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Mirage Owner's Manual



Please read this manual prior to your first flight with the Mirage.

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Thank you...

Thank you for choosing the Mirage. We are confident that this paramotor glider will provide you with countless happy experiences as you progress in your flying career. This manual contains all the information you need to fly and maintain your paramotor glider. A thorough knowledge of your equipment will keep you safe and enable you to maximize your full potential.

Please pass on this manual to the new owner if you ever resell your paramotor glider.

Happy Flights and Safe Landings,

The GIN Team

Safety Notice

By the purchase of our equipment, you are responsible for being a certified paramotor glider pilot and you accept all risks inherent with motor paragliding activities including injury and death. Improper use or misuse of GIN equipment greatly increases these risks. Neither Gin Gliders Inc nor the seller of GIN equipment shall be held liable for personal or third party injuries or damages under any circumstances. If any aspect of the use of our equipment remains unclear, please contact your local paramotor instructor, GIN reseller or the importer in your country.

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1. Gin Gliders

Gin Gliders was formed in 1998 by paraglider designer and competition pilot Gin Seok Song and his team of engineers and test pilots.

Gin's philosophy is simple: to design gliders that he, and any other pilot, loves to fly. This philosophy applies equally for an entry-level wing such as the Bolero, as for the world-beating competition glider, the Boomerang. No glider is released to the market without Gin's complete satisfaction.

Gin has been designing and manufacturing paragliders since 1986, and is backed by an equally experienced team, both within the company in Korea and throughout a worldwide network of distributors and dealers. The "GIN Team" has dominated the Paragliding World Cup every year since 1998, and has had countless other competition successes in World Cups, World and National Championships. This high level of expertise provided by dedicated professionals ensures that you get the best possible product support and after sales service.



2. Introducing the Mirage

The Mirage is a new concept in an intermediate-level powered paraglider. The designers, Gin Seok Song and Mike Campbell-Jones, have drawn on all their years of experience to produce a glider that is uniquely in tune with the needs of today's pilots. The Mirage offers outstanding security, with precise handling. This allows the pilot to accurately feel the sensations of flight, and thus develop an active flying style. Rapid progression up the learning curve is enabled, as the pilot becomes well acquainted with the myriad of different movements and moods of the air. The Mirage will allow you to experience the full pleasure of paramotoring and free flight, without ever compromising your safety.

For Pilots Who...

The Mirage is an ideal intermediate glider, and is also suitable for the more experienced club pilot who flies infrequently and wants a good performing glider with the highest safety margin. The Mirage is designed for all kinds of flying, from the first steps at the powered paragliding school to the long cross country flight.

Cutting-edge Design

Gin and Mike have made extensive improvements in the Mirage compared to other reflex profile wings in the current market. Performance, take-off and handling characteristics have been improved without sacrificing security.

The new shape of the wing tip improves the performance in flight by reducing the induced drag.

A double reinforcement at the leading edge has been introduced. This improves take-off characteristics, performance and increases the lifetime of the canopy.

The brake line layout features an extra upper line that gives the wing an even more precise feel.

Although your Mirage wing has been designed to fly like a conventional paraglider, the reflex wing section means that it has an elevator built into its shape. The wing no longer completely depends on payload as its only source of stability. It maintains its own attitude in pitch, rising and falling through thermals and turbulence, whilst remaining stable above the pilot's head, requiring minimal control input.

The trimmer system allows you to raise the rear of the airfoil, effectively reducing the chord and surface area by some 30%, giving the wing a higher wing loading and increased speed without changing the angle of attack. The centre of pressure also moves forward adding further to the pitch stability. This redistribution of loading gives the wing exceptional tuck-resistance and increases the working aspect ratio; the result is a faster, more efficient wing under power and at speed, much like a traditional powered aircraft.

When requiring more lift at lower speeds, the rear section can be trimmed down to restore a fully flapped airfoil, the Mirage changes its characteristics, becoming closer to a conventional paraglider with smooth sporty handling, short slow take offs and steep climb outs.

Construction

Your Mirage's strength and durability have been achieved through careful choice of modern

materials and innovative design.

All materials from which it is constructed are batched and every stage in its manufacture can be traced to a named operator and quality control checker.

The top and bottom surfaces are made from the hardwearing Porscher-Marine NCV, 45 and 40gm respectively. The wing tips, leading and trailing edges are reinforced using a mix of load tape and Mylar.

All lines are made of Technora, the latest in line technology, and incorporate the best qualities. The lines are both strong and flexible whilst remaining temperature stable, and less prone to shrinkages when lightly loaded.

The lines are split into 3 categories, tertiary, secondary and primary.

Line diameters are 1.1, 1.3, 1.4, 1.6, 1.8 & 2.3 mm respectively.

The larger diameters being the primary lines, the mallions to which the lines are attached to the risers, are made of polished stainless steel, which avoids corrosion and gives excellent strength and durability. The riser material is 1.2K / 20mm polyester webbing. The main attachment points are reinforced with Cordura, to protect against wear from the karabiners. The Mirage has been built with paramotoring in mind and when new, has a safety factor of some 50% over and above its tested loading. It has been engineered to perform to its specifications for about 400 hours.

Manufacturing

All GIN gliders are produced in the company's own facilities using the most modern techniques.

The highly skilled staff take extreme care during the entire manufacturing process. Stringent quality control is made after each step, and all materials that go into each wing can be traced.

These measures guarantee that pilots fly with the assurance that their wing meets the most exacting manufacturing and safety standards.

3. Before you fly

Pre-delivery Inspection

The Mirage is delivered with speed system, rucksack (reversible with fast packing bag), inner bag, compression strap, repair tape and this manual. Your instructor or dealer should have made a test inflation followed by a test flight before delivery.

Speed System

The speed system increases the maximum speed by lowering the angle of attack with a pulley-guided, foot-operated system. Approx. 30% gain in speed can be realized with the accelerator at full travel.

