Revision 1, 00 00 2007

Vista

Manual

APCO Aviation

Setting Future Standards

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CONTENTS:

!!! WARNING

This is not a training manual. It is extremely dangerous to yourself and others to attempt to fly this or any paraglide 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.

GLIDER TECHNICAL DATA

Size	X-Small	Small	Medium	Large
Cells	45	46	48	50
Area m^2	25.6	26.5	28.3	30.1
Area (projected) m^2	22.3	23.2	25.0	26.8
Span (incl. Stabiliser) m	11.42	11.75	12.40	13.05
Span (projected) m	9.31	9.64	10.30	10.96
Aspect Ratio	5.1	5.2	5.4	5.6
Aspect Ratio (projected)	3.9	4.0	4.2	4.5
Pilot Weight, Kg (all up)	-	70-95	85-110	-
Weight of Canopy Kg	6.0	6.2	6.5	6.5
Root Cord m	2.77	2.77	2.77	2.77
Tip Cord m	0.55	0.55	0.55	0.55
Length of Lines on B m	7.1	7.4	7.9	8.4
Total length of line used m		369	390	

LINES

	Material	Diameter	Strength
Top	Dyneema	1.0mm	90kg
Mid;st	Super Aramid	1.2mm	120kg
Bottom A3;A5;B3;B5	Super Aramid	1.8mm	230kg
Bottom A1;B1	Super Aramid	1.9mm	320kg
Bottom C ; D	Super Aramid	1.5mm	150kg
Brake Cascades ; st top	Dyneema	1.1mm	95kg
Steering Line	Polyester	2.0mm	85kg

FABRIC

Sail Cloth	"Zero Porosity" Ripstop Nylon
Warranty	3 Years / 250 hours

GLIDER PERFORMANCE DATA

V-min.	21 km/h
V-trim	37 km/h
V-max.	50+ km/h
Min Sink (at optimum wing loading)	1.0m/s

GLIDER CERTIFICATION DATA

VISTA EXTRA-SMALL	In process
VISTA SMALL	DHV 1-2 trim & accel
VISTA MEDIUM	DHV 1-2 trim & accel
VISTA LARGE	DHV 1-2 trim & accel

1 DISCLAIMER OF LIABILITY

Taking into consideration the inherent risk in paragliding, 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.

2 CONSTRUCTION

The glider 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 airfoil (rib) section. On either side the wing ends in a stabilizer or wing tip, which provides straight-line (Yaw) stability and produces some outward force to keep the span-wise tension. The front part of the ribs is made from Trilam to keep the leading edge shaped at high speeds and in turbulent air. It also improves the launch characteristics of the glider. The line hook-up points are made of Dyneema or Nylon tape.

3 MATERIALS

The glider 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 superaramid 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 karabiners that attach the lines to the risers are made of stainless steel.

4 Butt holes (Velcro closure on trailing edge tip)

In order to empty sand and small stones from the glider simply shake out the debris towards the wing tip and open the **Butt holes** (**Velcro closure** on trailing edge tip) and pull out the cloth tongue outside to empty. Do not forget to close the **Butt holes** afterwards.

5 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.

6 HARNESS

All of Apco's gliders are developed with the use of ABS (Automatic Bracing System) type harnesses without cross bracing. We recommend the use of an ABS harness with all our gliders. All certified harnesses can be used with our gliders. For best safety and performance we recommend an Apco harness equipped with a Mayday emergency parachute.

CAUTION:
WE STRICLY RECOMEND NOT TO USE CROSS BRACING STRAPS.
DUE TO APCO GLIDERS ARE DEVELOPED AND TESTED WITHOUT THE USE OF CROSS BRACING. USING AN ABS HARNESS WITH CHEST STRAP SET AT THE SPECIFIED WIDTH (CHECK THE CERTIFICATE STICKER ON YOUR GLIDER) WILL RESULT IN THE HIGHEST PASSIVE SAFETY ON YOUR GLIDER.

7 SPEED SYSTEM

7.1 ASSEMBLY & ADJUSTMENT

Apco gliders are supplied with a speed system as illustrated in option II. The pilot can change the speed system to the traditional "Apco" speed system to use the full accelerator range depending on the pulley arrangement on the harness being used.

7.2 OPTION 1

First attach the harness to the glider. Remove the Chain Link from the end of the accelerator line attached to the speed bar, then thread it through the elasticized ring on the harness, then through harness pulley and then re-attach it to the Chain link with a larks-head knot. Hook the Chain link onto the Chain Link on the riser of the corresponding side. Sit in the harness and have someone hold the riser up in a flying position for you. Adjust the speed bar line by pulling the end through the speed bar tube and moving the knot. The Bar should be about 10 cm (or closer if you have a second step) away from the front of the harness seat. This allows you to easily reach the bar with your foot, and will allow you to use the full range of the speed bar if you extend your legs fully. Do not adjust the speed system too short, as this will cause it to be activated permanently while flying, and could be dangerous. It is possible to fit a second step to the system, if one has trouble using the full range of the system (supplied separately).

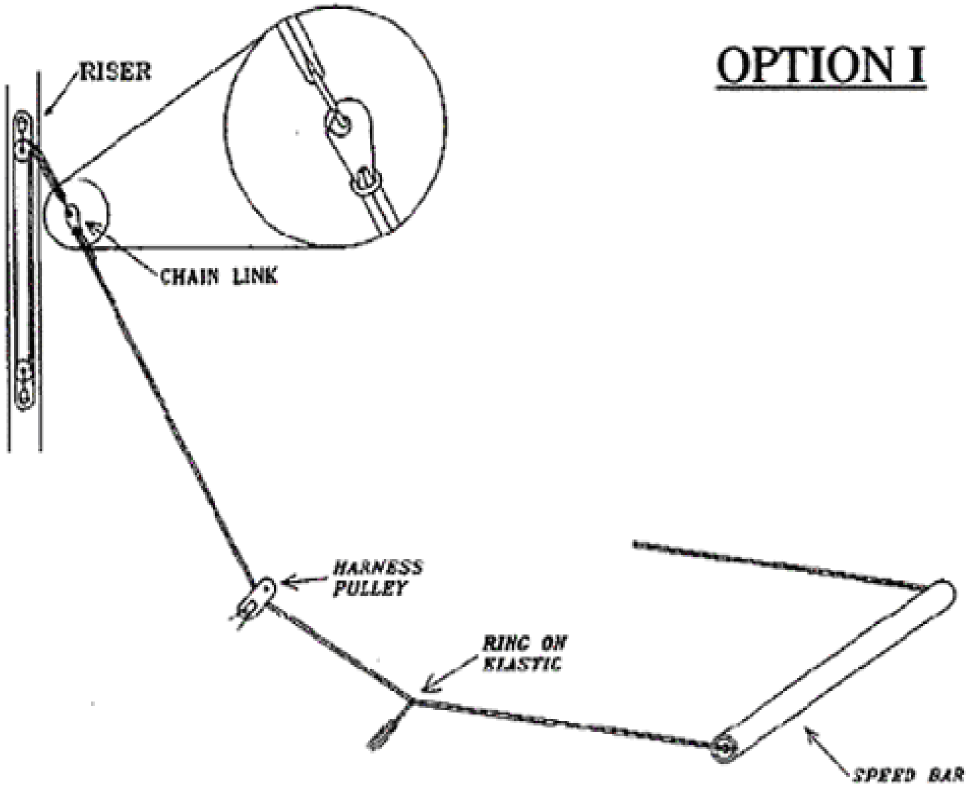


Figure 7-1

7.3 OPTION 2

First attach the harness to the glider, then thread the accelerator line from the top pulley on the riser, through the pulleys (and the elasticized ring if present) on your harness and then attach it to the supplied speed bar. To adjust the length and activation point of the speed system, sit in the harness and ask someone to hold the riser up in a flying position. By pulling out the end of the line protruding above the upper pulley on the riser and by moving the knot you can adjust the speed system. The Bar should be about 10 cm (or closer if you have a second step) away from the front of the harness seat. This allows you to use the full range of the speed bar if you extend your legs fully. Do not adjust the speed system too short as this will cause the speed system to be activated permanently while flying and could be dangerous. It is possible to fit a second step to the system if the pilot has trouble using the full range of the speed system (second step is supplied separately).

