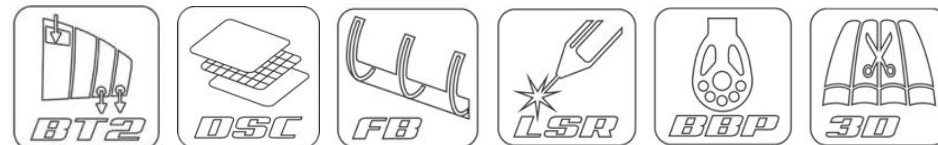
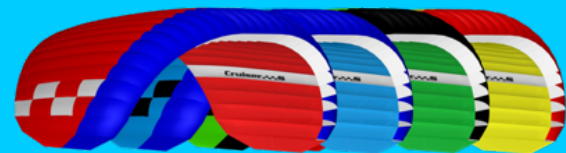


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Cruiser & *Cruiser-H-S* *Manual*



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CONTENTS:

DISCLAIMER OF LIABILITY	3
1 INTRODUCTION	4
2 TECHNICAL DATA	5
3 CONSTRUCTION	6
4 MATERIALS	6
5 FLEXON® Batten system:	6
6 TRIMMING	7
7 RISERS	7
8 EMERGENCY PARACHUTE	7
9 GENERAL INSPECTION	8
10 ANNUAL / PERIODICAL AIRWORTHINESS INSPECTION	8
11 FLYING	11
12 PACKING	15
13 MAINTENANCE & CLEANING	15
14 BUTT HOLE II (Auto Debris release valves)	15
15 STORAGE	16
16 DAMAGE	16
17 THREE YEAR WARRANTY	16





WARNING

This is not a training manual. It is extremely dangerous to yourself and others to attempt to fly this or any paraglider without first completing a flying course given by a qualified instructor.

Apco Aviation's gliders are carefully manufactured and inspected by the factory. Please use the glider only as described in this manual. Do not make any changes to the glider.

AS WITH ANY SPORT - WITHOUT TAKING THE APPROPRIATE PRECAUTIONS, PARAGLIDING CAN BE DANGEROUS.

DISCLAIMER OF LIABILITY

Taking into consideration the inherent risk in paragliding or hang gliding, (free flying and motorized), it must be expressly understood that the manufacturer and seller do not assume any responsibility for accidents, losses and direct or indirect damage following the use or misuse of this product.

APCO Aviation Ltd. is engaged in the manufacture and sale of hang gliding, paragliding, motorized Para/hang gliding and emergency parachute equipment.

This equipment should be used under proper conditions and after proper instruction from a qualified instructor. APCO Aviation Ltd. has no control over the use of this equipment and a person using this equipment assumes all risks of damage or injury.

APCO Aviation Ltd. disclaims any liability or responsibility for injuries or damages resulting from the use of this equipment.

The glider is designed to perform in the frame of the required class as certified.



1 INTRODUCTION

Re-designed from the ground up, this conservative tapered planform wing, the Cruiser – combines the advantages of both worlds, offering the perfect blend of enhanced performance, speed and handling, with ease of use, extreme safety and user friendly nature of our well known veteran PW and Hybrid. It is an easy wing to fly, suitable for students as well as experienced pilots, with significantly faster trim speed and superior glide (L/D). Since its launch the Cruiser has proved to be #1 choice of PPC wing for both students and intermediate pilots worldwide. Every pilot that transitions to the Cruiser from a rectangular chute is overwhelmed with excitement!

The wing, its performance, safety and pilot friendly nature on the ground and in the air is praised and appreciated by all.