It is important to have your accelerator system correctly routed through your harness and attached to the risers with the supplied Brummel hooks. The length of the speed bar system should be initially adjusted while on the ground, sitting in the harness so that the legs are fully extended at the point of full accelerator travel. It is helpful to have an assistant hold the risers taut while making this adjustment. Subsequent fine-tuning can be done on the ground following the first flight with the speed system. If in doubt about this procedure, consult your instructor or dealer.

Riser	A	B	C	D
length at trim speed	51cm	51cm	51cm	51cm
length at full speed	35cm	43cm	58cm	65cm

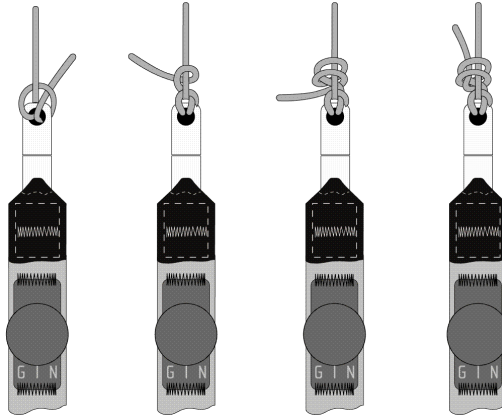
Brake line adjustment

The main brake line lengths of the Mirage correspond to the tested results of EN. These line lengths have been fine tuned by GIN test pilots, and it should not be necessary to adjust them. We recommend that brakes are not set too short otherwise full Reflex effect may be lost.

During flight, it is common to fly with half a wrap on the brakes. However, care should be taken to release the wraps in any extreme situation.

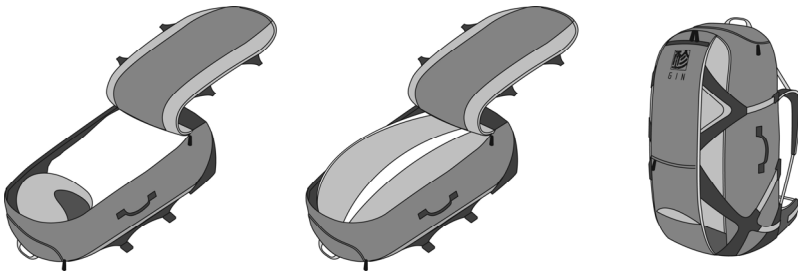
With an ordinary harness or your motor unit on your back, ground-handle the wing above your head. When the wing is nicely level, check that when the brakes are up against the brake pulleys that the trailing edge of the wing is not being pulled down. Then as you gently pull the brake you should have only a few centimetres of movement before the brakes start to pull down on the trailing edge of the wing. Make sure it is the same length on both sides. It is safer to have this adjustment too long than too short.

We recommend a double sheepshank or a bowline knot for the brake handle attachment as shown in the diagram.



Rucksack

All Gin gliders are delivered with a durable ripstop KODURA® rucksack, designed for ergonomic carrying comfort and ease of use.



Certified Weight Range

The Mirage must be flown within the certified weight range given in the reference section at the back of this manual. The weight range is quoted as the total weight in flight, i.e. the weight of the pilot, motor, glider, harness and accessories. The easiest way to check your total weight is to stand on weighing scales with all your equipment packed into your rucksack.

Pre-flight safety

To fly this equipment you should:

- Have appropriate practical and theoretical training and experience for this class of glider.
- Have the necessary insurance and licences.
- Be in your right mind, unaffected by extreme stress, recreational or prescribed drugs.
- Only fly in conditions suitable for your level of proficiency.
- Wear suitable head protection; use a certified harness and emergency parachute.
- Make a thorough pre-flight check.

4. Flying the Mirage

We recommend that you first practice inflating your glider on a small training hill, or flat ground before connecting to your motor. Make your first flights with your new paramotor glider in gentle conditions and from a familiar take off area.

The following is best carried out by an instructor or at the very least an experienced motor pilot. Before flying your Mirage with a motor unit, we recommend that you do a static hang test. This is done by hanging your motor unit from an appropriate structure from the wing attachment points by using a strong rope or strap, then by sitting in the harness, get an assistant to measure up the risers from the hang points up. The aim is to make sure that you, the pilot, are able to reach the brakes whilst in flight. Allowances should also be made for the wind blowing the toggles out of reach. The Mirage's risers are shorter than most conventional paragliders, which reduces the potential problem.

Preparation for launch

Following a consistent method of preparation and pre-flight checks is vital for safe flying. We recommend the following:

On arrival at the flying site, assess the suitability of the conditions: wind speed and direction, airspace, turbulence.

Inspect your glider, harness, reserve handle and pin, helmet and any other equipment.

Choose a sufficiently large take-off area with even ground and no obstacles.

Lay the glider out according to the plan form, and get the lines and risers sorted out.

Secure yourself in your harness and don't forget the leg loops! Put your helmet on.

Connect the risers to your motor karabiners, ensuring there are no twists or loops around the lines.

Connect the speed system to the risers with the Brummel hooks.

Do a final line check by pulling gently on the risers or lines to ensure there are no new knots, tangles or interfering branches or rocks. Take extra care in nil or light winds.

Pre-flight check list

Engine delivering full power?

Reserve parachute: pin in and handle secure.

Helmet and harness buckles closed.

Trim set?

Nothing likely to foul the prop?

Speed bar system running freely and out of harm's way?

Lines free. (Steering toggles and brake lines free and not twisted?)

Canopy open and into wind.

Airspace clear.

Flying with and without a motor

Although the design philosophy of the Mirage is that of a high-speed paramotor wing, which performs well as a free flying glider and may be flown as such with no adjustment. Slower trim

settings reduce internal air pressure and consequently give a lighter feel to the brakes and a better sink rate.

The main difference in the Mirage compared with other paragliders is the increased resistance to tucking, both on launch and in flight; its greater speed range and stability means that generally, it can be flown in stronger conditions safely. Basically the glider becomes more stable the faster you fly.

First flights

We recommend that, to give yourself the chance to get used to it, your first flights should be made with the trim setting set just below the neutral range, where, the Mirage will feel more familiar, like a conventional wing. With this trim setting, try flying with a small amount of brake - at the point where they just begin to feel heavier. In practice, this point will be encountered at about the one quarter-brake position.

