

BHPA Dual Flying Factsheet

Edition 3.1

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Introduction

A DUAL LICENCE IS REQUIRED BEFORE FLYING WITH PASSENGERS.

DUAL LICENCES ARE AVAILABLE IN THE FOLLOWING CATEGORIES:

- Paraglider (tow)
- Paraglider (hill)
- Hang Glider (tow)
- Hang Glider (hill)
- Hang Glider (aerotow)

THIS DOCUMENT DOES NOT COVER PARASCENDING WING AND ROUND DUAL FLYING OR POWERED DUAL FLYING.

This fact sheet is informed by the BHPA Technical Manual as well as the previous BHPA Code for Dual Flying. Dual flying is not an activity to be undertaken lightly. Before you take any steps towards flying with a passenger you must seriously consider the skills and level of responsibility that will be required of you. The relatively routine procedures of solo flight will all be more complicated. For you and your passenger's sake proceed very cautiously. This fact sheet is intended to act as a guide to the practicalities of dual flight. For further information on the rules and regulations of dual flight, and how to achieve dual licences refer to the BHPA Technical Manual

Section 1 - Considerations

1. YOURSELF

Before committing to flying dual take a critical look at your reasons for taking a passenger. Avoid getting into the situation where you feel pressured into flying because you're worried that you may disappoint someone. Ultimately you will be responsible for their life as well as your own, and disappointing them is much better than injuring them. Avoid making promises that may be difficult to fulfil. It's wise to stress to potential passengers the narrow margin of suitable conditions and how the flight may have to be postponed until another day. Are you familiar with all the equipment that you will be using? Have you flown the site before, in the prevailing conditions? As with all aspects of flying, it's best to change only one variable at a time. You must remain cool, calm and collected particularly in your assessment of the conditions. Remain objective, and don't allow your passenger or your peers to influence your decisions.

To fly dual you must have passed the Dual pilot examination and be in current practice. To fly dual for valuable consideration you must be an Air Experience Instructor (AEI) and operating within a BHPA registered school environment.

To convert from a dual pilot to an AEI you must have logged at least 30 dual flights as pilot in command, and either: already be a qualified instructor in the relevant discipline and environment, or, pass an additional examination.

2. THE PASSENGER

You are responsible for the passenger and it is up to you to decide whether they are suitable to fly. Firstly, on the practical side of things you must know their weight and establish whether your combined kitted up weight is below the maximum permitted payload for the type of glider that you intend to fly. If flying a very light passenger of course, you must ensure your total weight is above the minimum permitted.

Hang gliders respond to weight shift, therefore a heavier passenger moving the wrong way will have a greater affect on the control of the glider than a lighter pilot moving the right way; it is therefore recommended that hang-glider pilots don't carry passengers heavier than themselves. Another consideration is the physical strength of the passenger. If a stronger passenger starts to panic you may lose control of the glider.

Assess the fitness of your passenger. Ask them if they have any medical condition or disability. Do they suffer from fits, dizziness or a heart condition? If so are they taking any medication? Explain to the passenger the sensations of flight and the effects of turbulence. **You must stress that this is an 'adventure' sport and there are inherent risks.**

Age: There is no legal maximum or minimum age for passengers, provided that they are a suitable weight, in reasonable health and have sufficient maturity to understand the risks involved.

Flying children as dual passengers is permitted, but pilots are warned to exercise great caution when considering flying with younger children (even if their weight is adequate). If you are an AEI and accepting payment for such flights, you should be aware that you may have to justify that the flight is a bona-fide air experience lesson, and that your passenger is able to fully appreciate the risks involved. All minors (ie aged under 18) must have written permission from their parent or legal guardian.

Try to assess your passenger's 'attitude' towards flying. Chat to them to find out why they want to fly dual. If you have a group who are waiting to fly, it is appropriate to brief them together, but it is important that you speak to each one prior to flight to ensure that they are personally committed, and not simply responding to peer pressure.

If anyone seems nervous it is a useful strategy to leave that person till last:- watching a few flights may reassure them, or help them decide it is not for them. If you feel that they are not flying for the right reasons you can always cancel the flying for some reason (tiredness, deteriorating conditions etc).

It must be their decision to fly, do not try and persuade or encourage them as this could be viewed as pressure in some cases.

If your passenger is not a member of the BHPA then you are advised to get them to pay for a one-day membership: This means that they are fully committed and means they have signed the "I understand the risks" warning.

If you are an AEI and operating within a school, then your passenger **must** be a member of the BHPA. It is critical that the paperwork is completed **before** any flight takes place in order for your insurance to be in place and for the flight to be legal. If you have forgotten a membership book then you **cannot** fly your passenger. At least one instructor who thought he could "*do the paperwork later*" has found himself both on the wrong end of the law and in danger of losing both his business and potentially his house, as he was uninsured. (Schools are advised to keep a membership book permanently in the tandem glider bag.)