2 TECHNICAL DATA

Size	400	500	550
Cells	30	30	32
Area m2	37.1 (400 sq. ft.)	46.5 (500 sq. ft.)	50.3 (541 sq. ft.)
Area (projected) m2	31.2	38.8	42
Span (incl. Stabiliser) m	11.57	12.94	13.88
Span (projected) m	9.18	10.27	11.01
Aspect Ratio	3.6	3.6	3.83
Aspect Ratio (projected)	2.72	2.72	2.89
Payload kg	130-250	230-400	300-500
Weight of Canopy Kg	8	10	11
Root Cord m	3.66	4.1	4.1
Tip Cord m	1.03	1.16	1.16
Lines	Material	Diameter	Strength [kg]
Top; Bottom E&F	Super Aramid	1.8mm	230
Bottom A&B; C&D	Super Aramid	3.0mm	450
Brake top; safety BR	Super Aramid	1.8mm	230
Brake Bottom	Polyester	5.0mm	450
Sail Cloth	Nylon	Zero porosity "rip stop"	

PERFORMANCE	CRUISER	CRUISER S
V-min.	27km/h	29km/h
V-trim	52-58km/h	54-60km/h
Min Sink (at optimum wing loading)	3.8 m/s	3.8 m/s

* All Data measured at sea level, using a combination of GPS and Speed Probe, averaged over several runs



3 CONSTRUCTION

The wing is constructed with a top and bottom surface, connected by ribs. One top and bottom panel, together with the connecting ribs is called a cell. Each cell has an opening on the front lower part. The cells fill with air forcing the panels to take the shape dictated by the air-foil (rib) section.

On either side the wing ends in a stabilizer or wing tip, which provides straight-line (Yaw) stability and produces some outward lift to keep the span-wise tension.

The front part of the ribs use APCO's FLEXON batten system to keep the leading edge shaped at high speeds and in turbulent air. They also improve the performance and the launch characteristics of the glider.

The line hook-up points are made of Dyneema and imbedded in the bottom surface of the wing for minimal drag and maximum performance.

4 MATERIALS

The wing is made from tear resistant Ripstop Nylon cloth, which is P.U. coated to zero porosity and then siliconized to give the fabric high resistance to the elements. Different cloth is used for the top, bottom and ribs due to their different functions.

The lines are made of superaramide covered with a polyester sheath for protection against UV, wear and abrasion.

The bottom section of the brake lines is made of polyester because of its better mechanical properties.

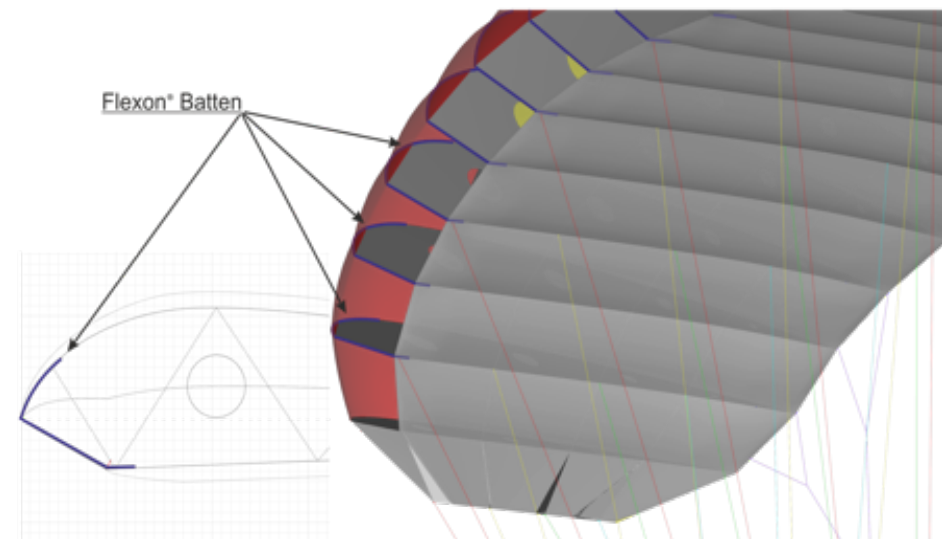
The maillon quick links that attach the lines to the risers are made of stainless steel.