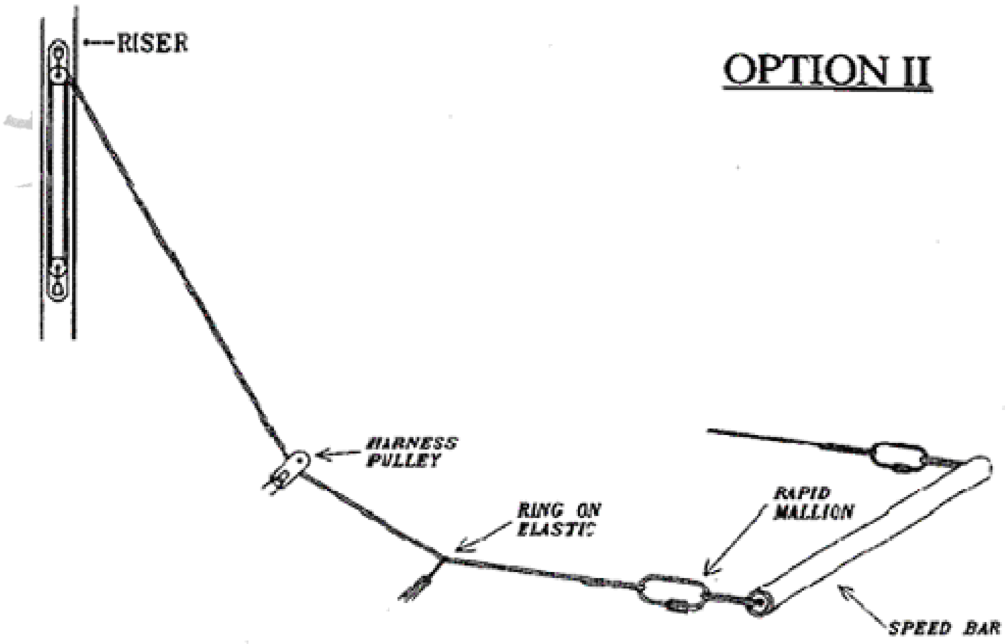


Figure 7-2

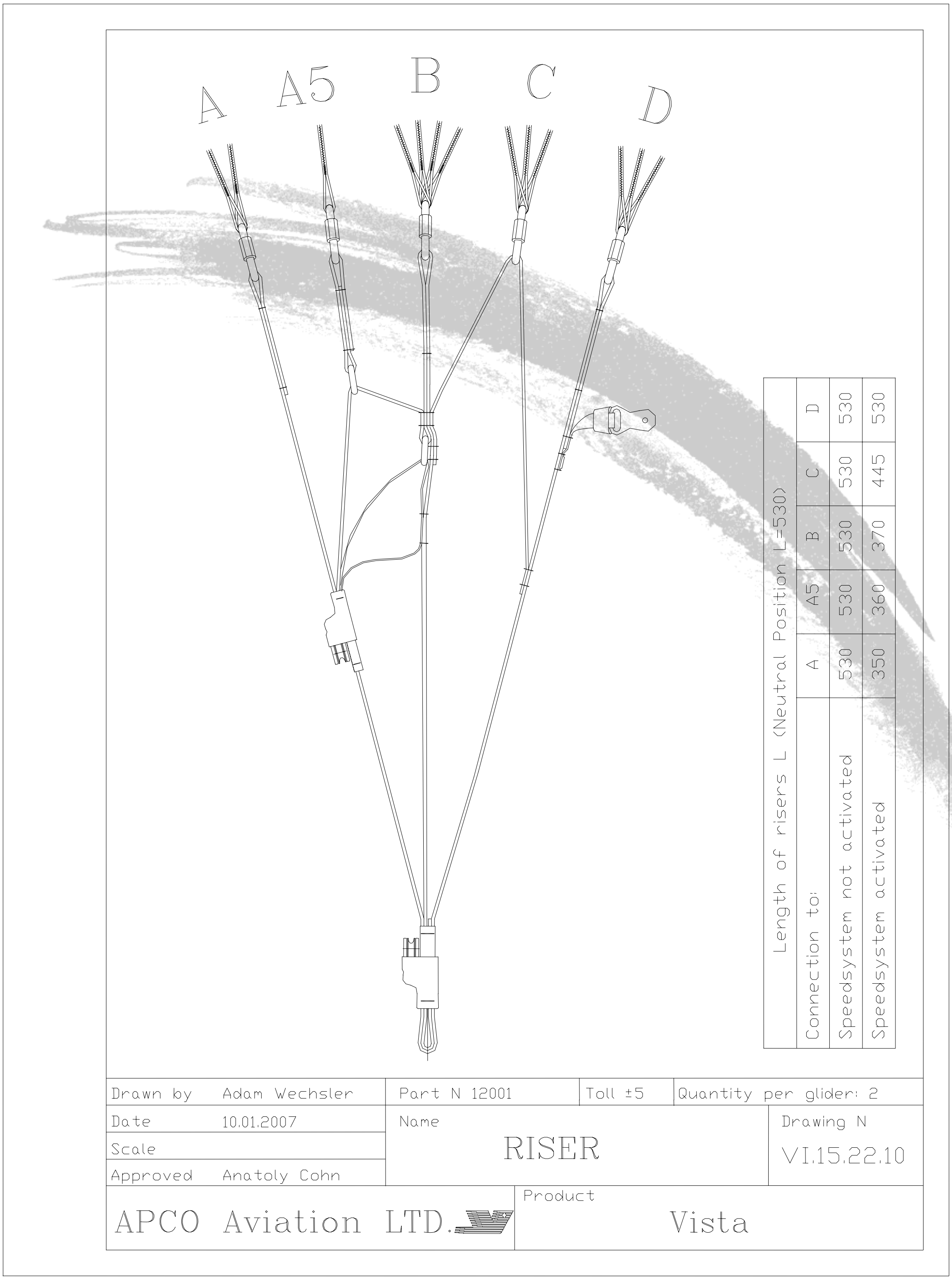
WARNING:
The use of the speed system in turbulent conditions or close to the ground is dangerous. While flying with the accelerator, the glider has a reduced angle of attack and is therefore more susceptible to turbulence and may collapse or partially deflate. Gliders react faster when accelerated and may turn more. The accelerator should immediately be released in this case.

8 EMERGENCY PARACHUTE ATTACHMENT

It is recommended to use a certified rescue parachute when flying. Attaching the rescue parachute should be done in accordance with the recommendation of the harness and reserve parachute manufacturer.

9 RISERS

The Vista is supplied with a split A riser. The 1st A-riser attaches to the central two A lines (A1 & A3). The second A-riser is attached to the outermost A line (A5). This is to facilitate Big ears or Tip tucks. At no time should the pilot change the risers or use risers not intended for this specific glider as this will affect the performance and safety of the glider.



10 INSPECTION

10.1 GENERAL

Pilots, please insure that your glider has been test flown and checked by your dealer before taking it into your possession.

10.2 BRAKE SETTING

Before the first flight the pilot/dealer has to take his/her glider and inflate it to check brake length and if needed shorten or lengthen the brake setting to his or her preference. It is important that the brakes are not set too short. If the glider is above your head the brakes should not be pulling the trailing edge down as that means that the brakes are too short. A good setting is to have about 10 cm of slack in the brake from the brake guide on the riser to the activation point of the brakes. (See Diagram below)

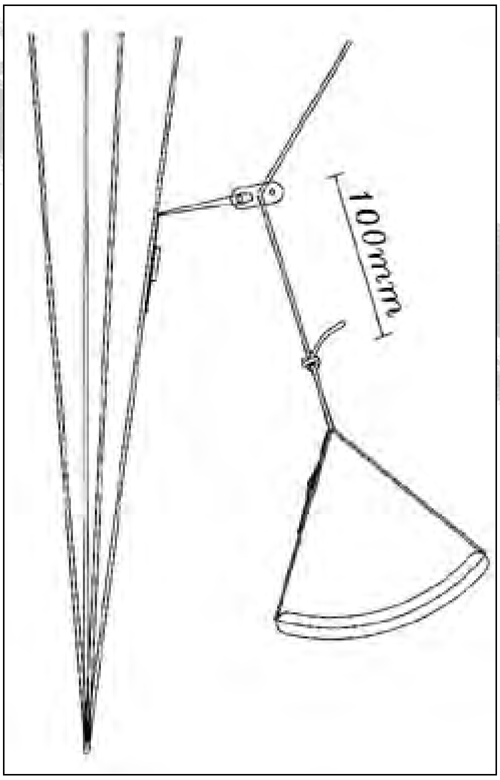


Figure 10-1 Brake Line Adjustment

10.3 FIRST CHECK AND PREFLIGHT INSPECTION

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

• Connection points between the glider and the harness.
• Check that there are no lines twisted, tangled or knotted.
• Check that the risers and speed-system are hooked up to the harness correctly.

