27	Check and change if necessary the lock washers of the gearbox (gearbox A orB)								X				X			
28	Check the 4 fitting screws of gearbox adaptor (gearbox A)								X				X			
			2H	10H	12,5H	25H	50H	75H	100H	125H	150H	175H	200H	225H	250H	275H
29	Change the lubricating oil of water pump								X				X			
30	Check cylinder heads and pistons	5					X		X		X		X		X	
31	Check the gap of piston rings	6					X		X		X		X		X	
32	Check pistons diameter	8					X 7		X 7		X		X 7		X 7	
33	Check the wear of piston rings	8					X 7		X 7		X		X 7		X 7	
34	Check vertical gap of rectangular piston ring	8					X 7		X 7		X		X 7		X 7	
35	Check cylinders diameter	8					X 7		X 7		X		X 7		X 7	
36	Check ovalization of cylinders	8					X 7		X 7		X		X 7		X 7	
37	Change the following gaskets : base, cylinder head, intake and exhaust	9					X		X		X		X		X	
38	Check pistons axles and bearings										X					
39	Check the crankcase and change the oil seals										X					
40	Major overhaul	10														

1 - And after each gasket change
2 - And aftyer each change of contact breakers
3 - And after each reparing
4 - Following engine builder's instructions

5 - If carbon deposit > 0,5mm, clean

6 - Clean pistons and piston rings
7 - If use in dusty environment
8 - see B/S 5 UL 91
9 - If cylinders are removed
10 - Contact your ROTAX dealer