Merlin 133 / 148 / 158

Owner's Manual

(1.96)

SEEDWINGS – Europe

A – 6262 Schlitters 63 - Austria

Tel: +43-5288-7273-0
Fax: +43-5288-7273-1

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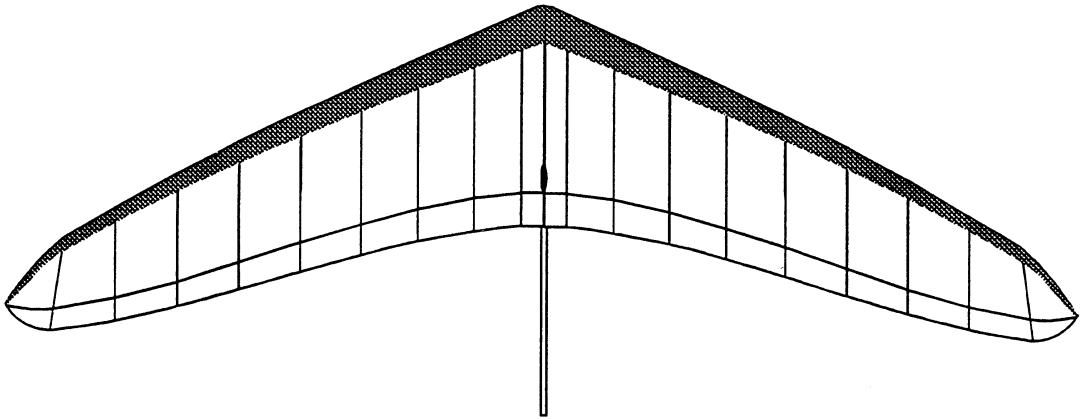
Important for your safety

Your ***Merlin*** has beed designed and build incorporating the most modern safety standards. Nevertheless, please note for your and other peoples safety:

- Read and comprehend this handbook prior to the first flight.
- The enclosed specification sheet (flight equipment specification sheet) is part of this handbook.
- This glider is intended for foot launch and non-motorized flight of *one* person only.
- It is not suitable for:
  - motorized flight,
  - bank angle exceeding 60° or angle of attack exceeding 30°,
  - air speed exceeding 80 km/h (50 mph),
  - aerobatics
- Note the maximum launch weight: 117 kg (260 lb) (Merlin 133) or 126 kg (280 lb) (Merlin 148).
- DHV pilot proficiency 3.
- The laws and regulation of the respective country for the operation of gliders are to be obeyed.
- Hang gliding is a high risk sport and holds the risk of injuries, in some circumstances with deadly outcome, even while using good equipment and executed by experienced pilots.
- Only fly this glider if you personally accept to take the risk of hang gliding.
- Gusty and turbulent weather may lead to conditions where even well experienced pilots cannot control the glider any more. In such conditions the glider may turn over and break, resulting in severe injuries.
- Always be aware of the wind and weather conditions, which may compromise the control of the glider.
- Fly only using inspected and certified harness and equipment.
- Use a helmet and parachute for each flight.
- Disobeying these safety guidelines may result in injury or death. Seedwings-Europe cannot be held responsible for any accidents, injuries or deaths, which result from disobeying the safety guidelines and instructions of this manual.

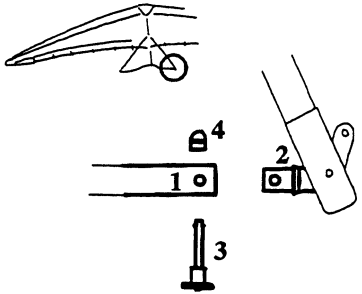
About the Merlins



The Merlin 148 and Merlin 133 are weight-shift controlled high performance hang gliders intended for foot launch. They are some of the most exclusive and performing hang gliders available.
The battens of the outer area of the sail and the shape of the battens were designed using modern computer-aided design methods. Many years of design experience and the extensive test program lead to outstanding flight performance. You can expect optimum handling and glide ratio even at high speed. Due to its elaborate design the Merlin offers a high level of active and passive safety. We like to use the opportunity to remind you of your own responsibility. Be part of the safety by being alert, having a clear state of mind and acting responsible.
We like to wish you success with your new Merlin, exciting and safe flights.