10.4 REGULAR INSPECTION CHECKS

• Damage to lines, webbing and thread on the stitching of the harness and risers.
• That the stainless steel connection links on the risers are not damaged and are fully closed.
• The pulleys of the speed system are free to move and the lines are not twisted.
• The condition of the brake lines, stainless steel ring and the security of the knot attaching the brake handle to the brake line.
• The sewing, condition of the lines and connection of the lines.
• Damage to hook up points on the glider.
• Internal damage to the ribs and diagonal ribs.
• Damage to the top and bottom panels and seams between panels.

10.5 LINE MAINTENANCE

Three groups of suspension lines and one brake line are attached to each riser. The three groups are called A, B, C, D and brake lines. The stabilizer lines are connected along with the B-lines. Superaramid 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.

IT IS **STRICLY RECOMEND** TO CHANGE THE BOTTOM LINES ON EVERY PARAGLIDER ONCE A YEAR OR EVERY 100 HOURS, WHICH EVER COMES FIRST. THE REST OF THE LINES MUST BE CHECKED YEARLY AND REPLACED IF NECESSARY.
NEVER REPLACE THE LINES WITH DIFFERENT DIAMETER OR TYPE OF LINES AS ALL GLIDERS WERE LOAD TESTED FOR SAFETY IN THEIR ORIGINAL CONFIGURATION. CHANGING LINE DIAMETER/STRENGTHS CAN HAVE FATAL CONSEQUENCES.

Every six months one lower A, B, C and D line 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.
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.

11 TAKE OFF

As this is not a training manual we will not try to teach you launching techniques. We will only briefly go through the different launch techniques to help you get the most out of your glider.

11.1 LAYOUT

Pre-flight check should be done before every flight.
Spread the glider 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 glider and that there are none caught on vegetation or rocks under the glider. Lay out the glider in a horseshoe shape. This method insures that all the lines are equally tensioned on launch, and results in an even inflation. The Mylar rib reinforcements will keep the leading edge open for easy inflation. The most common reason for a bad launch is a bad layout!

11.2 ALPINE LAUNCH OR FORWARD LAUNCH

The Vista has very good launch behaviour in no wind conditions. For the best results we recommend the use of the following techniques: Lay out the glider and position yourself in the centre of the wing with the lines almost tight. With a positive and constant force inflate the wing holding only the A-risers, and smoothly increase your running speed. The wing will quickly inflate and settle above the pilots head without the tendency to stick behind, the pilot might have to pull some brake to stop the wing from overshooting the pilot on an aggressive run. After you leave the A-risers, apply about 15% brakes and the Vista will gently lift you off the ground.

11.3 STRONG WIND AND REVERSE LAUNCH

The Vista has a lot of lifting power and care should be taken in strong wind. It is advisable to have an assistant hold the pilot when attempting a strong wind launch. It also helps if you walk towards the canopy and leave the A-riser just before the glider gets above your head. Then pull a bit of brake to stop the wing from overshooting, but not too much as the glider might pull you off your feet too early. The assistant should let the pilot walk in under the wing on inflation rather than resist the inflation; this reduces the tendency of the glider to lift the pilot prematurely.

11.4 TOW OR WINCH LAUNCHING

All APCO gliders are well suited for winching and have no bad tendencies on the winch. With towing it is important to have the wing above your head on launch and not to try and force a stalled wing into the air. This is especially important if the winch operator is using high tension on the winch. Very little brake if any need be applied on launch and during the winch. Directional changes can be made with weight shift rather than brakes. While on tow, the brake pressure will be higher and more input may be needed to make corrections than in normal flight.
For all our gliders we recommend using tow accelerating system. There are different types existing on the market. Please check with your dealer or tow operator for the recommended tow accelerator system. Use of it will eliminate any chance for accidental stalling on tow.

12 FLIGHT TECHNIQUES

12.1 FLYING SPEED

Indicated trim speed is dependant on the amount of brake the pilot is using, wing loading, altitude above sea level and the accuracy and make of speed probe. The speeds recorded were at optimum wing loading at sea level using a Flytec 4030 thus there could be a slight variation in speed range numbers that a pilot records.

NOTE:

The speeds indicated in the technical data sheet are the correct speeds measured at sea level using a calibrated instrument flying at optimum wing loading. Speed readings in the flight reports could differ as this was measured during testing using various instruments and is an indication of the difference between trim, stall and top speed. The speed range will be the same but the actual numbers may differ.

- With 0% brake the Vista will fly at 37 km/h with a sink rate of 1.1m/s.
- At 25% brake the glider will fly at 33km/h with minimum sink rate 1.0 m/s.
- The best glide angle is achieved with 10% speed system.
- With 80% brake the glider will fly at about 22km/h and will be close to the stall point 21km/h.

> CAUTION:
> APART FROM WHEN FLARING AT LANDING THERE SHOULD BE NO REASON TO FLY WITH 70% TO 100% BRAKE. THE SINK RATE OF THE GLIDER WILL BE EXCESSIVE AND THERE WILL BE A POSSIBILITY OF ENTERING A DEEPSTALL OR FULLSTALL SITUATION. THERE IS ALSO THE RISK OF GOING NEGATIVE OR ENTERING A SPIN WHEN ATTEMPTING TO TURN THE GLIDER NEAR THE STALL SPEED.

WARNING:

The use of the speed system in turbulent conditions or close to the ground is dangerous. While flying with the accelerator, the glider has a reduced angle of attack and is therefore more susceptible to turbulence and may collapse or partially deflate. Gliders react faster when accelerated and may turn more. The accelerator should immediately be released in this case.

12.2 THERMAL FLYING

The Vista has excellent thermaling capacity and will be a pleasure even when you are in a big gaggle or just having fun on a long XC flight. The glider has high internal pressure and needs very little pilot input even in very turbulent conditions. In light lift it is advised to make flat turns to keep the glider from banking too much and avoid increasing the sink rate. In strong lift conditions it is most effective to have small turns in the core with relatively high bank. For the best climb rate in ridge lift we recommend using about 15 to 20% brake.

12.3 ASYMMETRIC COLLAPSE

If one side of the glider partially folds or collapses it is important to keep your flying direction by applying some brake on the opposite side. The wing should re-inflate on its own without any input from the pilot. To help re-inflation it is possible to pull some brake on the collapsed side and release immediately. In the event of a big deflation, i.e. 70%, it is important to give brake in the opposite direction but care must be taken not to pull too much as you could stall the flying side. The glider is very solid and has a very strong tendency to re-inflate after any collapses.

12.4 CRAVAT

In case a cravat should occur from an asymmetric collapse or other manoeuvres, it is important to keep your flying direction by applying some brake on the opposite side and then it can usually be opened by pulling down on the stabilo line of the affected side while countering the turn with the opposite brake and weight shift. It also helps sometimes to pull Big Ears to release the tension on the affected lines, or a combination of the above techniques, i.e. pulling on the stabilo after pulling Big Ears.

12.5 FRONT STALL OR SYMMETRIC COLLAPSE

In the event of a front stall the glider will normally re-inflate on its own immediately without any change of direction. To speed up re-inflation briefly apply 30-40% brake (to pump open the leading edge). Do not hold the brakes down permanently to avoid an unwanted stall.

12.6 B-STALL

The Vista has a very clean stable B stall. To enter the B stall the pilot has to pull the first 20-cm slowly until the glider loses forward speed and starts to descend vertically. Then the pilot can pull more on the B until he/she attains a stable 7 to 9 m/s descent rate. The Glider has no tendency to front rosette or become pitch unstable. To exit the B stall the pilot releases the B slowly until the glider has regained its shape and then the **last 15 cm fast** to prevent the glider from entering deep stall. The Vista can be controlled directionally in the B stall by pulling more on one B riser than on the other to create a turn in any direction. The B-stall is a safe controlled way of losing altitude fast without any forward speed.

12.7 BIG EARS

Altitude can be lost in a controlled way by collapsing both tips. To do this, take the outer-most A-line (attached on its own riser) on both side and pull them down until the tips collapse. Pulling one side at a time may be more comfortable and easier, especially for smaller pilots. This should close about 30% of the wing in total. It is possible to steer with weight shift.

To increase the sink rate the pilot can push the speed system after he/she has collapsed the tips. This can give up to about 7 m/s sink-rate with about 45-km/h forward speed. To exit, release the speed system and then release the tip A-lines.

It may sometimes be necessary to apply a little brake to open the tips. If using the brakes to open the tips, it is best to open one tip at a time, this avoids reducing your air-speed.

<u>CAUTION:</u>
DO NOT ATTEMPT ANY EXTREME MANEUVRES WITH THE TIPS COLLAPSED AS THIS DOUBLES THE LOAD ON THE CENTER LINES AND ATTACHMENT POINTS AND COULD LEAD TO FAILURE.