5 FLEXON® Batten system:

New generation FLEXON® batten system incorporated (see below) in the leading edge of the ribs, insuring perfect profile shape (instead of traditional Mylar reinforcement). FLEXON® battens reduce the weight of the glider by an additional 500gr. and unlike Mylar reinforcement will guarantee no deterioration in performance or launch.

Additional advantage of FLEXON batten is that it is practically indestructible, safeguarding the performance and launch over the lifespan of the glider.

Flexon® Batten system



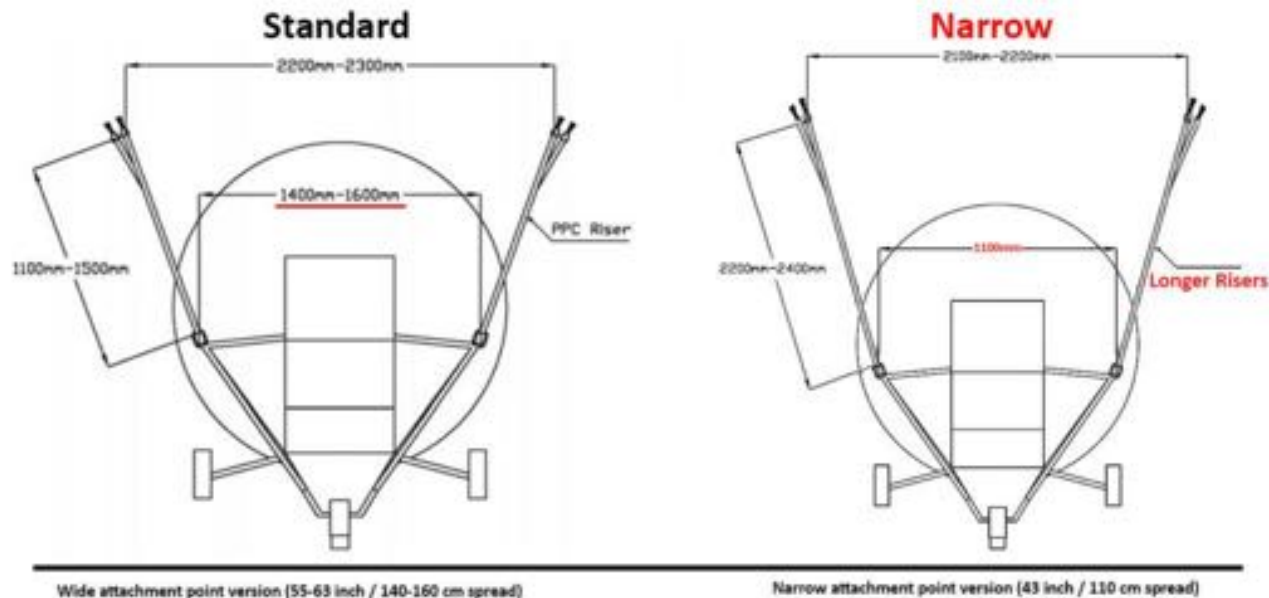


6 TRIMMING

All Apco gliders are trimmed for optimum performance combined with unsurpassed safety. It is very important not to re-trim or tamper with any of the lines or risers as this may alter the performance and safety. Trimming of the brake line should be done in accordance with this manual and carefully checked before flying.

7 RISERS

The both CRUISER and CRUISER S is available in Std and Narrow (110) designed for a standard PPC (trike) configuration, with a 140-160 cm distance between the base of the risers and should be using the standard risers of the PPC (trike) manufacturers, or Narrow, with a distance of 110cm between attachment points on the frame. For further information contact your PPC manufacturer (trike).



8 EMERGENCY PARACHUTE

It is recommended to use a certified rescue parachute when flying, no matter your intended altitude or flying style. Attaching the rescue parachute should be done in accordance with the recommendations of the frame and reserve parachute manufacturer. Always pre-flight check the reserve system before every flight.



9 GENERAL INSPECTION

Pilots, please insure that your wing has been test flown and fully checked by your dealer before taking it into your possession. Verify that the dealer checked and confirms that the glider is airworthy.