Seendwings-Europe

Setup



Lay the glider on the ground

- in the glider bag
- zipper up
- nose pointing uphill or with right angle to the wind direction

- Open zipper.
- Remove padding from A-frame.
- Take out batten bag from glider bag.

Assemble A-frame

- Put the control bar (1) into the corner bracket (2).
- Stick the pip pin (3) through the holes in (1) and (2).
- Secure the pip pin (3) with the cap (4).

In case the glider is not packed short, continue with chapter "Lifting the glider up" on page 7.

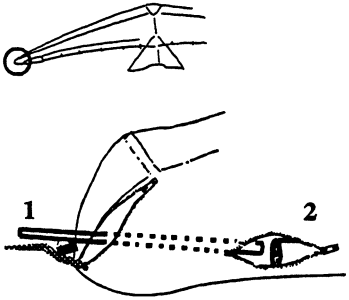
Short-packed leading edges

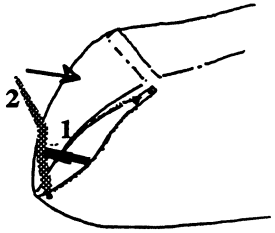
Only for short-packed airframe, otherwise continue with next chapter.

- Move sail towards the noseplate until the joint of upper and lower leading edge extends from the zipper at the tip of the sail while folding the Mylar carefully in a zigzag pattern.
- Note the "R" and "L" markings of the lower leading edges. Insert lower leading edge into upper leading edge. Note the sound at the stop, the lower leading edge must not be able to turn.
- Carefully extend the sail.
- Secure the loop of the sail
  - with the clevis pin,
  - at the outer end of the leading edge.

ATTENTION: The clevis pin must be inserted from top, current view – glider lying on the ground. The loop must extend parallel to the lower leading edge.

- Secure clevis pin with safety ring.
- Assemble the other leading edge the same way.



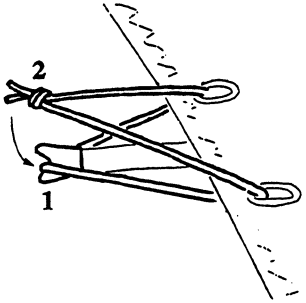


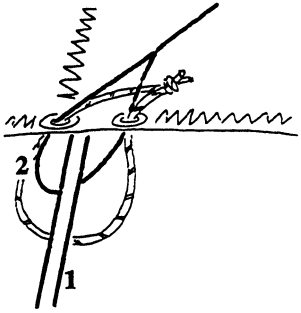
Lifting the glider up

- Lift the nose with one hand. Simultaneously with the other hand:
- Straighten lower rigging.
- Put glider on A-frame. Remove glider bag and straps.
- Remove padding from kingpost.
- Open wings about ¾ of range.
  - Kingpost lifts itself up.
  - Make sure that the reflex bridles are not entangled in the keel.

Insert wing tip tubes

- Remove bag from wing tip.
- Open zipper in wing tip to view the end of the leading edge (2).
- Insert the wing tip tube (1) into the leading edge.
- The tube must be fully inserted (sound at stop).
- Put the cap (1) of the lever (2) on the wing tip tube.
- Turn the lever (2) until it comes to a stop (sound).
- Assemble the other wing tip the same way.



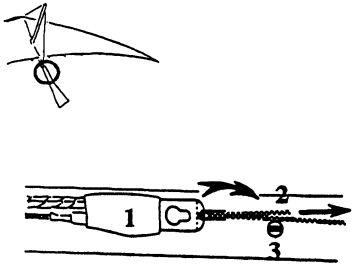


Insert upper battens

- Insert upper battens into batten pockets of the sail:
  - Black = left, white = right.
  - Start at the keel with the longest batten.
  - Make sure that the tip of the batten is not rubbing strongly against the stitches of the batten pocket.
- Insert the batten slowly. In case the batten needs excessive force to insert, open or fold the wings slightly to change the tension of the sail.
- Secure the the battens at their end (1) with the bungee or shock chord (2).

ATTENTION: The reflex bridles must form loops around all battens at which they end.

- The battens (1) at whose the reflex bridles end, must be fed through the loops of the corresponding reflex bridle.
- Please make sure that the reflex bridles are not entangled in other battens.