12.8 DEEP STALL OR PARACHUTAL STALL

Under normal flying conditions the Vista will have no tendency to enter deep stall. All gliders can however under certain conditions enter and stay in deep stall configuration (as a result of ageing of materials, improper maintenance or pilot induced).

12.8.1 Signs of parachutal stall

• The pilot has very little or no forwards speed and no wind in his face.
• The glider will be fully open but the cells will be bulging in and not out on the bottom surface.
• The glider might have a very slow turning sensation.
• You will have an increased vertical descent.

12.8.2 Exit from parachutal stall

It is important to recognize this situation. Most accidents involving parachutal stall happen because the pilot did not realize that he was in deep stall.

The best way to exit a parachutal stall is to pull all the A risers down to get the wing flying again. The pilot can pull the riser down until the wing starts to fly again. The moment the wing starts to fly the pilot should release the A riser, or the wing might suffer a frontal collapse.

Alternatively the pilot can push the speed bar to lower the angle of attack and get the wing flying again.

By pulling one or both brakes while in deep stall the pilot can accidentally enter a full stall or spin.

12.9 SPIRAL DIVES

The Vista has very good behaviour in spiral and has no tendency to stick in the spiral. By progressively applying brake on one side the glider can be put into a spiral dive. Safe high sink rates can be achieved like this. The spiral has to be exited slowly by releasing the brake over one complete turn or the glider may pitch forward and possibly suffer a collapse.

Care must be taken that the pilot has enough height to exit the spiral safely.

Sink rates in excess of 19m/s can be obtained.

> CAUTION:
> SOME GLIDERS CAN BE NEUTRAL IN SPIRAL AND MAY NOT EXIT WITHOUT PILOT INPUT. TO EXIT A NEUTRAL SPIRAL THE PILOT HAS TO LEAN HIS/HER WEIGHT TO THE OUTSIDE OF THE TURN OR APPLY BRAKE ON THE OUTSIDE WING. AS SOON AS THE GLIDER STARTS TO SLOW DOWN IN THE SPIRAL THE OUTSIDE BRAKE MUST BE RELEASED.

PILOTS CAN SUFFER BLACK OUTS IN SPIRALS AND THE PILOT HAS TO EXIT THE SPIRAL AS SOON AS he/she FEELS ANY ABNORMAL SYMPTOMS (Black dots in field of vision or light-headedness).

12.10 STRONG TURBULENCE

NEVER FLY IN STRONG TURBULENCE!

If you unexpectedly encounter strong turbulence, fly with about 20% brake applied to increase the internal pressure and the angle of attack of the canopy and land as soon as possible. If the air is turbulent on landing approach, land with Big Ears.

Learn to fly actively and to anticipate collapses and prevent them by applying brake when needed before you have unwanted collapses.

12.11 STEERING NOT FUNCTIONING

If the pilot cannot reach the brake or steering lines for any reason or if they are not functioning properly, (for example: If they break on a damaged point) he or she can control the glider by pulling down on the rear risers.

Care must be taken when steering like this, as much less input is needed to turn the wing and the response of the wing is also much slower than when using the brakes.

IF YOU PULL TOO MUCH ON ONE OR BOTH RISERS THE GLIDER WILL SPIN OR STALL.

On the landing flare the pilot should be especially careful not to stall the glider too high.

13 LANDING

Before landing the pilot should determine the wind direction, usually by checking a windsock, flags, smoke or your drift over the ground while doing one or more 360o turns.

- Always land into the wind.
- At a height of about 50 meters your landing setup should begin. The most commonly used one is to head into the wind and depending on the wind strength the pilot should reach his/her landing point by making s-turns.
- At a height of about 15 meters the final part of your descent should be made at trim speed into the wind.
- At a height between half a meter and one meter you can gently flair the glider by pulling gradually down on the brakes to the stall point. When top-landing it is sometimes not necessary to flare or a much smaller flare may be required, especially in strong ridge conditions.

13.1 TREE LANDING

If it is not possible to land in an open area, steer into the wind towards an unobstructed tree and do a normal landing approach as if the tree is your landing spot. Flare as for a normal landing. On impact hold your legs together and protect your face with your arms.

After any tree landing it is very important to check all the lines, line measurements, and the canopy for damage.

13.2 WATER LANDING

As you approach landing, release all the buckles (and cross-bracing if present) of the harness except for one leg. Just before landing, release the remaining buckle. It is advisable to enter the water downwind. Let the canopy rotate completely forward until it hits the water with the leading edge openings; the air inside will then be trapped, forming a big air mattress and giving the pilot more time to escape. Less water will enter the canopy this way, making the recovery much easier. Get away from the glider and lines as soon as possible, to avoid entanglement. Remember that a ballast bag can be emptied and then inflated with air for a flotation aid.

The canopy should be carefully inspected after a water landing, since it is very easy to cause internal damage to the ribs if the canopy is lifted while containing water. Always lift the canopy by the trailing edge, not by the lines or top or bottom surface fabric.

13.3 LANDING IN TURBULENCE

One of the safest ways to land a glider in turbulent conditions is to use Big Ears. This reduces the chances of getting a collapse while on final approach. Use weight shift to control your approach. It is possible to keep the ears in until you are ready to flare the glider. Simply release the A-risers and flare the glider, starting a little higher than usual. Practice this in normal conditions before you need it in an emergency.

14 PACKING

Spread the canopy completely out on the ground. Separate the lines to the left and the right side of the glider. If the risers are removed from the harness, join the two risers together by passing one carabineers loop through the other. This keeps them neatly together and helps to stop line tangles.

Fold the canopy alternately from the right and left sides, working towards the centre, press out the air, working from the rear towards the front. Place the risers at the trailing edge of the folded canopy and use them to finally roll up the canopy.

15 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.

16 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.

17 DAMAGE

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

18 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 canopy or the lines. Changes can introduce dangerous flying characteristics and will not improve flying performance.

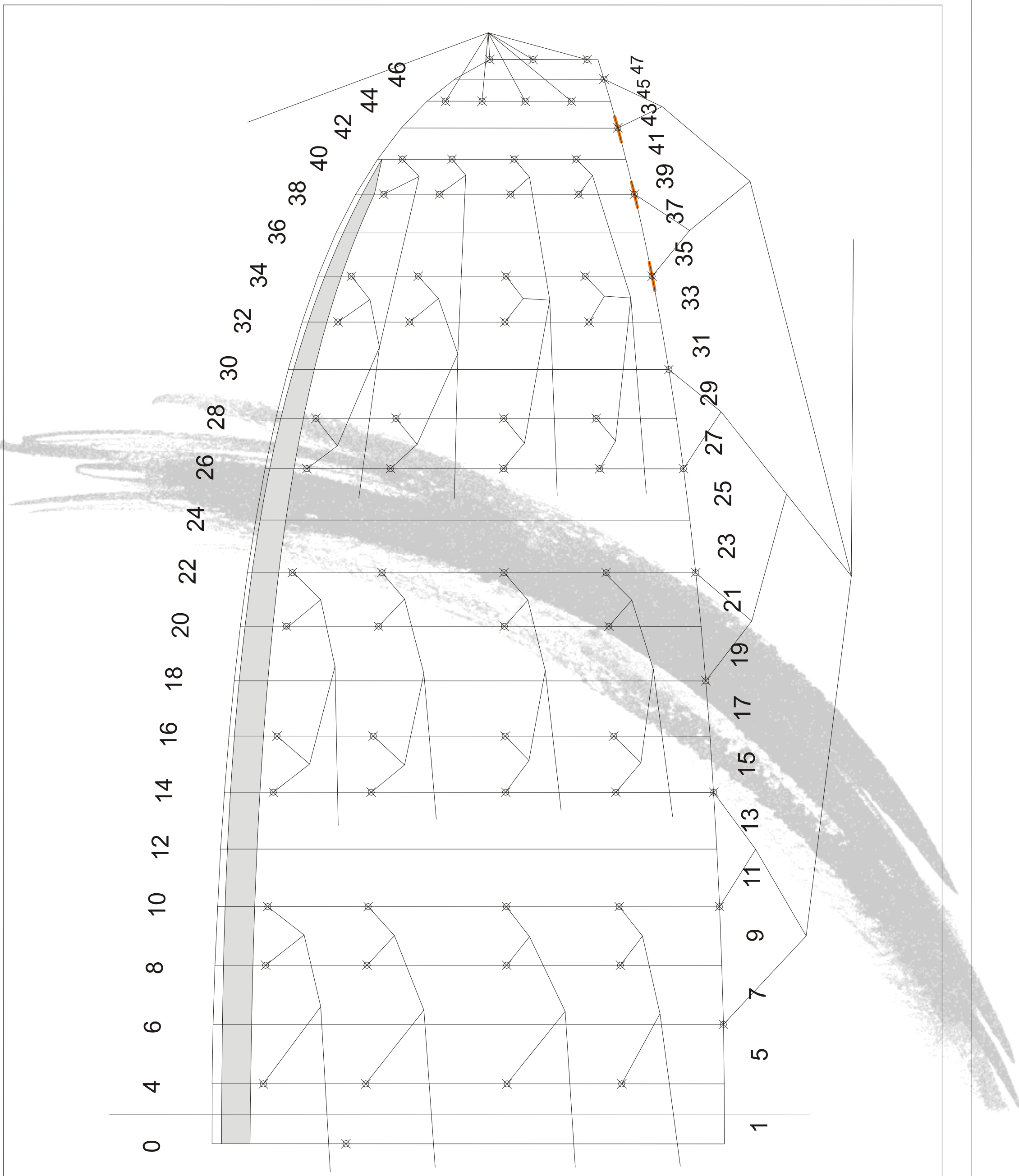
Do not put the glider in direct sunlight when not necessary. In order to protect the glider during transportation or waiting time we recommend one of our lightweight storage bags.

