



# ***MATRIX HARNESS***

*owners manual*



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## AMENDMENTS

Version	Date	Changes
1.00	1/1/2003	Created original owners manual.
1.01	1/8/2003	Added Matrix Race to manual.

## INTRODUCTION

Thank you for choosing the Moyes Matrix Race, Matrix or Matrix XC. We at Moyes are confident that our product will exceed your expectations in both performance and comfort. This manual was written to aid you in gaining the most from your Moyes Matrix harness and to provide you with an understanding of its design features.

Since 1967, Moyes Delta Gliders has strived to be on the cutting edge of developing hang gliders and accessories of the highest calibre. A family owned business operating under homespun values, we aim to provide a comprehensive international network to service all pilots. Even further, we work with some of the best pilots in the world to ensure that our products are stringently made and tested in order to improve their performance, ease of use and safety.

We wish you the very best flying,  
The Moyes Team



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## DESCRIPTION OF DESIGN

The Matrix Race, Matrix and Matrix XC are state of the art streamlined harnesses developed by the Moyes team – Kraig Coomber, Gerolf Heinrichs and Juan Corral. The Matrix is an exceptionally clean, minimal drag harness with no external flaps, strings or pockets. The Matrix Race takes the term “aerodynamic harness” to the next level of performance, while the Matrix XC is the sport version with a more conventional design and user friendly aerodynamic external pockets.

	Matrix Race	Matrix	Matrix XC
Extra long tapered and hinged carbon fibre back plate offers maximum support and comfort	Yes	Yes	Yes
Hands free harness angle of attack adjustment with incorporated slider for upright landings	Yes	Yes	Yes
Durable Cordura outer skin provides a seamless symmetrical taper from shoulders to toes	Yes	Yes	Yes
Continuous webbing provides excellent structural integrity	Yes	Yes	Yes
Internal retracting zip up and unzip cords	Yes	Yes	Yes
Large internal storage bag with water bladder sleeve and oxygen bottle attachment area	Yes	Yes	Yes
Travelling main riser back up system enables security with function	Yes	Yes	Yes
Externally mounted semi counter sunk parachute container positioned within easy reach of both hands	Yes	Yes	Yes
Parachute bridle guide routes bridle away from head/neck area to either a carabineer or main webbing attachment point	Yes	Yes	Yes
More aggressive taper for added aerodynamics	Yes		
Cordura/Neopreme/Mylar arm fairings for drag reduction	Yes		
Internal pockets for a camera, radio and drogue chute with external access	Yes	Yes	
Internal side panel access zips allow the addition or reduction of shaping material as well as the option for utilising the area for additional storage	Yes	Yes	
Aerotowing shoulder tabs that can be tucked away when not in use	Yes	Yes	
Less aggressive taper to the boot resulting in additional leg room			Yes
Three external aerodynamic pockets with easy in-flight access			Yes
Shoulder anchor tabs and waist tabs for towing			Yes



The Moyes Matrix Race



The Moyes Matrix



The Moyes Matrix XC

## SPECIFICATIONS

	Matrix Race	Matrix	Matrix XC
Outer Skin	Dupont Cordura	Dupont Cordura	Dupont Cordura
Inner Skin	Polyester	Polyester	Polyester
Webbing System	1" and 2" Polyester	1" and 2" Polyester	1" and 2" Polyester
Weight	7.2 kg	7.5 kg	7.2 kg
Backplate	Carbon/Nomex Sandwich	Carbon/Nomex Sandwich	Carbon/Nomex Sandwich
Strength	Load Tested to 7.5 kN	Load Tested to 7.5 kN	Load Tested to 7.5 kN
Internal Access Pockets	2 near thigh	2 near thigh	0
External Access Pockets	4 on side 2 on chest	3 on side 1 on chest	3
Internal Packup Gear Pocket (Full Length)	1 beneath backplate	1 beneath backplate	1 beneath backplate
Internal Water Bladder Pocket	Yes	Yes	Yes
Shoulder Tow Points	In Pockets	Yes	Yes
Waist Tow Points	No	No	Yes
Drogue Chute Pocket	Yes	Yes	No
Removable Boot Skid Protector	No	Yes	Yes

## GETTING STARTED

The Matrix is a closer fitting harness than most, so it is important to spend some time adjusting it before flying for the first time. Read the following instructions and if you have any questions that are not covered in this manual please contact your local Moyes dealer or Moyes directly at our website [www.moyes.com.au](http://www.moyes.com.au) or [moyes@moyes.com.au](mailto:moyes@moyes.com.au). We will be more than happy to answer any questions that you may have or receive feedback.