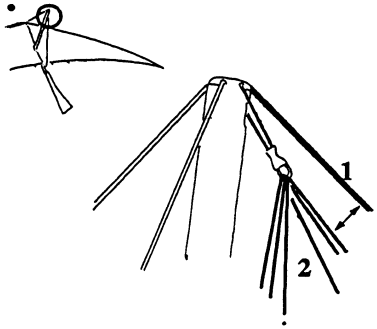


Tension crossbar

- Spread wings fully.
- Inspect all cables for twisted tangs.
- Retract the tang (1) with the chord (2) to tension the crossbar.

ATTENTION: Make sure that the reflex bridles do not get caught under the battens.

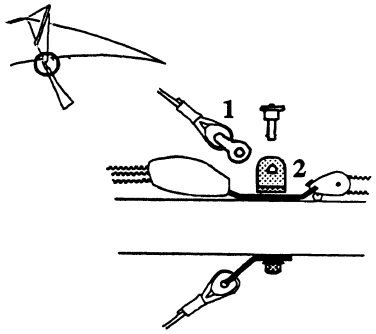
- Fasten tang (1) at bolt (3).



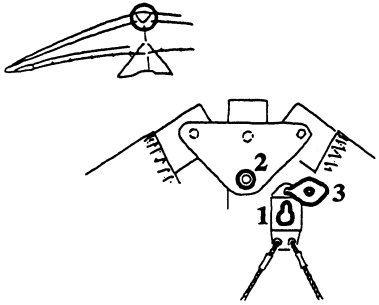
Fasten reflex bridles

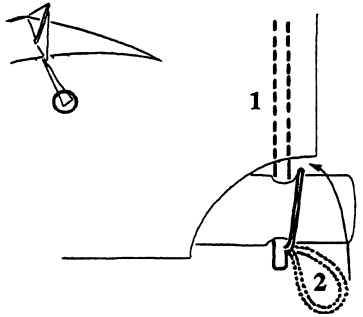
- Check the reflex bridles for correct routing prior to securing them.

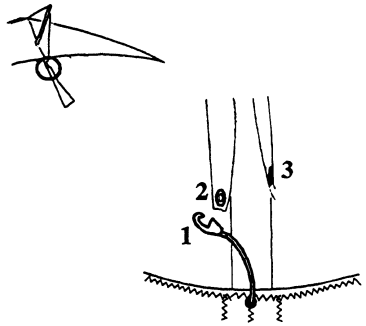
ATTENTION: The upper rigging must be routed on top and behind all reflex bridles.



- Fasten the upper rigging (1) at the eye bolt (2) using the pip pin.





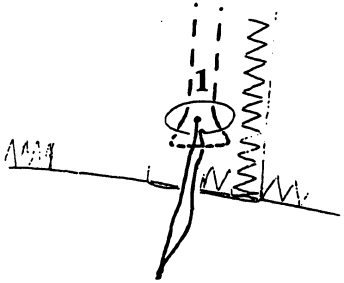


Fasten lower rigging

- Fasten tang (1) with key hole at the bolt (2).
- Secure with rubber tang.

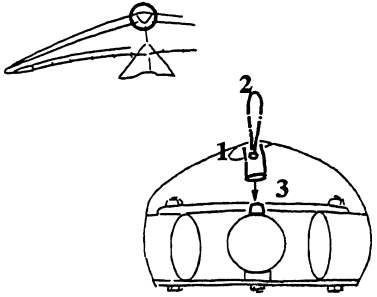
Assemble fin

- The fin must not be under tension (bungee chord not secured at the leading edge of the fin).
- Insert tube (1) through hole at the end of the keel into the fin.
- Secure tube with bungee chord around keel.
- Tension fin:
  - Insert hook (1) of the bungee chord at the trailing edge of the sail into
  - eyelets (2,3).



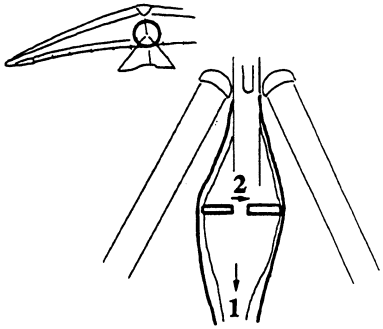
Insert lower battens

- Black = left, white = right.
- Insert batten into batten pocket (the end with the chord points to the back).
- Make sure that the batten are inserted into the correct pocket (different lengths).
- Use a finger to insert the ends of the batten (1) fully into the batten pocket.