When you have become fully confident in your wing, try experimenting with slower and faster trim-settings, weight-shift and speed bar and enjoy the extra speed and security the Mirage gives you (See the diagrams on page 21 for details).

Note- To ensure that the trim system grips efficiently, simply lift the webbing adjustment loop in the opposite direction after each adjustment, (this helps the webbing material over the teeth of the cam buckle).

Double-checking brake line lengths

Again it is better to seek the advice and assistance of a local instructor or experienced pilot. Choose a day when there is a steady breeze of about 10km/h. Then with an ordinary harness or your motor unit on your back, visually check lengths.

Launch

Forward launch

We recommend that when the wing is laid out, that all the lines are at full length with little or no slack between wing and pilot.

Then pull the brake lines in, to ensure that the middle inflates first. The Mirage is easily inflated by using "A" riser's only. When launching simply move forward from this position pulling on the "A" risers, whilst keeping the pressure balanced between each side (meaning the tension on the "A" risers). The glider shows little or no tendency to dive overhead, so frontal collapses which so often lead to failed launches, are rare. Instead the glider almost waits for you to catch up with it.

Note: - Too forceful a pull on the "A's" may crumple the leading edge and hinder the launch. Indeed in certain trim positions the Mirage requires no pull at all, just accelerating forward movement only.

Reverse launch

Yet again, the glider is very easy to launch because it does not over-shoot, so the pilot has little or no need to hold the wing back before making the turn. Reverse launches on this wing can be carried out in as little as 5 Kph.

In Flight

In flight the greater speed range of the Mirage may require some management. But once you have mastered how to use the speed to your advantage it becomes pure fun. Its tight handling allows you to make the best use of thermal cores, and its glide at speed means less time is spent in sinking air masses before reaching the next thermal. Limits have been provided to the range of the trim settings to avoid the danger of stalling when flying with the trim pulled right down and with maximum brake. With the trim fully released, the wing takes on more solid characteristics, carving through the air with even more pitch stability. The brake pressures increase and so does the range of movement prior to the stall point. Turns and rate of roll are linked in a linear fashion to the progressive feel of the brakes.

Use of the speed bar

The bar increases the speed by approximately 30%. Unlike most wings there is little or no loss of stability; in fact the wing seems to cut through turbulence even better than before application. However, if any instability is encountered due to excessive conditions it is recommended to release the bar for recovery and to return to normal flying mode. The brake pressures also increase when the bar is used, so it is more for use during straight and level flight.

As you become more experienced, careful release of the bar whilst entering turns gives an effect, similar to pulling the stick back in a conventional aircraft.

Although the speed bar can be used with confidence throughout the whole range of the trim settings, it is obviously most effective when used with the trims off i.e. on the fast setting.

Landing

The Mirage has a reasonable glide so good planning is required on approaches. The brakes, light at first, become progressively heavier over a healthy amount of travel, giving plenty of warning of a stall. With trims on slow the wing lands like any normal paraglider, plenty of air speed on approach, progressive flare, converting speed into lift, until the moment of touchdown. When landing with the fast trim on, the process of bleeding off the extra speed to land can take longer and require more space. In this mode there is a lot of stored energy, so you may find yourself climbing out again if you aren't careful with the controls. Having said that, the brakes are very powerful. The last bit of brake travel really shuts the wing down and slows you up. It does not take long to develop the confidence to fly in stronger winds than normal, but great care must be taken when flying fast near the ground. The Mirage stores energy well, so whilst it is possible to bleed off your speed without losing height before touchdown, respect must be shown for the higher speeds possible, especially in slope landings. On landing in high winds the glider may be collapsed with confidence using a strong pull on the rear or B risers.

Flying under Power

NOTE: Thorough pre-flight checks of the glider, harness and engine are essential prior to any launch. For powered flight, many of the flying characteristics are the same as in the previous section; however, there is a certain amount of additional information, particularly where the addition of the thrust of the power unit and correct matching of the wing to the motor unit is

concerned. Gin Gliders cannot be held responsible for the multitude of combinations that may be used, however if you wish to contact us we can offer some advice.

Forward Launching in Nil Wind

While there may appear to be no wind this is rarely the case and it is essential for aircraft of this type to take off and make the initial climb out to a safe height (depending on the surrounding terrain) into wind. This makes maximum use of the wind and avoids the danger of losing airspeed when climbing out steeply through wind gradient. Particular attention must be paid to trees, power lines and other large obstacles and any rotor that they may generate.

Preparing the wing:

Lay the glider out, downwind of the motor, so that the lines are fully extended and as if attracted to the motor or central focal point, and then lay the risers down ready to clip in. Set the trimmers to the take off position (Faster settings may be desirable in stronger conditions, see the diagrams in the page 21, 22). Make sure that when warming up the engine you do so upwind of the wing and then stop it whilst clipping in.

Attach the glider; proceed with the launch (as in section Launching).

From now on you should try to control the glider whilst facing forwards. If the wing is low behind you and you turn around the lines will trail over the propeller. However, falling backwards onto the motor is both dangerous and expensive and must be avoided at all costs, even that of a few damaged lines!

During the launch, if the pressures on each of your hands feels even, open the throttle to full take off power, leaning backwards against the thrust so that the engine is pushing you along the ground rather than into it.

It is best to try and leave the brakes alone and just let the canopy come up. If it starts to go off to one side, increase the pressure on the riser on the lower side, whilst moving sideways towards it and the centre of the wing. Where possible maintain the direction of your launch.

If the wing starts to drop backwards, increase to pressure on both "A" risers to help it up, as you increase power, try to keep a constant angle with the motor and maintain smooth power control. Any sudden changes will alter your course because of the powerful gyroscopic and torque effects.

If the canopy is so far off to the side or behind that it cannot be recovered, kill the engine, abort the take-off and reassess the launch conditions.

As the canopy comes up, the drag reduces and it should stabilize over your head without overshooting you. This is a good time to check that your wing is nicely inflated and that there are no tangles or lines fouled, but this must be done whilst on the move and without turning. When you feel the resistance reduce, allow your run to accelerate. Feel for pressure on the brakes, coming down on them as required to steer or to increase lift for taking off.