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

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

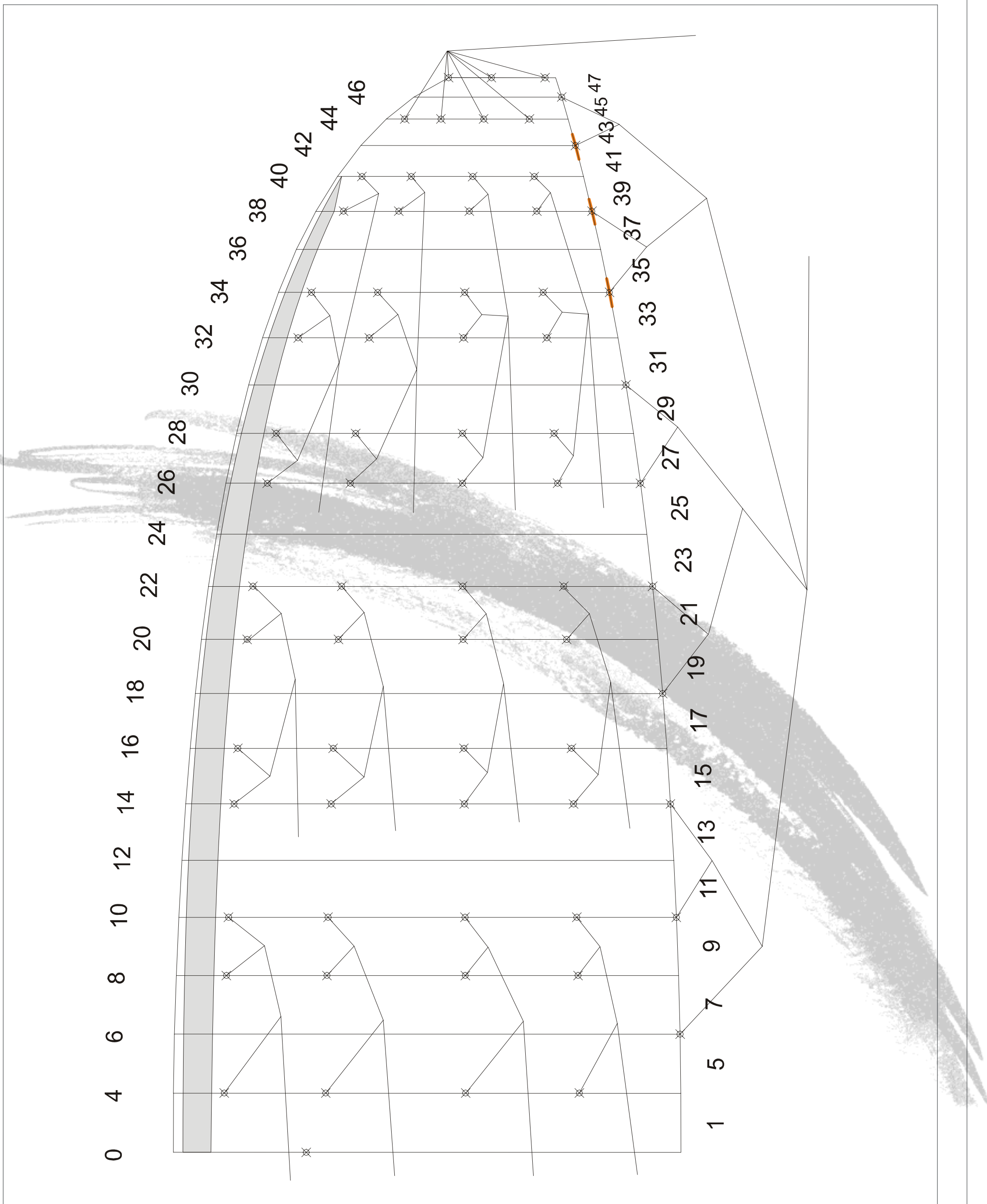
Lastly, be equipped with a certified emergency parachute and helmet on every flight.

19 VISTA <u>EXTRA SMALL</u> SKETCHES



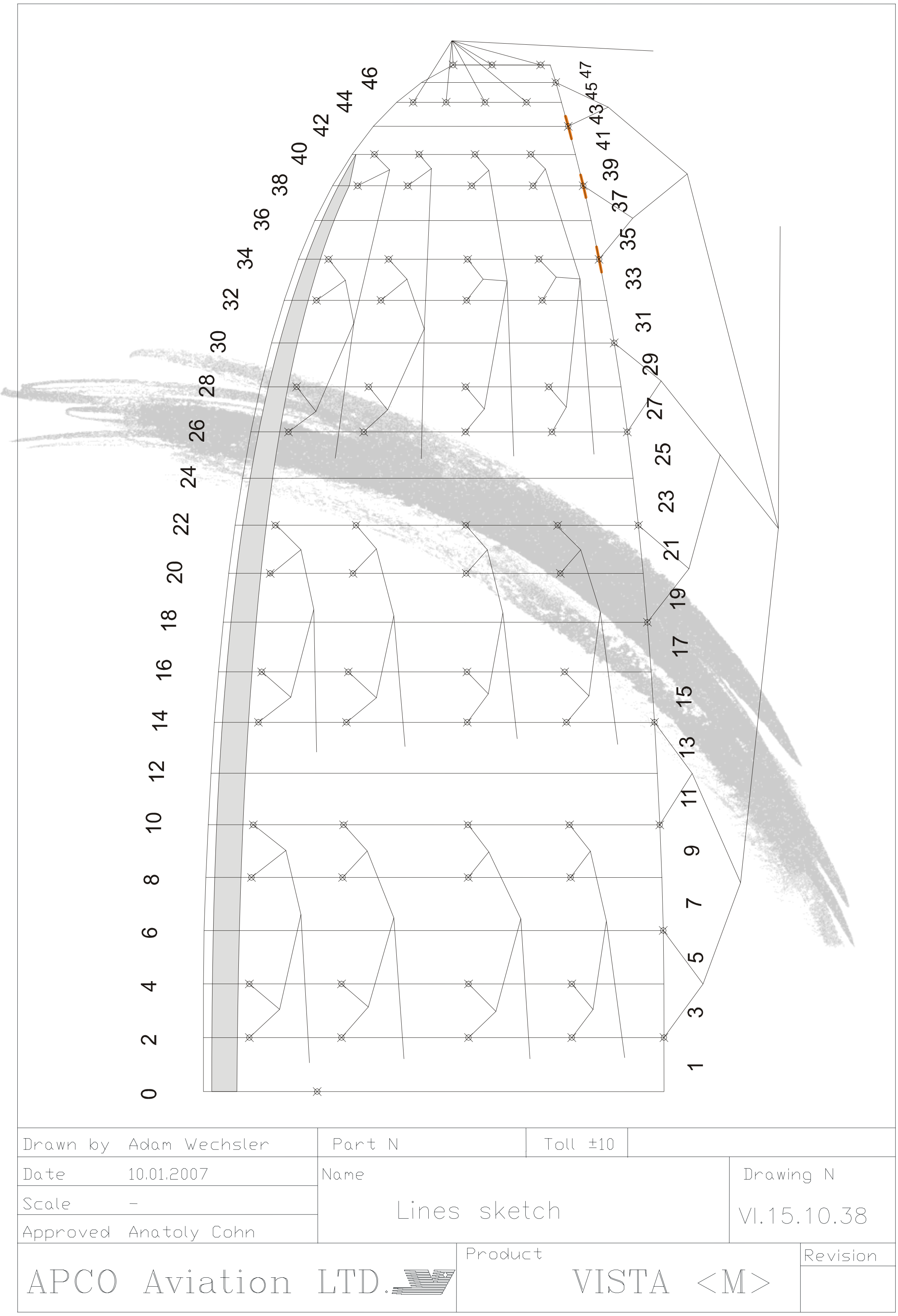
Drawn by	Adam Wechsler	Part N	Toll	Quantity per glider
Date	31.10.07	Name		Drawing N
Scale	–	Sketch of lines		
Approved	Anatoly Cohn			
APCO Aviation LTD.		Product: Vista <XS>		