QUICK LINK SAFETY INSTRUCTION

Tightening torque of nut: 1,20 [NM] – Secure the nut with a drop of Loctite® glue.

BRAKE SETTING

The CRUISER is supplied with brake safety line (brake line measurement setting line). In order to set the correct length of the brake after connecting the CRUISER to the PPC and rigging the brake line through the intended pullies on the machine, use another hand to hold the brake lines together pulling away from the PPC till the safety line is tight, adjust the main brake line in accordance to this length and fix it to that position.

- It is very important that the brake line is set to the correct length (first few centimetres of the brake are fairly light, while still functioning).
- If the brake is set too short, it will result in delayed inflation and the glider will not come over head as easily. If set too long there will be a slack of the controls and will not function as intended.
- DO NOT cut/ remove the safety brake line as it will be very helpful when re-assembling the wing after periodical check, changing between machines etc.

10 ANNUAL / PERIODICAL AIRWORTHINESS INSPECTION

It is highly recommended that your glider (and other equipment), undergo a Periodical Airworthiness Inspection which is to be done by Apco, or an Apco approved / appointed service centre.

This is recommended to be done every 24 months or every 100 hours, whichever comes first.

This recommendation is in line with Israeli regulations, binding in Israel. as an alternative, we suggest for you to follow the regulations set by your national authorities.



POROSITY:

Porosity is measured with a calibrated Porosimeter. It should be measured in at least 5 different places on the upper surface. Below is an example of the sections we test at Apco. The upper surface, at 20-35% chord (from L/E) is most prone to becoming porous, and is thus the most important section to test. It is also important to test the different cloth types, and different colours used.





LINE MAINTENANCE

Superaramide lines are known to be sensitive to the influence of the elements. They must be carefully inspected periodically. In his/her own interest, the pilot must observe the following points to ensure maximum performance and safety from the glider. Avoid sharp bending and squeezing of lines. Take care that people do not step on the lines. Do not pull on the lines if they are caught on rocks or vegetation. Avoid getting the lines wet. If they do get wet, dry them as soon as possible at room temperature and never store them wet.

One line of each line group (a, b, c, upper and lower) must be tested for minimum 50% of the rated strength. if the line fails under the load test or does not return to its specified length all the corresponding lines must be replaced. never replace lines with different diameter or type of lines as all gliders were flight and load tested for safety in their original configuration. Changing line diameter/strengths can have dangerous / fatal consequences.

Professional use of gliders: towing, tandem, schooling and competition flying requires more frequent line inspection and replacement of A, B, C, D and brake lines. [For replacement lines please refer to our online direct line services.](#)





FIRST CHECK AND PREFLIGHT INSPECTION

With every new wing, the following points should be checked:

- Connection points between the wing and the trike.
- Check that there are no lines twisted, tangled or knotted.
- Check that the risers are hooked up to the trike correctly.

REGULAR INSPECTION CHECKS

Following are the wing inspections provided by the manufacturer; however further inspections must be made of the entire flying machine before taking off.

- Damage to lines, webbing and thread on the stitching of risers.
- The stainless steel connection links on the risers are not damaged and are fully closed.
- The sewing and connection of the lines.
- Damage to hook up points on the wing.
- Internal damage to the ribs.
- Damage to the top and bottom panels and seams between panels.

11 FLYING

WHERE YOU FLY

Make sure you have landowner permission and that the Airspace is of the appropriate class.

Make sure not to disturb other people, livestock or wildlife.

Before every flight, check weather forecast, and locally check and observe the wind direction and strength, even when it seems that there is no wind at all, there is always some drift. Be careful and understand the conditions, since in PPC flying it is important that the launch and initial climb are performed with a head wind (the danger of losing your airspeed while crossing the wind gradient is greatly reduced). Special attention must be paid to trees, power lines and other obstacles, include the possibility of upwind obstacles that may cause rotor wind shadow or mechanical turbulence. Use a windsock, or better, use three.