Points to note:

* If your propeller protection cage is flimsy enough, the pressure of the lines on it during launch may distort it to the point where it fouls the prop. If this is the case make sure the lines have cleared the cage before you open the throttle.

* All control inputs should be smooth and progressive.

- * Don't attempt to take off if the canopy isn't roughly level overhead. Dangerous oscillations may result if you apply full power with it too far off to one side.
- * Keep your undercarriage down until you are definitely flying!
- * The faster the trim setting, the more brake the glider will need to get off the ground.

Reverse Launching in Stronger Winds

Because the Mirage launches so easily it is possible to perform a reverse launch with both front risers and one brake in one hand and the throttle and opposite brake in the other. If the wind is appreciable this is the easiest method of launching, but if the wind is light the difficulty of running backwards safely with a motor on makes a forward launch preferable.

Having started and warmed up your motor upwind of the canopy, attach yourself to the power unit, face the canopy, approach the risers and clip them on to the appropriate mallions. Build a wall first using front and rear risers simultaneously. We recommend that you momentarily raise the glider off the ground to check for tangles and line snags.

Holding risers, brakes and throttle control as outlined above, pull the front risers up to lift the glider over your head. It is unlikely to over-fly you, especially if it is trimmed to fly fast. This may be contrary to what your paragliding intuition tells you, but on the fast setting (trim fully off) the Mirage's reflex wing section stabilizes the wing and prevents it from pitching forward.

It may even sit back a little but applying a small amount of brake makes it pop forward.

When the glider is steady above you turn round, apply power and take off.

As with forward launching, the trim/power/brake relationship must be established for the best rate of climb and forward speed.

Points to Note:

*This is a cross-hands reverse launch. You must master this technique before attempting it under power.

Your local Paragliding School will assist you here.

* All control inputs should be smooth and progressive.

* Don't attempt to take off if the canopy isn't roughly level overhead.

Dangerous oscillations may result if you apply full power with it off to one side.

* Keep your undercarriage down until you are definitely flying!

* The faster the trim setting, the more brake the glider will need to get off the ground.

Speed systems may cause problems when clipping in. Don't get your lines crossed!

The Climb Out

Once off the ground and flying safely, continue into wind using the brakes to achieve the desired climb rate. Don't attempt to climb at too steep an angle. Attempting to use too much brake to force a higher climb rate will only degrade the climb by creating extra drag and with the addition of lots of thrust could result in a stall or a spin.

Under power the Mirage behaves more like a powered fixed wing airplane than a paraglider, and it helps to think of it as such.

Provided there are no obstacles in your path, it is often safer, and quite spectacular, to fly level with the ground after take-off gaining more speed before converting it into considerable height

using the brakes and then easing off into the climb out.

The other reasons for not climbing out too steeply are the risks involved when having engine failure, i.e. a stall and diving recovery.

Although the Mirage will not sit back behind you the way that some gliders may, a slow forward speed and high angle of attack is still likely to put you into a near stalled attitude if your power source suddenly goes on strike. In this situation you should always be able to set up a reasonable approach, so don't make things hard for yourself - fly with sufficient airspeed at all times, and keep your angle of attack under control at low altitude.

Depending on the geometry of the set-up of your power unit, the propeller's torque effect may make itself felt as you leave the ground. Expect it to turn you and, if necessary, steer against it in order to maintain your direction. However, when countering the torque effect during a steep climb on slower trim settings under a lot of power, care must be taken to avoid the risk of stalling.

Because of the large vertical distance between the thrust line of the prop and the wing common to all paramotors, the extent of the power management required is critically dependent on your set up and flying ability.

Power induced Oscillations

Certain combinations of weight, power, and propeller size can cause oscillation where the torque and gyro effects lift the pilot to one side; you then drop back only to swing up again. To counter this you can:

- * Alter the throttle setting. And /or
- * Adjust the torque strap if fitted. And/or
- * Shift your weight in the harness. And/or
- * Adjust the trimmers to dampen it out.

Weight shift is the best counter. Oscillation usually occurs on high power settings - more power and a larger propeller cause more oscillation. It could be that your control inputs are amplifying the oscillation. In this case, throttling back a little and flying hands-off should take care of the problem.

Having said all this, it is quite common for inexperienced pilots to be too busy on the controls, this is referred to as pilot induced oscillation, and the simple answer is stop moving your hands

Level Flight

On reaching a safe height after takeoff, and if you wish to go cruising, turn on to your chosen heading, reach up and release the trimmers if on a slow setting and if you like, and you have sufficient height, let go of the brakes completely. If conditions are very rough you may wish to keep hold of them, however the Mirage is even more stable at higher speeds, so we suggest you let go and enjoy the flight.

Note –All paramotors should have adequate netting to prevent toggles entering propellers whilst in flight – check yours!

If you have one, keep an eye on your alti/vario. In level flight - it is easy to creep into a climb without noticing. Use the information from your instruments to optimize your forward speed and reduce drag and fuel consumption. This will all be specific to your own set up. With its

hands-off flight capability, the Mirage is good at letting you do this.

With a sound understanding of the current wind conditions at different altitudes and intelligent use of any thermal activity, wave, convergence, ridge or frontal lift it is possible to conserve your fuel and greatly extend your operating range. The engine of course makes it easy to put you in the right place at the right time to exploit the conditions. Don't be afraid to throw the Mirage into a tight thermal to gain height and save fuel - you will find it is particularly good at coring thermals. Using slower trim settings will allow you to climb faster in thermals.

Using the Trimmers and Speed Bar

The Mirage's reflex wing section is unique in this way, it basically has a huge range of trims and speed bar waiting for you to explore. We only ask that you explore the full flight envelope at a safe height and with adequate training and experience.

Remarkably, the Mirage has a huge and relatively safe speed range compared with most aircraft. With the trimmers fully off the wing's speed and stability increases and hence its ability to cut through turbulence and go places improves.