20 VISTA SMALL SKETCHES

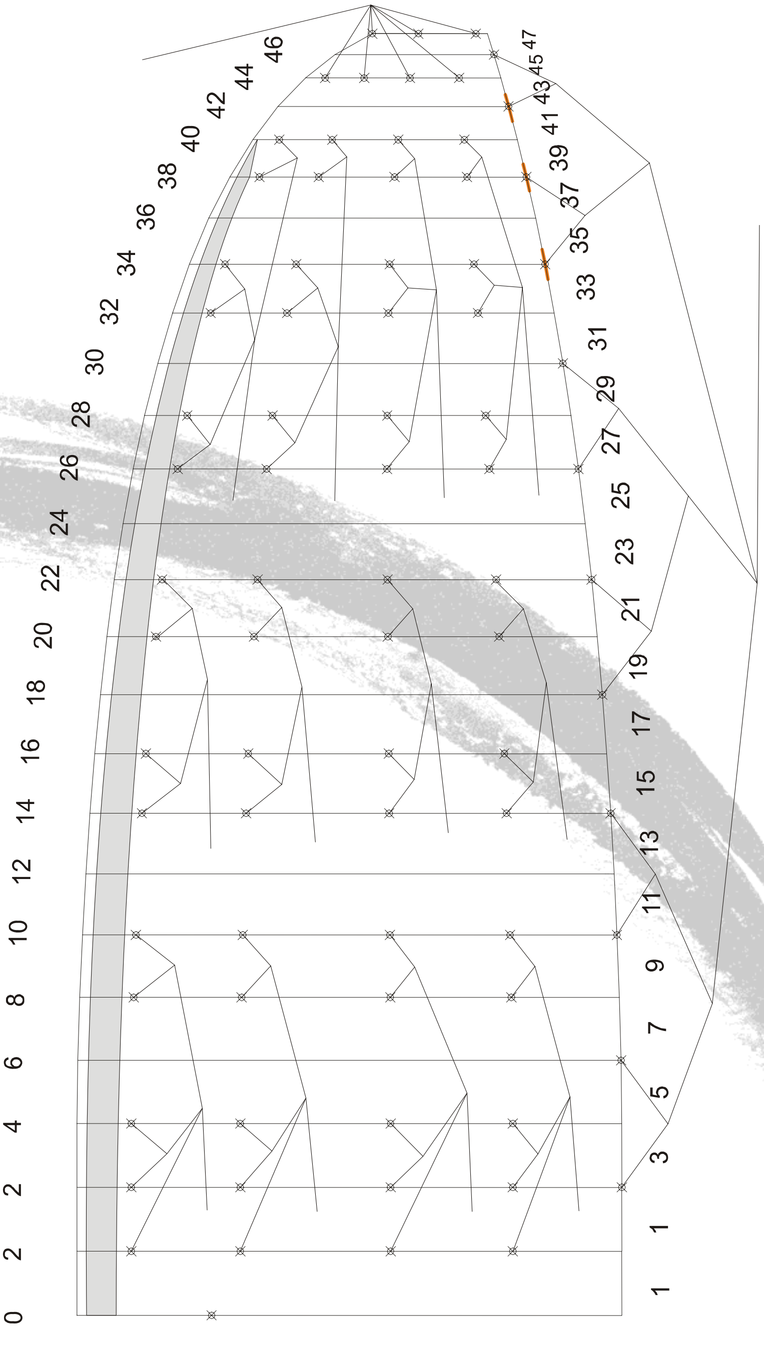


Drawn by Adam Wechsler	Part N	Toll ±10	
Date 10.01.2007	Name Lines sketch		Drawing N VI.15.10.38
Scale -			
Approved Anatoly Cohn			
APCO Aviation LTD.	Product VISTA <S>		Revision

21 VISTA MEDIUM SKETCHES



22 VISTA LARGE SKETCHES



Drawn by Adam Wechsler	Part N	Toll±5	Qty per glider
Date 16.07.07	Name	Drawing N	Rev
Scale –	line sketch.		C (DHV)
Approved Anatoly Cohn			
APCO Aviation LTD.	Product	Vista "L"	

23 VISTA SMALL CERTIFICATION

Deutscher Hängegleiterverband e.V. im DAeC
DHV/OeAeC-Technikreferat
LBA-anerkannte Prüfstelle für Hängegleiter und Gleitsegel
Beauftragter der österreichischen Luftfahrtbehörde

GS TESTFLUG DHV03 APCO VISTA S

Test No 017712-GSTF03-997-Beni
Test date 10.11.2006
Type Apco Vista S
Test type GS Testflug DHV03
Order Auftrag GS Musterprüfung Apco Vista S (Apco Aviation Ltd.)
Customer Apco Aviation Ltd.
Test standard Lufttüchtigkeitsforderungen für HG und GS
Expert Stocker
Result positive
Billing to: 100%
Technical peculiarities

Deutscher Hängegleiterverband e.V
Miesbacher Straße 2, 83703 Gmund

13. Nov. 06
iA [signature]

Datum / Unterschrift (Stocker)

DHV test flight main data

Harness type SUP´AIR 02
Take off weight [kg] 73
Weight limit for certification [kg] 65
Number of pilots 1
Trim speed [km/h] 33
Accelerated speed [km/h] 0
Classification 1-2

Supplementary remarks

PG test flight specific

Harness category GH
Accelerator used? Yes
Trimms -

DHV PG Test flight 2003 data

Take off

Take off class. 1
Inflation evenly, immediately
Rising behaviour immediately comes over pilot
Take off speed average
Take off handling easy

Straight flight

Straight flight class. 1
Speed range high
Roll damping high
Pitch damping high
Yaw stability high

Turn handling

Turn handling class. 1-2
Spin tendency slight
Control travel average
Agility average
Control pressure increase high

10265

Control without brakes	control through rear risers possible
Symmetric stall	
Deep-stall limit	1-2
Deep-stall limit	average 60 cm - 75 cm
Full stall limit	average 65 cm - 80 cm
Full stall with full steering way	yes, soft stall
Falling back	average
Increase in steering power	high
Front collapse	
Front collapse class.	1-2
Effort	high
Pre-acceleration	average
Opening behaviour	spontaneous, delayed
Front collapse (accelerated)	
Front collapse accelerated class.	1-2
Effort	average
Pre-acceleration	average
Opening behaviour	spontaneous, delayed
Asymmetric collapse	
Asymmetric collapse class.	1-2
Turn tendency	< 90 degrees
Change of course	90 - 180 degrees
Rate of turn	average
Max. roll/pitch angle	less than 45 degrees
Loss of altitude	average
Stabilization	spontaneous
Opening behaviour	spontaneous, impulsive
Asymmetric collapse (accelerated)	
Asymmetric collapse acc. class.	1-2
Turn tendency	90 - 180 degrees
Change of course	90 - 180 degrees
Rate of turn	average with deceleration
Max. roll/pitch angle	less than 45 degrees
Loss of altitude	average
Stabilization	spontaneous
Opening behaviour	spontaneous, impulsive
Countersteering an asymmetric collapse	
Countersteering an asymmetric collapse class.	1-2
Stabilization	countersteering easy
Control travel	average
Control pressure increase	high
Turn in opposite direction	easy, no tendency to stall
Opening behaviour	spontaneous, impulsive
Full stall, symm. exit	
Fullstall, symm. exit class	1-2
Behaviour	nervous
Reaction	average shoot forward no collapse
Turn tendency	
Rate of turn	

Loss of altitude
Stabilization
Opening behaviour

Spin out of straight flight

Spin out of straight flight class. 1-2
Rate of turn average
Exit turn continues through 90 - 180 degrees
Reaction average shoot forward to one side
no collapse
Turn tendency no turn
Rate of turn
Loss of altitude
Stabilization
Opening behaviour

Spin out of turn

Spin out of turn class. 1-2
Reaction average shoot forward to one side
no collapse
Turn tendency no turn
Rate of turn
Loss of altitude
Stabilization
Opening behaviour

Spiral dive

Spiral dive class. 1-2
Entry average
Spin tendency slight
Exit turn continues through 180 - 360 degrees
Sink rate after 720 °[m/s] 12