PREFLIGHT

Pre-flight check should be done before every flight.

Do this systematically, the same way every time, don't let someone interrupt you during this, be focussed and complete the checks carefully.



LAYOUT

Spread the wing on the ground. Spread the lines, dividing them into groups A&B, C&D and brake lines left and right. Make sure the lines are free and not twisted or knotted.

Make sure all the lines are on top of the wing and none are caught on vegetation or rocks under the wing. Lay out the wing in a horseshoe shape. This method ensures that all the lines are equally tensioned on launch, and results in an even inflation.

The Flexon rib reinforcements will keep the leading edge open for easy inflation.

CAUTION:

IT IS HIGHLY RECOMMENDED TO BOTH LAUNCH, LAND AND PACK THE WING ON A SOFT SURFACE SUCH AS GRASS OR SAND. ANY HANDLING (SUCH AS LAUNCHING, LANDING, FOLDING, MAINTAINING) OF THE WING ON ROUGH, HARD SURFACES (PAVED, TARRED, OR ROCKY), WILL DAMAGE THE FABRIC IN CONTACT AREAS WITH THE GROUND AS A RESULT OF ABRASION.

The most common reason for a bad launch is a bad layout!

FINAL CHECKS

- Helmet is on and fastened for both passenger and pilot.
- Passenger and pilot have fastened the belts properly.
- The risers are properly connected and laid out.
- The brakes are pulled to the neutral position and laid out so they are not caught on the frame.
- Propeller is clear.
- The engine delivers full power.
- Take off area is clear of obstacles and free to use.

INFLATION & TAKEOFF

Depending on the wind conditions, open the throttle continuously at a rate that when the lines are fully straightened the throttle is at the position of 50%-100% depending on your PPC, some experience is how ever required to get the proper judgement. And let the canopy climb above your head.

CAUTION:

THE CRUISER HAS A GREAT LIFTING CAPACITY, THUS GIVING MORE THROTTLE CAN LIFT THE MACHINE BEFORE REQUIRED.

When the canopy is above your head, reduce the throttle to about half of the range, check the canopy and center it above your head if





necessary.

NOTE: If throttle was eased off too early or, too much brake applied during the inflation, or not enough power being used, the wing can get stuck behind at an of 50-70 degrees. In that case ease off the throttle completely, let the wing drop back to the ground and then re-inflate.

Recheck if take-off is clear, open the throttle fully and take off.

Do not try to take off until your wing is overhead in both Pitch and Roll. Applying power before that can cause dangerous oscillations.

CLIMBING OUT

Once you are safely airborne, continue heading against the wind, using brakes to correct the direction.

Do not try to climb too steeply.

In flight the CRUISER behaves more like an airplane than a paraglider, and it is good idea to regard it as such. If there are no obstacles present, it is by far safer to fly level for a while after take-off, clearing the ground gradually, gaining some speed before converting it to height with a brief application of brakes.

Another reason to avoid climbing too steeply is the risk of engine failure at low altitude, which can result in a unavoidable and sometimes steep dive towards the ground.

When climbing steeply with high power output, beware of the possibility of stall, which could be caused by wind gradient, especially if the wind above is a tailwind. Do not climb with excessive brakes applied.

You should always be able to land safely in case of engine malfunction, so it's better not to take unnecessary risk and always fly with a safe margin of speed and height.

LEVEL FLIGHT

Check your altitude regularly on your flight instruments (but, do not just concentrate in the cockpit, since obstacles might just appear "out of no-where").

In level flight it is very easy to climb or descend unintentionally. Your instruments will help you optimize speed and fuel economy.

Of course, each flight depends on configuration of your gear, but due to CRUISER's ability to fly safely without constant piloting, it will let you adjust everything to the best effect.

Depending on the power unit geometry, it is possible that after take-off you will notice a propeller torque (known as P-factor), which may induce a turn, this can be countered with normal steering, and most frames have trimming options for this.