On faster trim or speed bar settings, brake pressures generally increase and weight-shift or a wing tip stabilizer becomes more effective. On the slower settings, sink rate improves and handling becomes lighter enabling you to make best use of thermal cores, whilst giving you an improved climb rate and shorter slower take-offs and landings. For correct usage, first study the diagrams on page 21, 22, showing trim and speed bar movement as well as speed bar hook-ups. The diagrams also show you the effect on the wing shape relative to the different settings.

At all speed settings the differential application of both brakes while banking allows you to make very effective turns by increasing the lift to assist the turn when the lift axis is canted over in the bank. Likewise engine thrust and speed bar can be applied at certain times to increase turn rate etc. These techniques come with more experience allowing you to get the most from your wing you to achieve fully coordinated, smooth turns, much like those possible on a three axis aircraft.

Point to Note:-

* Remember, the trimmers and speed bar controls are extra items for your pre-flight checks!

Landing

There generally seems to be two philosophies about landing a paramotor - either with or without power.

Power-off Landings

Cut all power at about 50m and glide in like a paraglider.

This minimizes the risk of propeller damage but you only get one go at it - you have to get it right!

With or without power the Mirage rides out turbulence much better on a fast trim setting, so if it is rough come in fast, allow yourself plenty of room (like a hang glider) and bleed off speed before you touch down. The Mirage stores energy quite well and it may be necessary to round out and 'float' level with the ground, converting your excess speed into lift while you slow down, before flaring to touchdown.

If you aim at a precision or tight landing, or in nil-wind conditions, it is advisable to use half or

even full trim (maximum lift configuration).

This will hardly alter your glide angle but will decrease your sink rate; these decisions become more critical at higher wing loadings.

Power-on Landings

At a steady tick over, lose height at a shallow angle, then as you near the ground level out and bleed off speed before flaring to touch down. Kill the motor as your feet touch the ground. The advantage of this method of course is that if you get it wrong you can power up and go round again at any time. The disadvantages are; the increased risk of (expensive) prop damage if you get it wrong and the dangers involved in falling over with the engine running and getting your lines in the propeller if you forget to switch off before the wing deflates.

Points to note:

- * If possible, know all about your landing area before you take off.
- * Check the wind direction before you set up your approach.
- * Power-off landings probably need less space.
- * If in doubt, practice your approach until you are sure you can land safely.

Advanced manoeuvres

The Mirage has achieved an EN rating for the manoeuvres prescribed by the test authorities. However it is essential that pilots take proper training before attempting certain aerobatics.

We also suggest that you seek advice from instructors or experienced pilots before conducting ANY of these manoeuvres or go flying in extreme conditions, and that you carry a reserve parachute.

During take-off

ALWAYS ensure that your wing is definitely flying with enough air speed, before opening the throttle or pulling on any brakes during any launch. If it does happen that you have managed to leave the ground but are not fully flying, DO NOT add more power and more brakes but smoothly come off them, If the wing does not accelerate, just land. Re-assess the conditions as it may well be you are trying to climb out through a wind gradient.

Remember: - Stalling is common to all aircraft that take off with insufficient air speed and then try to climb. The thrust line on a paramotor is well below the wing, so adding power adds to the problem.

Line knots or tangles

If you do take off with a line knot or tangle, try to get clear of the ground and any traffic before taking corrective action. Weight shift and/or counter brake to the opposite side and pump the knotted side with your brake. Be careful not to fly too slowly to avoid a stall or spin. If the knot or tangle is too tight to pump out, immediately land safely.

Active Flying

The Mirage has a high internal pressure, resistance to tucking and a very high degree of passive safety. However, it is recommended that at this stage you already start practising an active flying style. This will help you avoid deflations in all but the most turbulent conditions. The key

to active piloting is keeping the glider above your head at all times. If it falls back behind you, let up the brakes. If it surges in front of you, counter brake until the surge is controlled. If you sense a loss of pressure on one side of the canopy, smoothly apply brake and/or weight shift on the appropriate side until you feel pressure return. In all cases, maintain adequate airspeed and avoid overreaction.

In turbulence

Deflations of the canopy can occur in strong turbulence. The Mirage will recover without pilot input in almost all situations, so whenever in doubt, let up the brakes and let the glider fly. However, it is recommended that you follow the advice below in order to help the wing recover more rapidly.

Asymmetric deflation

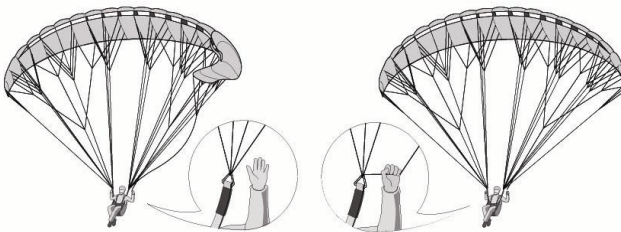
In the event of encountering strong turbulence and suffering an asymmetric deflation (collapse on one side), the Mirage will promptly and easily re-inflate without interference from the pilot, but the course might alter slightly. This might be unwanted close to the ground or other gliders. Maintain your course by weight shifting away from the collapsed side. This action can be aided by applying a little force on the brake opposite to the deflation. This will normally be sufficient. However, if the deflation fails to come out, pump the deflated side with a firm and smooth pumping motion. Let the glider regain its flying speed after it has re-inflated.

Symmetric deflation

A symmetric (frontal) deflation will come out promptly without pilot input. The glider will regain airspeed with a small surge. If counter braking, be careful not to over-correct.

Cravat / glider wrapped around lines

A cravat occurs after a severe deflation when the wingtip becomes trapped in the glider lines. It is extremely unlikely to occur on the Mirage. Nevertheless, the pilot should be familiar with the procedure for correcting it. Counter brake and/or weight shift and pump the brake on the tangled side. On all Gin gliders, there is a separate stabilizer/winglet main line that goes down to the B riser. This line usually comes slack in the event of a cravat. Pull it down completely until it comes tight and the cravat normally comes out.



Cascade of events

Many reserve deployments are a result of a cascade of over-corrections by the pilot. Please note that over-corrections are often worse than no input at all.