### Packing List

- Harness
- Two zipper runners for Parachute cover (Matrix Race and Matrix only)
- Matrix Owners Manual.

Your new Moyes Matrix Race, Matrix or Matrix XC harness will be shipped to you fully assembled. You are only required to fit your parachute and make some final personal adjustments.

### Parachute Installation

The parachute pocket is on the right or left side of the pilot and positions the parachute partially behind and partially beside your back.

#### Matrix Race and Matrix

The parachute can be attached along your riser to the carabineer, or to the internal webbing loop that connects to the harness near the upper back. Connecting the parachute bridle to the shoulders offers less drag but may complicate the deployment process. The shoulder attachment method ensures a head-up touch down but may pull the pilot towards the glider during a deployment.

1. When packing your parachute, be sure to stow the bridle first. There is an internal Velcro flap to keep the bridle parallel to the zipper during a deployment. This flap is over the top of the carbon plate and should be velcroed under the bridle. Layer excess bridle into neat S-folds in the base of the pocket.
2. Place your parachute, already packed correctly in its deployment bag, into the bottom of the pocket with the handle outwards.
3. Place all the flaps down and use a thin piece of string to feed the bungies through each layer of the flaps, and then secure them with the pins of the handle.

#### ! NOTE

If possible we recommend that you use the chute handle from the deployment bag directly, instead of the handle extension. Using an extension reduces your control of the parachute during employment.

4. Use one of the zipper sliders provided to close the entire zipper starting at the parachute handle and finishing by running the slider completely off the zipper at the centre of the back plate. Keep one zipper slider in your harness and the other in a separate safe place.

It is important to practice deploying your parachute to be certain that there are no problems during the deployment sequence. To allow the parachute to exit, the outer Velcro flap **MUST** disengage. The zipper will not begin to break apart until the very end of the zipper is separated. Once the zipper has started separating, the rest opens very easily.

The action of pulling the reserve handle, which should be downward and outward, should do the following;

1. Pull apart the Velcro that holds the deployment handle flat against the harness.
2. Pull the deployment pins out of the bungee.
3. Pull apart the Velcro on the outer flap and the Velcro that goes across, and to each side of the deployment handle.

Once enough Velcro has been pulled apart, the slack at the end of the zipper will have been taken up and then the zipper will separate rapidly. An important point is that the Velcro is there only to prevent an unwanted deployment, not to hold the reserve in its container. The outer flap is only there for cleanliness, and to stop the deployment pins from being pulled out unintentionally or catching on side wires, etc. If you find it difficult to pull the parachute out of the pocket, try disabling some of the Velcro by putting another layer of 'opposite' Velcro to prevent the layers from sticking. Also the attachment point of the deployment handle to the deployment bag should be above the grommets; this allows the deployment handle to peel rather than shearing the Velcro.

### **Matrix XC**

1. Attach the parachute bridle to the harness riser carabineer.
2. Fit the supplied bridle shroud around the harness riser and the parachute bridle. This keeps the bridle streamlined and assists with a controlled deployment.
3. Fit the Velcro tags at the bottom of the riser and along the top of the harness.
4. The parachute bridle accesses the harness's parachute container via a slot in the top rear of the container. Surplus length of the parachute bridle is then S-folded into the rear or side of the parachute container.
5. Insert the parachute, in its deployment bag, into the harness parachute container with the deployment bag handle towards the outside. Ensure the bridle is neatly stowed so it will not tangle during deployment. Make sure all the flaps are on the outside of the parachute container.
6. Fit the bungee through the front hole first. Using a thin piece of string, pull the bungee through the bottom flap, then the inside top flap.
7. Fit the bungee through the rear hole. Using a thin piece of string, pull the bungee through the bottom flap, then the inside top flap, the rear flap and finally the outside top flap.

Parachute deployment with the Matrix XC is much simpler than the Matrix, however it still needs to be practised prior to flight.

## Adjustments

### Leg Straps

The Matrix Race, Matrix and Matrix XC leg straps are adjustable. We recommend adjusting the leg straps to be as tight as possible while still being comfortable.

Tight leg straps will make it easier to get into the prone position after launching and provide excellent flare authority during the landing flare.

#### ! NOTE

Once the leg straps are properly adjusted, it is worthwhile to place some stitches into the straps to stop them from slipping. You can also fold the strap back through the buckle, however stitching ensures no slippage occurs.

### Shoulder Strap Adjustments

The shoulder straps are adjustable to compensate for the fabric shrinking if you fly in a hot and dry climate or changes to the thickness of clothing that you wear. Adjust the straps to provide sufficient support, without them becoming uncomfortable during long flights.