Due to considerable vertical distance between thrust axis and wing chord - the range of safe power operation is closely associated to your skills and equipment.



Power-unit induced oscillations:

Certain configurations of engine weight, output and propeller diameter can cause oscillations, during which the pilot is being lifted to one side by the torque effect, swings down due to his weight, and then is lifted again and so on.

To avoid this, you can:

- Change the throttle setting.
- In addition, pilot reactions can often be wrong or come too late, increasing the problem instead of solving it.
- In this case the safest way to deal with this question is to close the throttle and release the brakes.
- Less-experienced pilots especially tend to overreact.
- This is called a pilot-induced oscillation, and the proven solution is to **leave the brakes alone**.

LANDING

Powered:

Make a flat approach with the engine idling, then level out and lose the speed before final flare.

Immediately on landing, switch off the engine.

The main advantage of this procedure is the possibility of going around with the wing again (repeating the approach) if anything goes wrong.

If you forget to switch off the ignition before the wing falls down, there is a considerable risk of damaging propeller, catching lines in it.

Unpowered

In case of an engine failure glide towards a landing zone, try to aim towards the centre of the landing field, as there is no possibility of opening the throttle and going around.

At the altitude of 1-1.5meters, flare the wing symmetrically by applying both brakes at a rate so that when reaching the ground, the sink rate is approximately 0m/s.

Remember:

- Whenever possible, get to know the landing field before taking off.
- Check the wind direction before planning the approach.
- Landing with power off requires much less space.
- In case of any doubt, practice the landing until you feel totally safe
- Never place the power unit downwind of the wing.
- Check, double check and then check once again that there is no fuel leakage.
- Do you have enough fuel for the flight? It is always better to have too much than too little!
- Check that there is nothing loose in that could possibly contact the propeller in flight.
- Whenever you encounter a problem, fix it AT ONCE however small it is!
- Always put on and lock helmet before getting buckled.



- Before each launch run a full pre-flight inspection.
- After landing, continue to maintain the wing's direction straight, as on turning you always risk getting lines in the propeller.
- Turn only if there is danger.

12 PACKING

We recommend folding or bunching the wing, leaving it attached to the frame. This reduces setup time and the risk of errors. It does require a more thorough pre-flight inspection, as issues that may be found after flying while packing, may go undetected. Spread the wing completely out on the ground. Separate the lines to the left and the right side of the glider. Fold the canopy from the tip to the centre, from right and left sides, working towards the centre, then, press out the air, working from the trailing edge towards the leading edge while folding / rolling the wing. Put the folded wing into the supplied pack, and store it on the rear seat or on top of the frame. Keep it away from exhaust or other hot engine parts.

If the risers are removed from the lines, stow the line ends all together and keep them from passing through each other by putting them inside the centre cell opening of the wing. This keeps them neatly together and helps to stop line tangles.

13 MAINTENANCE & CLEANING

Cleaning should be carried out with water and if necessary, gentle soap. If the glider comes in contact with salt water, clean thoroughly with fresh water. **Do not use solvents of any kind**, as this may remove the protective coatings and destroy the fabric.

14 BUTT HOLE II (Auto Debris release valves)



The F3 is equipped with Butt-hole II, which automatically clears smaller particles such as sand, grass and stones from the wing.





15 STORAGE

When the glider is not in use, the glider should be stored in a cool, dry place. A wet glider should first be dried (out of direct sunlight). Protect the glider against sunlight (UV radiation). When on the hill keep the glider covered or in the bag. Never store or transport the glider near paint, petrol or any other chemicals.

Do not leave your paraglider in the trunk of a car or exposed to the sun.

Temperatures on a hot summer's day in a closed environment: car, etc. can easily reach over 60°C

At these temperatures Nylon permanently changes its characteristics which may alter the behaviour and shape of the wing.

It will cause permanent damage to the paraglider, rendering it non-airworthy. APCO's warranty will not be applicable.