Flat spin

In normal thermalling flight, you are very far from the limits of a flat spin. Nevertheless, should this occur, just let up the brakes and wait for the glider to surge forward.

Full stall, dynamic stall

This is an extreme manoeuvre and there should never be any need to perform one.

Do not take wraps with your brakes before entering a full stall. Keep your hands close to your body during the stall, and lock them under your harness seat plate if necessary. In a stable full stall, the canopy will oscillate back and forth. Before releasing the stall, raise your hands slightly and evenly to fill the glider with air. If possible, let the brakes up when the glider is in front of you to avoid excessive surge. The Mirage will slow down the surge on its own, but you may counter brake the dive briefly for comfort if needed and then let up the brakes to regain airspeed. Be careful not to stall the glider again when damping the surge.

Never attempt a stall and then change your mind and release the brakes, as the glider will surge radically.

Deep stall (parachuting, stable stall)

The Mirage does not have a tendency to get into nor stay in a deep stall. Should this nevertheless occur, put your hands on the A risers and push forward to gain speed. On some modern harness/accelerator setups, you can reach the speed bar without using your hands. If so, push the speed bar. Never try to steer out of a deep stall.

You can recognise a deep stall by the glider getting "mushy" and the airflow around your ears decreasing. This situation is usually achieved by flying in turbulence or exiting a deflation with too much brakes applied.

Losing altitude

Extremely strong and widespread lift is found, for example, in storm conditions. The best place to be in this situation is on the ground. Nevertheless, if you've been caught out by the weather and find yourself needing to descend rapidly, there are several ways to do so. The best way is, of course, to find sink. Failing that, try one of the techniques below. They are presented in order, from the least to the most extreme. Most of these techniques place undue stress on your glider, and should be avoided if you wish to extend its lifetime. **We recommend you initially practice these manoeuvres under qualified supervision during a safety-training course.**

Big ears

This method is a good safe way of descending; however care should be taken when pulling down the outer A lines, not to pull them too far, the Mirage has a lot of load on the "A's" especially on the faster trim settings. A spiral may be a more efficient way to get down.

Note; we do not recommend using big-ears with power, There is a risk of stable stall and it defeats the object.

Although the noise of the wind around your ears may indicate the airspeed improves, the airspeed does not improve with big ears. You may use the speed bar in combination with big ears to maintain your forward speed but increase the sink.

The glider can be steered while in big ears using weight shift alone.

When releasing the lines, the Mirage's ears will come out on their own. Release the big ears at least 100m above the ground. If this is not possible, keep the big ears in until you flare for landing rather than letting them out on the approach. This is a safer method because of a possible wind gradient close to the ground and your low airspeed/high wing loading with big ears in.

Spiral dive

The spiral dive should be considered an extreme manoeuvre. Practice spiralling with caution and lesser sink rates to get a feel for the Mirage's behaviour. Weight shift and pull the brake on one side gradually. Let it accelerate for two turns and you will enter the spiral dive. Once in the spiral, you can control your descent rate and bank angle with weight shift and the outer brake.

WARNING! A pilot who is dehydrated and/or not accustomed to spiralling can lose consciousness in a steep spiral dive! As with all types of aircraft, we advise you to assist the glider to exit from the spiral dive in a controlled manner. Let the glider decelerate for one or two turns by applying outer brake and/or weight shift.

B-stall

To quickly lose altitude without straining your body with G-force you can use the B-stall. Reach up to the B-risers just below the maillons and twist your hands while gently pulling. It will be difficult at first, but become lighter the more you break the aerofoil. Once pulled, do not release immediately. The glider needs to settle into a stable B-stall before releasing. On exiting the B-stall the Mirage has a very gentle dive without deep stall tendencies. We advise you to release the B-stall symmetrically with both hands in a decided manner.

Steering without brakes

If a brake is not operational for some reason, you can steer the Mirage with the D-risers. Add steering input by weight-shifting in your harness. Be careful not to steer too much with the riser to avoid any possibility of a spin.

Aerobatics

The Mirage is not designed for aerobatics. Besides the inherent risks, extreme manoeuvres of any kind place unnecessary stress on the glider and effectively shorten its lifespan.

All of the previously mentioned manoeuvres, and recoveries from them, are taught on SIV courses.

Contact a local instructor or paragliding club for more Information about SIV.

Tow launch

The Mirage is suitable for towing by pilots who have the relevant towing qualification. The Mirage has no tendencies towards deep stall/parachuting. There is sufficient margin to counter

steer the glider in a normal towing situation. Make sure you use proper equipment, experienced personnel, the recommended techniques and all relevant safety precautions for towing.

GOLDEN RULES!!!

- * Never place your engine downwind of your wing.
 - * Check, check and re-check the fuel system for leaks.
 - * Have you enough fuel to get you there? Better too much than too little!
 - * Check for any loose articles that could trail or fall into the propeller while flying and fasten them securely.
 - * If you spot a problem, no matter how small, deal with it NOW!
 - * Always put on and fasten your helmet before clipping in to the harness.
 - * Always carry out full pre-flight checks before launching.* Try to control the glider on the ground facing forwards so as to keep the lines out of the prop. You should only turn to face the glider to avoid falling backwards onto the motor.
 - * Don't fly into danger - over water, trees, power lines etc. where an engine failure will leave you in trouble.
 - * Try not to fly into the turbulence of your own wake or that of others, especially at low altitude.
 - * It is unwise to fly hands-off below about 100m. AGL. As an engine failure below this height may require you to make immediate control inputs to set up a landing approach.
 - * Never rely on the engine: it may cut out at any moment. Always fly as if it will, so fly the wing – NOT the motor
 - * Except for collision avoidance, making a sharp turn against the torque effect during steep climbs can be dangerous: you may rapidly stall and enter a spin.
 - * Avoid downwind low flying: it drastically reduces your options!
 - * Be sensitive to mechanical problems early. A noticeable change in engine tone or a new vibration may spell trouble.
- Land and check it out.
- * Make sure your navigation is up to the job.
 - * Remember, not everyone enjoys your engine noise.
- Care must be taken when flying near livestock.