B-line stall

B-line stall class. 1
Entry easy
Exit spontaneous

Big ears

Big ears 1
Entry easy
Recovery spontaneous, quickly

Big ears accelerated

Big ears acc. class. 1
Entry easy
Recovery spontaneous, quickly

Landing

Landing class. 1-2
Point of flare average
Landing speed average
Landing behaviour average

Deutscher Hängegleiterverband e.V. im DAeC
DHV/OeAeC-Technikreferat
LBA-anerkannte Prüfstelle für Hängegleiter und Gleitsegel
Beauftragter der österreichischen Luftfahrtbehörde

GS TESTFLUG DHV03 APCO VISTA S

Test No 017703-GSTF03-989-christian
Test date 10.11.2006
Type Apco Vista S
Test type GS Testflug DHV03
Order Auftrag GS Musterprüfung Apco Vista S (Apco Aviation Ltd.)
Customer Apco Aviation Ltd.
Test standard Lufttüchtigkeitsforderungen für HG und GS
Expert Amon
Result positive
Billing to: 100%
Technical peculiarities

13. Nov. 06
it [signature]

Deutscher Hängegleiterverband e.V
Miesbacher Straße 2, 83703 Gmund

Datum / Unterschrift (Amon)

DHV test flight main data

Harness type Liga
Take off weight [kg] 87
Weight limit for certification [kg] 85
Number of pilots 1
Trim speed [km/h] 38
Accelerated speed [km/h] 0
Classification 1-2

Supplementary remarks

PG test flight specific

Harness category GH
Accelerator used? Yes
Trimms -

DHV PG Test flight 2003 data

Take off

Take off class. 1-2
Inflation evenly, immediately
Rising behaviour comes over pilot delayed
Take off speed average
Take off handling average

Straight flight

Straight flight class. 1-2
Speed range high
Roll damping average
Pitch damping average
Yaw stability average

Turn handling

Turn handling class. 1-2
Spin tendency slight
Control travel average
Agility average
Control pressure increase high

10265

Control without brakes	control through rear risers possible
Symmetric stall	
Deep-stall limit	1-2
Deep-stall limit	average 60 cm - 75 cm
Full stall limit	average 65 cm - 80 cm
Full stall with full steering way	yes, soft stall
Falling back	slight
Increase in steering power	average
Front collapse	
Front collapse class.	1-2
Effort	high
Pre-acceleration	slight
Opening behaviour	spontaneous, delayed
Front collapse (accelerated)	
Front collapse accelerated class.	1-2
Effort	high
Pre-acceleration	slight
Opening behaviour	spontaneous, delayed
Asymmetric collapse	
Asymmetric collapse class.	1-2
Turn tendency	90 - 180 degrees
Change of course	180 - 360 degrees
Rate of turn	average with deceleration
Max. roll/pitch angle	less than 45 degrees
Loss of altitude	average
Stabilization	spontaneous
Opening behaviour	spontaneous
Asymmetric collapse (accelerated)	
Asymmetric collapse acc. class.	1-2
Turn tendency	90 - 180 degrees
Change of course	180 - 360 degrees
Rate of turn	average with deceleration
Max. roll/pitch angle	less than 45 degrees
Loss of altitude	average
Stabilization	spontaneous
Opening behaviour	spontaneous
Countersteering an asymmetric collapse	
Countersteering an asymmetric collapse class.	1-2
Stabilization	countersteering easy
Control travel	average
Control pressure increase	high
Turn in opposite direction	easy, no tendency to stall
Opening behaviour	spontaneous, delayed
Full stall, symm. exit	
Fullstall, symm. exit class	1-2
Behaviour	stable
Reaction	average shoot forward no collapse
Turn tendency	no turn
Rate of turn	

Loss of altitude
Stabilization
Opening behaviour

Spin out of straight flight

Spin out of straight flight class. 1-2
Rate of turn average
Exit turn continues through 90 - 180 degrees
Reaction average shoot forward to one side
no collapse
Turn tendency
Rate of turn

Loss of altitude
Stabilization
Opening behaviour

Spin out of turn

Spin out of turn class. 1
Reaction slight shoot forward to one side
no collapse
Turn tendency
Rate of turn
Loss of altitude
Stabilization
Opening behaviour

Spiral dive

Spiral dive class. 1-2
Entry easy
Spin tendency slight
Exit turn continues through < 180 degrees
Sink rate after 720 °[m/s] 8

B-line stall

B-line stall class. 1
Entry easy
Exit spontaneous

Big ears

Big ears 1
Entry easy
Recovery spontaneous, quickly

Big ears accelerated

Big ears acc. class. 1
Entry easy
Recovery spontaneous, quickly

Landing

Landing class. 1-2
Point of flare average
Landing speed average
Landing behaviour easy

24 VISTA MEDIUM CERTIFICATION

Deutscher Hängegleiterverband e.V. im DAeC
DHV/OeAeC-Technikreferat
LBA-anerkannte Prüfstelle für Hängegleiter und Gleitsegel
Beauftragter der österreichischen Luftfahrtbehörde

GS TESTFLUG DHV03 APCO VISTA M

Test No 017794-GSTF03-1013-christian
Test date 02.12.2006
Type Apco Vista M
Test type GS Testflug DHV03
Order Auftrag GS Musterprüfung Apco Vista M (Apco Aviation Ltd.)
Customer Apco Aviation Ltd.
Test standard Lufttüchtigkeitsforderungen für HG und GS
Expert Amon
Result positive
Billing to: 100%
Technical peculiarities

06. Dez. 06
i.A. [signature]

Deutscher Hängegleiterverband e.V
Miesbacher Straße 2, 83703 Gmund

Datum / Unterschrift (Amon)

DHV test flight main data

Harness type Liga
Take off weight [kg] 83
Weight limit for certification [kg] 80
Number of pilots 1
Trim speed [km/h] 37
Accelerated speed [km/h] 0
Classification 1-2

Supplementary remarks

PG test flight specific

Harness category GH
Accelerator used? Yes
Trimms -

DHV PG Test flight 2003 data

Take off

Take off class. 1-2
Inflation evenly, immediately
Rising behaviour comes over pilot delayed
Take off speed slight
Take off handling easy

Straight flight

Straight flight class. 1-2
Speed range high
Roll damping average
Pitch damping average
Yaw stability average

Turn handling

Turn handling class. 1-2
Spin tendency slight
Control travel average
Agility average
Control pressure increase average

10329

	Control without brakes	control through rear risers possible
Symmetric stall		
	Deep-stall limit	1-2
	Deep-stall limit	average 60 cm - 75 cm
	Full stall limit	average 65 cm - 80 cm
	Full stall with full steering way	yes, soft stall
	Falling back	slight
	Increase in steering power	average
Front collapse		
	Front collapse class.	1-2
	Effort	high
	Pre-acceleration	slight
	Opening behaviour	spontaneous, delayed
Front collapse (accelerated)		
	Front collapse accelerated class.	1-2
	Effort	high
	Pre-acceleration	slight
	Opening behaviour	spontaneous, delayed
Asymmetric collapse		
	Asymmetric collapse class.	1-2
	Turn tendency	90 - 180 degrees
	Change of course	180 - 360 degrees
	Rate of turn	average
	Max. roll/pitch angle	less than 45 degrees
	Loss of altitude	average
	Stabilization	spontaneous
	Opening behaviour	spontaneous
Asymmetric collapse (accelerated)		
	Asymmetric collapse acc. class.	1-2
	Turn tendency	90 - 180 degrees
	Change of course	180 - 360 degrees
	Rate of turn	average with deceleration
	Max. roll/pitch angle	less than 45 degrees
	Loss of altitude	average
	Stabilization	spontaneous
	Opening behaviour	spontaneous
Countersteering an asymmetric collapse		
	Countersteering an asymmetric collapse class.	1-2
	Stabilization	countersteering easy
	Control travel	average
	Control pressure increase	average
	Turn in opposite direction	easy, no tendency to stall
	Opening behaviour	spontaneous, delayed
Full stall, symm. exit		
	Fullstall, symm. exit class	1-2
	Behaviour	stable
	Reaction	average shoot forward no collapse
	Turn tendency	no turn
	Rate of turn	

Opening behaviour

Spin out of straight flight

Spin out of straight flight class. 1-2
Rate of turn average
Exit turn continues through 90 - 180 degrees
Reaction average shoot forward to one side
no collapse
Turn tendency no turn
Rate of turn

Loss of altitude
Stabilization
Opening behaviour

Spin out of turn

Spin out of turn class. 1-2
Reaction average shoot forward to one side
no collapse
Turn tendency no turn
Rate of turn