#### ! NOTE

Do not adjust the shoulder straps out if the harness is too small. This will have an adverse affect on the harness' usability. It is better to make any necessary length adjustments at the boot.

### Tilt Adjustment

It is important to do a hang test in the harness prior to your flight. Practise changing your head up position, as well as opening and closing the zippers. If the tilt mechanism appears too hard or too easy to change, an adjustment of the dorsal rope may be required. Lengthening the dorsal rope will make the tilt adjustment easier, while shortening the dorsal rope will make the tilt adjustment harder.

## FEATURES

### Towing Loops

#### **Matrix**

The Matrix comes standard with shoulder loops. These tuck away when not in use. There is also a small zippered pocket near the tow loops for stowing the tow release while in flight. If a waist tow point is required, the internal lower leg straps can be used.

#### **Matrix Race**

The shoulder towing loops are located inside the two chest pockets of the Matrix Race.

### Inside Pockets

There is one large pocket behind your back that is accessed by the central zipper. This pocket can carry all your pack up gear if required. There is also a water bladder pocket sewn to the inside of this storage pocket. A number of webbing tabs on the inside of the pocket allow you to secure oxygen equipment or water bottles, if necessary.

#### **Matrix Race and Matrix**

There are two side pockets that run from thigh to ankle that will contain some lightweight stuffing bags when delivered. This stuffing produces a smooth taper towards the feet. The pockets have easy access zippers beside your legs. The stuffing bags can be removed and replaced by carefully rolling up pack up gear to leave more space behind your back.

### Outside Pockets

#### **Matrix Race**

There are two access zippers on the opposite side of the parachute that leads to four small chambers for cameras, a radio or a drogue chute. Two of the pockets are accessible to the rear of the arm fairing, and two are accessible from under the arm fairing. There are webbing tabs inside the pockets to attach safety ties.

#### **Matrix**

There is one access zipper on the opposite side of the parachute that leads to three small chambers for cameras, a radio or a drogue chute. There are webbing tabs inside the pockets to attach safety ties.

#### **Matrix XC**

There are two external pockets opposite the parachute and one external pocket just to the rear of the parachute. All pockets have webbing tabs to secure any content if required.

## Drogue Chute

### Matrix Race and Matrix

The rear most outside pocket is intended as a drogue chute pocket and has a suitably strong webbing loop to attach the drogue chute bridle.

**! IMPORTANT**

It is important that you use the correct loop, as the other loops are not strong enough to withstand the loads produced. A drogue chute detaching during a small field landing can produce a very dangerous situation.

## Carbon Plate

The Matrix harnesses get their excellent shape and strength with a carbon fibre/Nomex core plate that is hinged in the middle to facilitate launching and transporting. The plate is designed to withstand high flight loads but can still be damaged if due care is not taken during transport.

## PREFLIGHT

Before putting your harness on, check the following:

- Carbon plate and buckles for cracks, abrasion, or other signs of damage
- Webbing, ropes, and cords for wear or damage.

Before launching, perform the following:

- Confirm that you are hooked in and that your main riser is not twisted.
- Check that your leg straps are attached.
- Make sure that your helmet is on that the strap is secure.

### WARNING

Try to avoid sitting in your harness whilst waiting to launch. This may result in damage to the backplate hinges or the hinge mounts.

## INFLIGHT

### Closing Main Zipper

If you have difficulty zipping up after launching, try pulling the chest zipper further down towards your waist before pulling the leg zipper up. Then, push firmly on the boot of the harness and lift your waist into the harness, as you zip up. Pushing on the boot also helps by aligning both sides of the zipper, thus making it easier to zip up. If the harness feels tight in the upper leg area, try reducing the amount of stuffing from the side leg pockets. Also, avoid packing anything within six inches of the hinge in the carbon plate. This will allow more room for your hips to fit in the harness. It is important not to force the zipper, as this will shorten its life.

#### ! NOTE

The life and operation of the zipper will be greatly increased by keeping the zipper clean. Try to avoid laying the harness in dirt during glider setup or de-rigging.

#### ! IMPORTANT

The Matrix main zipper is not removable because of the high tension in the second skin of the harness tends to peel the Velcro used to attach a removable zipper.

### Pitch Adjustment

There are two sorts of pitch adjustment locking systems – the Rope Cleat and the Twin Lock. The Rope Cleat is located on the main riser, while the Twin Lock system is built into the backplate.

#### Rope Cleat

The Matrix and Matrix XC utilise an innovative pitch adjuster called the Rope Cleat, as well as the traditional slider in the back plate to enable safe and comfortable landings. The cleat is located 1/3 of the way up the main riser. A suspension rope runs from the shoulders through this cleat and back to a position near the knees.