Fasten nose batten

- In case the nose batten is not yet inserted into the sail, insert the nose batten into the batten pocket (1).
- Lift the tip to the nose batten with the chord loop (2).
- Put the nose batten on top of the screw (3).



Pilot suspension

1. Pull down hang strap (1).
2. Assemble expansion tube below the keel.

ATTENTION: If it is not necessary to lay the glider flat on the ground, continue with the "preflight" on page 12. **A preflight must be performed prior to every single flight.**

Lay down flat

Useful in case of strong wind

- Fully release VG.
- Open corner bracket on the side of VG (remove pip pin).

IMPORTANT: Opening the corner bracket is important, as otherwise the lower rigging may become overstressed while turning the A-frame backwards.

- Turn nose of the glider into the wind.
- Detach front lower rigging from nose plate.
- Lift nose and simultaneously pull forward to tilt A-frame backwards.
- Lay glider flat on the ground.

ATTENTION: After lifting glider up in preparation for launch, performing a preflight is mandatory.

Preflight

To be checked in general

Metal parts	corrosion
Tubes	dents, bends
Cables	kinks, defective strains
Thimbles	deformation, orientation
Chords	wear
Sail	wear, tears, stitching
Screws, bolts	bends
Nuts	secure fit

Nose

- Is the lower rigging secured?
- Check screws and nuts of the nose plate.
- Look along leading edge and check for dents and bends.
- Check cables and thimbles.
- Attach nose cone.

Head of A-frame

- Check nuts, bolts and safety rings.
- Check both hang straps for wear and correct positioning.
- Check downtubes for dents and bends.

Inner side of sail

- Check for correct routing of VG chord.
- Check cable and fittings of crossbar.
- Check visible tubes for dents and bends.
- Check nuts and screws of crossbar joint.

Edges of A-frame

- Check thimbles for deformation and twist.
- Check lower rigging.
- Are the pip pins correctly inserted and secured with caps?
- Check bolts and safety rings of downtubes.
- Check nuts and screws.
- Is the VG chord running smoothly and easily? To release the VG, tension the lower rigging, if necessary.

Trailing edge of sail

- Check shock chords and bungee chords for secure fit on the battens and wear.
- Check trailing edge of the sail for wear and defective stitching.
- Check the routing of the reflex bridles – none must be caught beneath a more inside batten.
- Battens, at whose the reflex bridles end, must be routed through the loop of the corresponding reflex bridle.

Wing tips

- Are the wing tip tubes correctly tensioned?
- Close zippers.

Lower keel and kingpost

- Check kingpost for correct mounting.
- Check pilot suspension at kingpost for wear and correct mounting.
- The rear upper rigging must be routed correctly behind all reflex bridles.
- Is the rear upper rigging correctly attached?
- Check reflex bridles for damage. Do not fly in case some strains are broken.
- Is the tang of the crossbar cables correctly secured?
- Check fin.
- Close velcro of fin.

Joint of leading edge and crossbar

- Open zipper.
- Check Nylock nuts.
- Check rigging and fitting. Expecially the joint of fittings and cables is under kink stress while braking down the glider.
- Check lower rigging:
    - Push up leading edge with both hands, simultaneously push the lower side cable down with a foot at a force of approx. 250N (25 kg or 55 lbs).
- Close zipper.
- Check other side the same way.

ATTENTION: Damaged or worn parts must be replace before flying the glider

Flight operation

Prior to launch

- Perform preflight of glider and harness.
- Hook into main and reserve hang strap.
- Perform hang check:
    - Hang position as low as possible, but high enough that the harness always clears the control bar for all control movements.
    - The reserve hang strap should be 5 cm (2 inch) longer than the main hang strap.

ATTENTION: In case it is necessary to extend the hang straps, we strongly recommend to let an authorized Seedwinds dealer attach new hang straps. Extending existing hang straps can be dangerous. Shortening the hang strap also is dangerous, since the strength of the strap can become compromised.