(DIAGRAM RR1)

Note ● = Center of pressure movement
Closer to the LE = more stability

Diagram RR2 showing different Mirage riser trim positions and their effect on the wing section

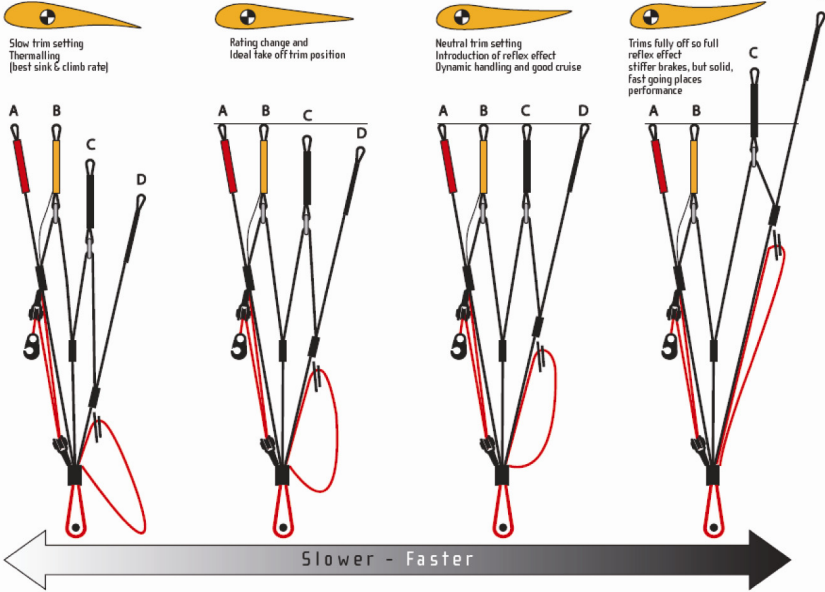

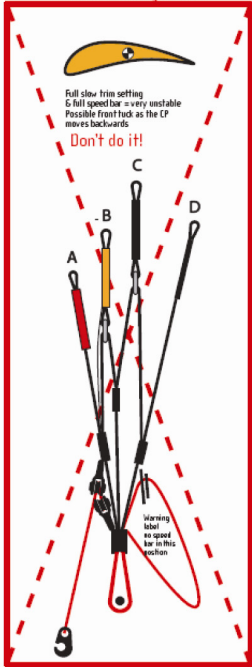


Diagram RR2 showing different Mirage riser trim positions with speed bar

Note  = Center of pressure movement
Closer to the LE = more stability

Warning do not fly with this configuration



At these faster settings application of brake removes the Reflex stability, as the trailing edge is deformed. I.e. Fly with less brake. Try to use wing tip steering and / or weight shift instead.



Neutral trim setting with speed bar off
speed bar may be used above this trim position (faster settings)



Speed bar fully on
Trims fully off
Full Reflex effect,
Maximum stability & speed

note : brakes may be used but we recommend no brakes, and steering with weight shift and/or wing tip steering only.



5. Care, Maintenance and Repairs

The materials used in the Mirage have been carefully selected for maximum durability. Nevertheless, following the guidelines below will keep your glider airworthy and will ensure a long period of continuous safe operation. Excessive wear is caused by careless ground handling and packing, unnecessary exposure to UV light, chemicals, heat and moisture.

Ground handling

The following should be avoided:

Violent shocks to the upper surface (e.g. when the canopy crashes to the ground leading edge first whilst ground handling).

Dragging the glider along the ground.

Stepping on the lines or canopy. The Kevlar inside the sheath can take lots of pulling force without stretching, but is sensitive to bending with small radius.

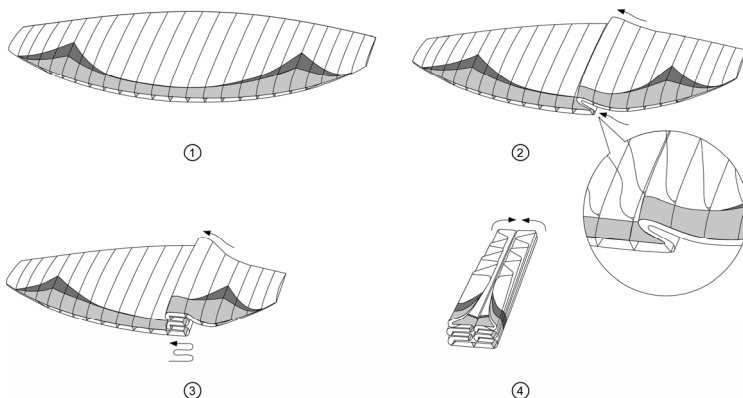
Opening your wing in strong winds without first untangling the lines.

UV damage

Avoid leaving the glider out in the sun unnecessarily. UV rays from the sun degrade the materials.

Packing instructions

We advise you to pack the glider 'accordion wise' as shown in the diagram. This packing procedure takes slightly longer and may require an assistant, but it conserves the rigidity in the profile reinforcements.



Since folding the glider weakens the materials, pack the glider as loosely as possible.

Transport and Storage

Moisture is the worst enemy for your glider, adversely affecting the ageing of fabric, lines and reinforcements. The Mirage should therefore be kept dry and cool. Do not pack the glider away for a prolonged period if it is damp, sandy, salty, or if other objects have entered the cells. Always allow it to dry naturally before storage, in a cool, dry room. Leave the rucksack zip open whenever possible to allow residual moisture to evaporate, and do not transport or store the glider in the proximity of chemicals such as gasoline, paints or other solvents.

Cleaning

Use only lukewarm water and a soft cloth to clean your wing. Never use any abrasive materials or detergents. Only clean the wing if it is absolutely necessary e.g. after a landing in salt water.

Inspections

GIN Gliders recommend that the Mirage is inspected by an authorized Gin agent. The first inspection shall take place 30 months after the first flight or after 200 hours, whichever happens sooner. Consecutive inspections shall take place every 200 hours flying time or every 24 months, whichever happens sooner.

A full inspection will give you peace of mind and extend your glider's lifetime. Additional inspections should be performed by a qualified person following a crash or violent landing on the leading edge, or if you note a deterioration of performance or behaviour.