The rope is locked at each end, through grommets in the backplate, by knots. There are white chalk marks on the rope to denote the proper knot position. When in prone, and exactly horizontal, your harness should not have a bend in it. If the rope is a few millimetres too long, the harness will change pitch angle too easily. If it is too short, you may have difficulty adjusting the angle of the harness.

It is a good idea to practise using your Matrix before flying with it for the first time. The Rope Cleat is a very effective mechanism for adjusting your angle of attack, but you need to learn how to use it.

The Rope Cleat locks the rope in place when there is tension in the rope on both sides of the cleat. Only when tension is removed from one side, is the rope able to slide through to the other side.

The Rope Cleat locks the rope in place when there is tension in the rope on both sides of the cleat. Only when tension is released from one side, is the rope able to slide through to the other side. Thus, when you are relaxed in the harness, the weight of your legs in the rear and the weight of your shoulders in the front, maintains tension in the rope on both sides of the Rope Cleat. This locks the angle of attack of the harness. Arching your back and pulling down on the base bar will bring the harness to a more head-down position. Pushing yourself up on the base bar will bring you to a more head-up position. Relaxing your body after each adjustment will lock the harness in place.

After launching, the initial rotation from hanging to the prone position requires a deliberate movement. Pushing with your feet on the boot of the harness makes this transition easier as there is a cord attached from the boot to the main riser. Once in the prone position, only subtle actions are required to adjust your position for climb or glide. It will eventually become a subconscious action.

**! NOTE**

If after practice, the pitch adjustments are too difficult then increase the length of the dorsal rope by adjusting one of the knots. If the pitch adjustment is too easy, reduce the length of the dorsal rope. We recommend using a "Figure of Eight" knot or "Bowline", as these knots are easy to undo for future adjustment.

If you decide you require a better "head down" position with the harness, there is also a spacer that can be removed from the slider bar. Removing the spacer moves the Centre of Gravity rearwards, allowing for a lower head down position. To remove the spacer, the slider bar must be removed from the backplate.

**Twin Lock**

The Twin Lock system uses two cams built into the backplate. The dorsal rope is anchored to the main riser and travels forward to an entry point in the backplate. The rope circles round a cam built into the backplate towards the front and is then routed to another cam towards the rear of the backplate. The dorsal rope circles the rear cam and returns to the rear of the main riser. The rope is tied together between the two cams, and this is where adjustments are made.

When the pilot is relaxed in the harness, the body weight keeps the dorsal rope tight. The surface tension of the rope on the two cams stops the rope from sliding and prevents changes to the pitch of the harness. To change the pilots head down position, the pilot relieves the pressure on the dorsal rope by bending their legs and pulling down on the basebar. To increase the attitude of the pilot (ie. head up position), the pilot relieves the pressure on the dorsal rope by bending their legs and pushing up on the basebar.

If the pitch adjustment is too easy, the dorsal rope can be tightened by retying the knot between the two cams inside the harness. If the pitch adjustment is too hard, the dorsal rope can be loosened by retying the knot between the two cams inside the harness.

## Landing

It is important to have tight leg straps to aid in the landing phase of the flight. Once you decide to transition to the downtubes, push up on the basetube with your legs still in the harness. With some practice you will be able to do this smoothly without sudden airspeed or glider attitude changes. After the slider has moved, bring your hands up to the downtubes. Pulling up on the downtubes will allow you to rotate even more upright if you find it necessary. Once you are upright, bring your legs out of the harness to touch down.

## MAINTENANCE

Your Moyes Matrix Race, Matrix, and Matrix XC will last for years of safe and enjoyable soaring, if properly maintained. Avoid contact with solvents and other chemicals. Ultra violet radiation gradually weakens the materials so it is important to minimise UV exposure. Leave your harness lying in the shade of your glider while preparing to fly and pack it up as soon as you land. Should it become necessary to clean your Matrix, do so with a damp cloth. Difficult stains should be removed with a mild detergent and thorough rinsing with fresh water.

Also regularly check the slider bar nuts and bolts, as well as the screws on the back plate hinges. A frayed dorsal rope will also hinder operation, therefore it should be replaced at the first sign of wear.

## TROUBLESHOOTING

**It is too hard to adjust the attitude of the harness.**

Increase the length of the Dorsal.

**The attitude of the harness is too easy to adjust, therefore the harness will not hold its position while flying.**

Decrease the length of the Dorsal rope.

**I am unable to get a satisfactory "head down" position.**

Remove the spacer from the slider bar. This will move the Centre of Gravity rearwards.