Launch

- Check:
    - Harness hooked in,
    - VG tension about 1/3 of travel,
    - nose horizontal or slightly lifted,
    - wings horizontal,
    - wing tips clear,
    - favorable winds.
- In case of a launch in strong winds it is beneficial to use one or two persons as launch crew. To ensure communication, the commands have to be agreed on.
- The run to launch should be progressive to the maximum speed.

Flight

- Upon reaching sufficient ground clearance, the VG can be adjusted, if necessary.
- Loose VG enables best handling in turns.
- Tight VG improves the glide ratio especially at higher speeds, but the handling in turns is delayed.

Such handling is typical for a modern weight-shift controlled high performance hang glider.

ATTENTION: Perform the first flight at a known site at moderate weather conditions. Always allow an additional safety margin for all controls, until you are familiar with the response of the glider.

Landing

- Straight landing approach.
- Directly into the wind.
- Speed slightly higher than best glide.
- Keep speed constant until just above the ground (control bar about 1 m (3 feet) above the ground).
- Keep wings leveled.
- Ease out the control bar so the ground clearance remains constant while the air speed diminishes.
- For pushing out to flare, the hands should grip the downtubes quite high. In case you cannot gip high enough, the leg loops of the harness may be too long
- Upon feeling light pressure at the control bar, push out control bar quickly and fully.
- The stall of the Merlin occurs precisely, but moderate and at low air speed and enables perfect landings.

ATTENTION: Due to the ground effect, the glide path of the Merlin is longer than in free flight. Always allow for additional space for the first landings.

WARNING: Never try to practice landings with a vicious flare at a ground clearance of more than 1 m (3 feet). A sudden stall in free air may lead the glider to flip over, which is extremely dangerous.

Tow

The Merlin is ideally suited for tow launch.
Tow launch is only permissible, if:

- The pilot has successfully completed tow classes.
- A stationary winch certified for hang gliders is used for stationary tow.
- The education of winch operator or UL pilot includes the towing of hang gliders.
- A release certified for towing of hang gliders is used.

During tow:

- Wheels are mounted to the control bar.
- VG tension about 1/3 of travel.
- Make sure that you are familiar with all details of the tow operation.

Roof rack transportation

To avoid damage to the glider:

- The glider should lay on the roof rack with the zipper of the glider bag up.
- The roof rack should support the glider by at least 3 positions, and
  - support at least 2/3 of the length of the glider,
  - be at least 10 cm (4 inches) wide,
  - contain soft padding.
- Strap the glider down securely, but not to tight to prevent the Mylar from getting kinked.

Storage

- Store glider:
  - in a dry and shaded place,
  - inside the glider bag.
- In case the glider became wet, let it dry before putting it into storage (also see "Humidity" on page 19).
- In case a 100% waterproof glider bag was used for transportation, exchange it for the normal glider bag, so humidity can evaporate during storage.
- A storage rack similar to the one used for roof rack transportation should be used for storage.

Service and maintenance

ATTENTION: All repairs of the sail or frame, except for the exchange of easily exchangeable parts (like downtubes and VG chord), have to be performed by an authorized Seedwings dealer.

Maintenance

The glider has to be serviced on a regular basis to ensure optimum safety, performance and durability.

- Parts, which were found defective during preflight, have to be exchanged. See "Preflight" on page 13.
- Periodically match the battens to the batten template. See "Check battens" on page 22.
- Once in a while the following parts may me treated with silicon spray or paraffin wax to reduce wear:
  - Zipper of the glider bag,
  - zippers of the sail,
  - battens,
  - wing tip tubes.
- Cleaning of the sail, if it is necessary at all, should be done with clean water.
- A main service should be performed every 6 months or 50 flight hours (whatever comes first), or every time there is suspicion for damage. See "Annual service" on page 19.
- To keep the DHV certification valid, a service check has to be performed 5 years after delivery of the new glider, then every 2 years, by an authorized manufacturer of hang gliders. Seendwings-Europe will supply a list of locations in your area.

In case of a crash

After every crash, a hard landing of if the wind flip over the glider on the ground, the glider has to be checked carefully and defective parts have to be replaced.

ATTENTION: If your are not absolutely sure that you found and repaired all damage, a main service has to be performed by an authorized Seedwings dealer.

Humidity

- Every time the glider got wet:
    - Let glider dry thoroughly.
- In case the glider got in contact with salt water or after a few flying days in salty air:
    - Rinse with clear water, including the inside of all tubes.
    - Let glider dry thoroughly.
    - Wipe the inside of the tubes with cloth dipped in low viscosity oil.