16 DAMAGE

Using spinnaker repair tape (for non-siliconized cloth) can repair tears in the wing (up to 5cm). A professional repair facility should repair greater damage.

17 THREE YEAR WARRANTY

The following warranty is granted by APCO Aviation Ltd. with respect to all of its standard Serial Production Wings, manufactured from January 1, 1994, subject to full compliance by the purchaser/owner to its following terms, as hereby detailed:

APCO Aviation Ltd. guarantees the fabric of its wings against porosity to the extent that the wing becomes Unairworthy. The fabric is warranted to remain sufficiently impermeable to air, to fly safely for a period of 250 hours or 3 years, whichever comes first. APCO Aviation Ltd. undertakes at its option to repair or replace the wing, as necessary, at APCO's discretion. The under-surface porosity does not affect airworthiness, and does not need to be checked during annual inspection.

This warranty is subject to the following limitations: a. The original purchaser has properly completed and returned the Warranty Registration Card to APCO Aviation Ltd. b. The wing owner duly records the wing's flight time and use, in an official Log Book, signed by himself and/or an official instructor site supervisor, meet official etc. This Warranty will not be in force for wings without properly registered and logged Flight Records. The wing has undergone its periodical inspections as required in accordance with its users' Manual and Directives of Association, to which the owner is affiliated, and has received its periodical signed Airworthiness Certificates from the owner's local paragliding authority, to this effect. d. The wing has been properly maintained and serviced, exclusively by APCO authorized dealers and their employees, and cleaned, dried, packed and stored in accordance to the manufacturer's instructions. For replacement wings the owner shall be entitled to a discount from the retail price proportionate to the remaining life span of the wing, as covered by this Warranty (pro-rata).

The wing has been flown for recreational use only – high stress applications, including (but not exclusive to) towing, instability manoeuvres, schooling, training and any professional use of the wing, are expressly excluded from the terms of this Warranty.

This warranty does not apply to the following:



- Use outside the specified load limitations.
- Colour fading of the fabric.
- Damage or corrosion caused by solvents, fuel or other chemicals.
- Accidental or flight (take off/landing) related damage.
- Damage caused by emergency parachute deployment.
- Modified wings.
- Any special, indirect, incidental or consequential damages of any nature whatsoever, resulting from the use of the wing, or lack of use and pleasure thereof, other than the cost of the product.

This warranty is transferable.

Your statutory rights are in no way affected by this warranty.

The manufacturer retains the right of final decision regarding any claims made within the framework of this warranty.

GENERAL ADVICE

A qualified person or agent of the company should check the glider every year.

The glider is carefully manufactured and checked by the factory. Never make changes to the wing or the lines. Changes can introduce dangerous flying characteristics and will not improve flying performance.

Do not put the glider in direct sunlight when not necessary. In order to protect the glider during transportation or waiting time we recommend one of our lightweight storage bags.

- Do not fly over water, between trees or power lines and other places where engine failure will leave you helpless, always make sure you have possibility for emergency landing.
- Mind the turbulence caused by other gliders or even by yourself, especially when flying low.
- It is not recommended to let go of the brakes below 100 meters, because a possible power unit malfunction may require immediate attention.
- In general, never trust your engine, as it can stop at any moment. Always fly prepared for engine failure.
- Unless it is absolutely necessary (e.g. collision avoidance), do not execute tight turns against the torque direction. Especially when climbing you can easily enter a stall or negative spin.
- Do not fly with tail wind at low altitudes - it narrows your options!
- Do not wait for the problem to grow - any change of engine sound or a vibration may indicate a problem. You'll never know until you land and check it out!
- Be certain of your navigation
- Remember that not everyone is fond of your engine noise. In short, don't be an ASS!

If you have any doubts about flying conditions - do not begin.

If you have any questions, please contact your dealer or us.

Lastly, be equipped with a certified emergency parachute and helmet on every flight.



APCO wishes you many hours of enjoyable flying - Take Air!