You should also check for any damage to your lines, wing, and karabiners before each flight.

Repairs

Very small holes in the wing can be repaired with the sticky back tape provided with your glider. Ideally, damaged lines should be replaced by your GIN dealer. Before fitting a replacement line, check it for length against its counterpart on the other side of the wing. When a line has been replaced, always inflate the glider on flat ground to check that everything is in order before flying.

Major repairs, such as replacing panels, should only be carried out by the distributor or the manufacturer.

Environmentally friendly disposal

GIN paragliders are manufactured with non-toxic materials that have been assessed for their environmental impact. When your Vantage has reached the end of its life after a number of years, please take care to dispose of it in an environmentally friendly manner. Please check with local authorities regarding the current regulations and disposal facilities in your area.

Act responsibly and help preserve your flying sites

Please observe all local rules at the flying sites you use. It is important not to endanger the preservation of flying sites that are a vital necessity to the enjoyment of our beautiful sport.

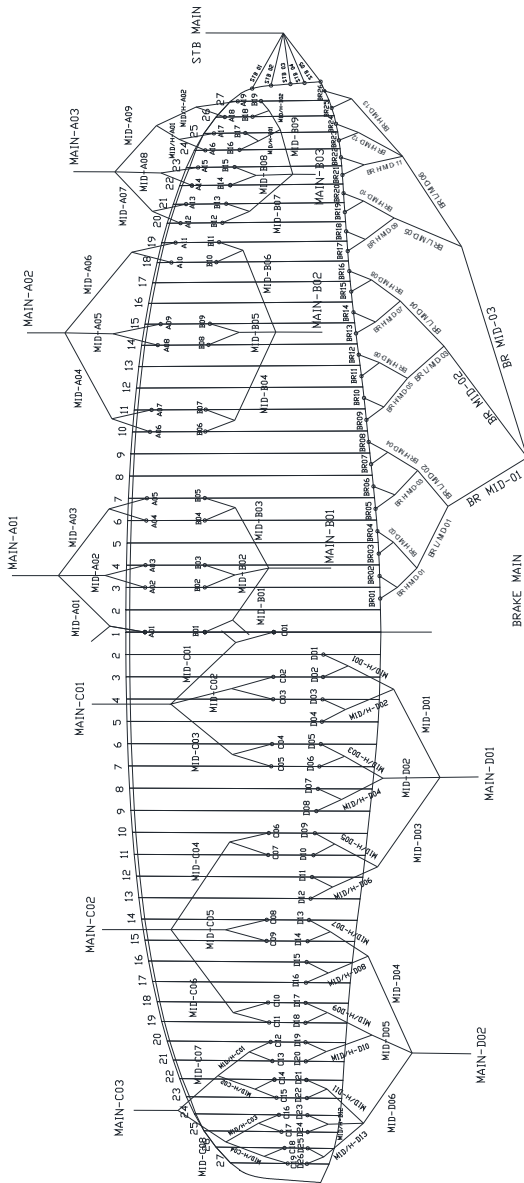
6. Reference

Testing and Certification

The Gin Gliders Mirage has been certified to the EN-926 standard. This is the safest class of paraglider. The Mirage has also passed load tests and shock tests with a load exceeding 8G of the maximum weight in flight.

Technical Specification Data

SIZE		24	26	28
FLAT	AREA	24.0 m ²	26.0 m ²	28.5 m ²
	SPAN	11.49m	11.96m	12.52m
	A.R	5.5	5.5	5.5
PROJECTED	AREA	20.07 m ²	21.75 m ²	23.84 m ²
	SPAN	8.95m	9.32m	9.76m
	A.R	3.99	3.99	3.99
CHORD	ROOT	2.59m	2.69m	2.83m
	TIP	0.66m	0.69m	0.72m
CELL NUMBER		54	54	54
GLIDER WEIGHT		6.1kg	6.6kg	7.1kg
FREE FLIGHT WEIGHT		60-80kg	80-100kg	95-115kg
MAX WEIGHT PARAMOTOR		110kg	135kg	155kg
EN		C	C	B



Material List

Model		Mirage
Fabric of Canopy	Top	Dominico 30D ME
	Bottom	Dominico 20D ME
	Profile	Dominico 30D FM/20D ME
	Reinforcement	W420
	Bridle	Nylon 12mm
Suspension Line		Upper : TGL 80 Middle : TGL280, TGL220, TGL 80 Main : TGL400, TGL280, TGL220, TGL140
Riser		Guth & Wolf - Polyester 20mm
Maillons		Stainless Steel 4.3mm
Thread		HT Polyester Yarn 150D/3, 225D/3

"Designing paragliders is a personal journey of challenge and discovery, an ongoing search for perfection."

- Gin Seok Song

Every effort has been made to ensure that the information in this manual is correct, but please remember that it has been produced for guidance only. It should not be used as a "how to fly" manual.

This owner's manual is subject to changes without prior notice. Please check www.gingliders.com for the latest information regarding the Mirage and other GIN products.

WARNING:

All gliders have to be inflated on flat ground before the first flight. The first flight has to be done by the Gin Gliders official agent before delivery to the final pilot.

Motor paragliding or paramotoring is an extremely dangerous activity that can and sometimes does result in serious injury or death.

The designer, manufacturer, distributor, wholesaler and retailer cannot and will not guarantee your safety when using this equipment or accept responsibility for any damage, injury or death as a result of the use of this equipment. This equipment should only be used by qualified and competent pilots or by pilots under the direct supervision of a competent and qualified motor paragliding instructor.

You alone must take full responsibility to ensure that you understand the correct and safe use of this motor paragliding equipment, to use it only for the purpose for which it is designed, and to practice all proper safety procedures before and during use.

Paramotor gliders require careful and constant care.

Over time, age, solar radiation, dirt, dust, grease, water, wind, stress and other variables will degrade the materials, performance and safety of the glider, thereby increasing the risk of injury or death.

Read and make sure you fully understand the owner's manual of this paramotor glider before you fly.

Always wear a helmet and protective clothing when flying a paramotor glider.