Annual service

- Complete inspection of sail and frame during which the sail is removed.
- Must be performed by an authorized Seedwings dealer.
- Annual or every 100 flight hours (whatever comes first), or every time there is suspicion for damage.

ATTENTION: The length of the reflex bridles may change with time and mismatch the set values. Since the correct length is of paramount importance for the safety, the lengths of the reflex bridles and the pitch compensator have to be checked, and if necessary adjusted, during every annual inspection by an authorized Seedwings dealer.

Check of the pitch compensator adjustment

ATTENTION: The correct adjustment of the pitch compensator affects the pitch stability of the glider and thereby its safety. Therefor the compensator must only be adjusted by an authorized Seedwings dealer.

- The compensator cable should be just without tension for fully applied VG.
- As soon as the VG is being released, the compensator must start lifting the reflex bridles.

Downtube exchange

A downtube has to be replaced if it is bend or shows signs of over-stressing at the surface. Perform the change carefully and thoroughly. To tools are needed.

- Remove safety ring and washer from bolt at the upper end of the downtube.
- Remove bolt.
- Remove bolt at the lower end of the downtube the same way.
- Remove old downtube and insert new one.
  - At side of VG: Feed VG chord through tube.
- Both fittings must be inserted fully into the ends of the downtube.
- Insert both bolts.
- Secure both bolts with washers and safety rings.

Trimming

ATTENTION: Trimming of a hang glider requires a lot of experience with the different adjustments of the glider and their effect on the performance. You can do the adjustments on your own, if you feel safe to do so. Read the following instructions carefully. These instructions cover the most important adjustments. Only change one adjustment at a time. Perform a test flight in calm conditions prior to any further adjustment. In case of problems or questions while trimming the glider, contact an authorized Seedwings dealer or Seedwings-Europe.

Speed

- The trim speed is already adjusted at the time of delivery, but it depends on the pilot weight.
- The trim speed should be between the speed for best glide and minimum sink.
- Changing trim speed:
  - Remove screw at joint of kingpost and keel.
  - Move kingpost by one hole:
    - Forward to increase trim speed.
    - Backwards to decrease trim speed.
  - Reattach and tighten screw to joint of kingpost and keel. Use new Nylock washer.

Turn

In case the glider shows a turn and there is no suspicion for bend or defective parts (like after a hard landing), check in the following order:

Check battens

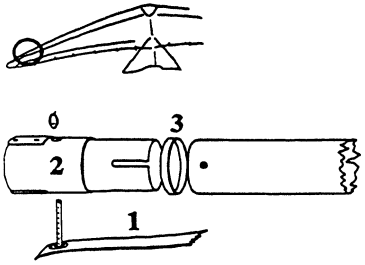
- Spread batten chart across a flat surface (soil and grass are not suited).
- Make sure that the battens are compared to the corresponding curve on the chart.
- Align the tip of the batten to the corresponding marking on the chart.
- The batten should not deviate from the curve by more than 0.5 cm (5/256 inch) at any point.
- Start correcting deviations from the tip of the batten.
- Avoid kinks or flats.
- Check left and right battens for symmetry.
- In case the battens did not show any deviation, continue with the next paragraph, otherwise perform a test flight and check for a turn.

Check tubes

- Remove nose cone.
- From the tip of the keep (nose plate), look along keel to check for bends.
- From the tip of the keel check symmetry of left and right leading edge.
- Remove tension from crossbar and wing tip tubes.
- Open sail joints at the ends of the leading edges and push sail carefully along the leading edge until the crossbar joints are exposed. Check the exposed parts of the leading edge for bends.

ATTENTION: Minor deformations of these tubes may not be detected while the sail is fixed to the frame, although they may cause a turn.

WARNING: In case all described actions did not remove the turn, an authorized Seedwings dealer should inspect the glider.



Sail tightness adjustment

The sail tightness has been already adjusted by the manufacturer. After extended use (about 100 hours) it may be necessary for adjust the tension again.

- Put glider on A-frame, do not spread wings.
- Remove sail straps (1) at the ends of both leading edges.
- Remove leading edge caps (2), attach one spacer ring (3) (up to a maximum width of 5 mm (5/256 inch).
- Assemble in reverse order. Make sure while attaching the sail joint that the bolt has to be inserted from the bottom – current view, glider standing on A-frame.