Loss of altitude
Stabilization
Opening behaviour

Spiral dive

Spiral dive class. 1-2
Entry easy
Spin tendency slight
Exit turn continues through 180 - 360 degrees
Sink rate after 720 °[m/s] 12

B-line stall

B-line stall class. 1
Entry easy
Exit spontaneous

Big ears

Big ears 1
Entry easy
Recovery spontaneous, quickly

Big ears accelerated

Big ears acc. class. 1
Entry easy
Recovery spontaneous, quickly

Landing

Landing class. 1-2
Point of flare average
Landing speed average
Landing behaviour average

Deutscher Hängegleiterverband e.V. im DAeC
DHV/OeAeC-Technikreferat
LBA-anerkannte Prüfstelle für Hängegleiter und Gleitsegel
Beauftragter der österreichischen Luftfahrtbehörde

GS TESTFLUG DHV03 APCO VISTA M

Test No 017895-GSTF03-1018-mike
Test date 30.11.2006
Type Apco Vista M
Test type GS Testflug DHV03
Order Auftrag GS Musterprüfung Apco Vista M (Apco Aviation Ltd.)
Customer Apco Aviation Ltd.
Test standard Lufttüchtigkeitsforderungen für HG und GS
Expert Küng
Result positive
Billing to: 100%
Technical peculiarities

18. Dez. 06
i.A. [signature]

Deutscher Hängegleiterverband e.V
Miesbacher Straße 2, 83703 Gmund

Datum / Unterschrift (Küng)

DHV test flight main data

Harness type Liga
Take off weight [kg] 105
Weight limit for certification [kg] 105
Number of pilots 1
Trim speed [km/h] 37
Accelerated speed [km/h] 0
Classification 1-2

Supplementary remarks

PG test flight specific

Harness category GH
Accelerator used? Yes
Trimms -

DHV PG Test flight 2003 data

Take off

Take off class. 1-2
Inflation evenly, immediately
Rising behaviour comes over pilot delayed
Take off speed slight
Take off handling easy

Straight flight

Straight flight class. 1-2
Speed range high
Roll damping average
Pitch damping average
Yaw stability average

Turn handling

Turn handling class. 1-2
Spin tendency slight
Control travel average
Agility average
Control pressure increase average
Control without brakes control through rear risers possible

10343

Symmetric stall

Deep-stall limit 1-2
Deep-stall limit average 60 cm - 75 cm
Full stall limit average 65 cm - 80 cm
Full stall with full steering way yes, soft stall
Falling back slight
Increase in steering power average

Front collapse

Front collapse class. 1-2
Effort high
Pre-acceleration slight
Opening behaviour spontaneous, delayed

Front collapse (accelerated)

Front collapse accelerated class. 1-2
Effort high
Pre-acceleration slight
Opening behaviour spontaneous, delayed

Asymmetric collapse

Asymmetric collapse class. 1-2
Turn tendency 90 - 180 degrees
Change of course 180 - 360 degrees
Rate of turn average

Max. roll/pitch angle less than 45 degrees
Loss of altitude average
Stabilization spontaneous
Opening behaviour spontaneous

Asymmetric collapse (accelerated)

Asymmetric collapse acc. class. 1-2
Turn tendency 90 - 180 degrees
Change of course 180 - 360 degrees
Rate of turn average
with deceleration
Max. roll/pitch angle less than 45 degrees
Loss of altitude average
Stabilization spontaneous
Opening behaviour spontaneous

Countersteering an asymmetric collapse

Countersteering an asymmetric collapse class. 1-2
Stabilization countersteering easy
Control travel average
Control pressure increase average
Turn in opposite direction easy, no tendency to stall
Opening behaviour spontaneous, delayed

Full stall, symm. exit

Fullstall, symm. exit class 1-2
Behaviour stable

Reaction average shoot forward
no collapse
Turn tendency no turn
Rate of turn

Loss of altitude
Stabilization

Loss of altitude
Stabilization
Opening behaviour

Spin out of straight flight

Spin out of straight flight class. 1-2
Rate of turn average
Exit turn continues through 90 - 180 degrees
Reaction average shoot forward to one side
no collapse
Turn tendency no turn
Rate of turn

Loss of altitude
Stabilization
Opening behaviour

Spin out of turn

Spin out of turn class. 1-2
Reaction average shoot forward to one side
no collapse
Turn tendency no turn
Rate of turn
Loss of altitude
Stabilization
Opening behaviour

Spiral dive

Spiral dive class. 1-2
Entry easy
Spin tendency slight
Exit turn continues through 180 - 360 degrees
Sink rate after 720 °[m/s] 12

B-line stall

B-line stall class. 1
Entry easy
Exit spontaneous

Big ears

Big ears 1
Entry easy
Recovery spontaneous, quickly

Big ears accelerated

Big ears acc. class. 1
Entry easy
Recovery spontaneous, quickly

Landing

Landing class. 1-2
Point of flare average
Landing speed average
Landing behaviour average

25 VISTA LARGE CERTIFICATION

TEST REPORT DHV 03 APCO VISTA L	
Type	Apco Vista L
Certificate-No	DHV GS-01-1693-07
Holder of certificate	Apco Aviation Ltd.
Manufacturer	Apco Aviation Ltd.
Classification	1-2 GH
Winch tow	Yes
Number of seats min / Number of seats max	1 / 1
Accelerator?	Yes
Trimmers?	No

	BEHAVIOUR AT MIN WEIGHT IN FLIGHT(100 KG)	BEHAVIOUR AT MAX WEIGHT IN FLIGHT(125 KG)
Take off	**1-2**	**1-2**
Inflation	evenly, immediately	evenly, immediately
Rising behaviour	comes over pilot delayed	comes over pilot delayed
Take off speed	average	average
Take off handling	average	average
Straight flight	**1-2**	**1-2**
Roll damping	average	average
Turn handling	**1-2**	**1-2**
Spin tendency	slight	slight
Control travel	average	average
Agility	average	average
Symmetric stall	**1-2**	**1-2**
Deep-stall limit	average 60 cm - 75 cm	average 60 cm - 75 cm
Full stall limit	average 65 cm - 80 cm	average 65 cm - 80 cm
Increase in steering power	average	average
Front collapse	**1-2**	**1-2**
Pre-acceleration	slight	slight
Opening behaviour	spontaneous, delayed	spontaneous, delayed
Asymmetric collapse	**1-2**	**1-2**
Turn tendency	90 - 180 degrees	90 - 180 degrees

Change of course	180 - 360 degrees	180 - 360 degrees
Rate of turn	average	average
	with deceleration	with deceleration
Max. roll / pitch angle	less than 45 degrees	less than 45 degrees
Loss of altitude	average	average
Stabilization	spontaneous	spontaneous
Opening behaviour	spontaneous	spontaneous
Countersteering an asymmetric collapse	**1-2**	**1-2**
Stabilization	countersteering easy	countersteering easy
Control travel	average	average
Control pressure increase	average	average
Turn in opposite direction	easy, no tendency to stall	easy, no tendency to stall
Opening behaviour	spontaneous, delayed	spontaneous, delayed
Full stall, symm. exit	**1-2**	**1-2**
Spin out of straight flight	**1-2**	**1-2**
Spin out of turn	**1-2**	**1-2**
Spiral dive	**1-2**	**1-2**
Entry	average	average
Spin tendency	slight	slight
Exit	turn continues through 180 - 360 degrees	turn continues through 180 - 360 degrees
Sink rate after 720 °[m/s]	11	11
B-line stall	**1-2**	**1-2**
Entry	easy	easy
Exit	spontaneous	spontaneous
Big ears	**1-2**	**1-2**
Entry	easy	easy
Recovery	spontaneous, quickly	spontaneous, quickly
Landing	**1-2**	**1-2**
Landing behaviour	average	average
Front collapse	**1-2**	**1-2**

(accelerated)		
Pre-acceleration	slight	slight
Opening behaviour	spontaneous, delayed	spontaneous, delayed
Asymmetric collapse (accelerated)	**1-2**	**1-2**
Turn tendency	90 - 180 degrees	90 - 180 degrees
Change of course	180 - 360 degrees	180 - 360 degrees
Rate of turn	average	average
	with deceleration	with deceleration
Max. roll / pitch angle	less than 45 degrees	less than 45 degrees
Loss of altitude	average	average
Stabilization	spontaneous	spontaneous
Opening behaviour	spontaneous	spontaneous
Big ears accelerated	**1-2**	**1-2**
Entry	easy	easy
Recovery	spontaneous, quickly	spontaneous, quickly
Supplementary remarks		

APCO wishes you many hours of enjoyable flying.

Take Air!