Effect of a misadjusted sail tightness

- Too high tension leads to a strongly worsened handling and may lead to reduced performance and flattering of the outer areas of the sail.
- Too low tension reduces the fit of the leading edge (larger washout), which may lead to reduced pitch stability and performance.
- Unbalanced tension may lead to a turn (larger tension on the left side normally causes a right turn, and other way round).

Braking down

- Loosen VG fully.
- Open up hang strap tube.
- Remove nose cone.
- Pull out nose batten by a few cm, but it needs not to be pulled out fully.
- Disassemble fin.
- Undo the rear upper rigging.
- Unfasten the crossbar and fold wings slightly.
- Remove battens:
  - Start at the wing tip,
  - pull out carefully.
  - Do not forget battens of the lower sail.
- Remove wing tip tubes. Fold lever into sail.
- Undo the front lower rigging at the nose.
- Fold wings up to a distance of 1 m (3 feet) at the wing tips.
  - Make sure that the crossbar cables freely slip into the keel pocket.
- Push kingpost forward.
  - Put padding on upper and lower end of the kingpost.
- Pull out sail fully from in between leading edges and keel.
- Fold wings fully.
- Roll the sail:
  - First fold sail at the wing tips inwards, roll and cover with bags.
  - Roll sail in center area.
  - Temporarily secure sail with a strap.
  - Roll other side of the sail.
  - Attach all straps around both wings, do not tighten too much.

NOTE: For new sails the rolling may be more difficult due to the stiffness of the batten pockets. It is more important that the Mylar leading edge covers the sail after attaching the straps that rolling the sail nicely.

- Put on glider bag, flag pointing backwards.
- Lay glider flat on the ground.
- Open control frame, fold control bar backwards.
- Reinsert pip pin.
- Push on padding around corner brackets.
- Put battens, wing tip tubes and fin tube into batten bag. Store batten bag inside the glider bag at the rear end between the wings.
- Push nose cone into leading edge.
- Close glider bag.

Spare parts

Only those parts are listed, which can be replaced by the pilot.

Dimensions in mm. Please state model and serial number of your glider when ordering spare parts.

Parts not listed are more difficult to replace. In this case please contact your Seedwings dealer.

Be extremely careful and thorough with all repairs on your glider.

ATTENTION: All repairs to the sail and frame, except the exchange of easily exchangeable parts (like downtubes and VG chord), have to be performed by an authorized Seedwings dealer.

Control frame

Part	*Comment*	*Count*
Downtube	Airfoil tube	2
Control bar	Ø29x2	1
VG chord clamp	cl 702	1
Corner bracket	PVC	2
Screw	Ø6x40 hex head	2
Fitting control bar	Ø24.9	2
Pip pin	Ø6x40	2
Fitting downtube	Ø25x22	2
Bolt + washer + safety ring	Ø5x26	4

Misc

Part	*Comment*	*Count*
Battens left	#1 to #8 or #9	1 each
Battens right	#1 to #8 or #9	1 each
Nose batten	#0	1
Lower battens left	#1 to #2	1 each
Lower battens right	#1 to #2	1 each
Bungee chord for battens	Ø4	
Shock chord for battens	Ø2.5	
Wing tip tube	Fiberglass	2
Spacer rings (shims)	Ø52x0.9x3 or 5	
Bolt for sail strap at wing tip	Ø6x65	2
Kingpost	Complete	1
Hang strap	Complete	1
Nose cone		1
VG chord	Ø4	1

Technical data

The individual adjustments and dimensions are listed in the data sheet, which was shipped with your glider.

	Merlin 133	***Merlin 148***	***Merlin 158***
Max. speed	80 km/h	80 km/h	80 km/h
Max. launch weight	117 kg	126 kg	136 kg
Min. launch weight	85 kg	90 kg	100 kg
Pilot weight range	45 – 77 kg	50 – 85 kg	75 – 105 kg
Number of seats	1	1	1
Glider weight without bag	30 kg	32 kg	32.5 kg
Sail area	12.4 m²	13.75 m²	14.6 m²
Width	9.85 m	12.25 m	10.40 m