Make sure that your passenger is wearing suitable clothing and footwear, and has removed any sharp objects from their pockets. Long hair can be a problem on paragliding dual flights as it blows straight into the face of the pilot and can obscure vision. Long hair should be retained inside the passenger's clothing or helmet.

You may not carry passengers who are under the influence of drugs or alcohol.

Even if your passenger is an experienced pilot, you are the pilot in command and their safety is your responsibility. Don't assume that even an experienced pilot won't do something stupid: You are taking pilots out of their familiar flying environment and are increasing the likelihood that they will overlook even the most basic things.
CHECK EVERYTHING YOURSELF!

3. EQUIPMENT

Spend some time familiarising your passenger with the equipment that you will be using. Get them to follow you through the daily inspection and pre flight checks, and explain to them what everything is and what you are looking for in the check. Make sure that your passenger's harness and helmet fit and are secured correctly. No matter how eager you both are to get airborne you must spend time on the ground sorting out the relative flying positions that you'll adopt once in the air. Know your equipment's peculiarities before taking new passengers. You can familiarise yourself with peripheral equipment such as harnesses in solo flight. This may be more difficult with dual gliders due to the minimum weight requirements. If this is the case then you should gain experience of the glider by flying with another dual rated pilot. The point is that you should avoid flying with a new passenger whilst using unfamiliar equipment. Remember, never change more than one variable at a time!

Equipment - Hang Gliding:

Harness - Preferably use a Pod type harness for your passenger, as they present the least risk of tripping on take off, and are easy to get into during flight. If a Stirrup harness is being used then make sure that a foot rubber is used to keep the stirrup clear whilst running. Cocoon harnesses are only suitable for trolley launched towed flights, because of the danger of the passenger tripping on the apron.

Clip into the glider and check that the passenger is suspended around 25cm (10") higher than you and will leave the ground before you. Make sure that the leg loops on the passenger's harness are not too long as they may end up being last to leave the ground despite being hung higher, this could adversely affect the control of the glider. For inexperienced passengers using pod type harnesses it is recommended that the leg closure zips are either removed (they are usually held in with velcro) or left open during the flight.

Wheels - 18cm (6") diameter wheels on the basebar are mandatory, (9" for dual tow and aerotow flights). You should however avoid using 'barrow' type wheels as they reduce the usable width of the base bar excessively.

Helmets - As for solo flight. You must ensure that your passenger is wearing a suitably fitting CE966 helmet, and that the chin strap is properly done up before clipping in.

Glider - The glider must have a certificate of airworthiness and be cleared for dual use by the manufacturer. You must ensure that the 'all up' weight of you and your passenger is within the permitted payload. When assessing the payload be sure to include the weight of harness, helmet, parachute, clothes etc.

Modern purpose built, dual gliders are trimmed for dual flight, and the accompanying handbook should be followed. Many pilots find that older adapted gliders trim much slower with the additional weight of the passenger and are therefore having to constantly pull on to avoid stalling. To prevent this move the passenger's hang point slightly further forward than the normal hang point used by the pilot. Some experimentation may be necessary with lighter or heavier pilots, but make all alterations cautiously. The pilot and the passenger should be clipped into separate main and back up loops.

Emergency Parachutes - Dual emergency parachutes are much bulkier than solo ones and may not fit in the parachute container of some harnesses without modification. The container may then be an awkward size to mount on your chest or the side of your harness. Consider the parachute bridle to harness attachment point carefully and ensure that the connectors are strong enough to hold you and your passenger during the opening shock. Be very careful if using harnesses containing solo emergency parachutes. Any deployment (accidental or deliberate) of these will almost certainly lead to enough drag to stop the glider flying, but will then produce a high descent rate that may not be survivable.

Hang Glider Tow Bridles - Tow bridle set up for Aerotow:

There are two approved systems that may be used: the 2:1 Tow leg set up (adapted for aerotowing) or the American 50/50 Aerotow bridle set up.

The 2:1 Tow leg set up (adapted for aerotowing)

The connection to the tow is slightly different than for solo flight. The two ends of the Billy cord yoke that attach to the harness loops at the solo pilot's right and left hip must be attached to the inner most hip harness loops of both the pilot and the passenger i.e. If the passenger is on the pilot's left then the passenger's right hip loop and the pilot's left hip loop must be used. The Billy cord must be routed through the control frame (over the base bar) as in Figures 1 and 2. The Billy cord ends should be of fixed length, and not free running through the end of the main Billy cord, (otherwise the passenger could drop back as the pilot is pulled forward and vice versa). The tow leg top mounting will normally be between 10 - 15cm in front of the hang point on keel pocketless gliders, and 15 - 20cm in front of the hang point on keel pocketed gliders. An additional weak link of 40kg breaking strain must be incorporated at the release end of the threader to prevent any possibility of a tow continuing from the glider in the event of a malfunction of any part of the system.

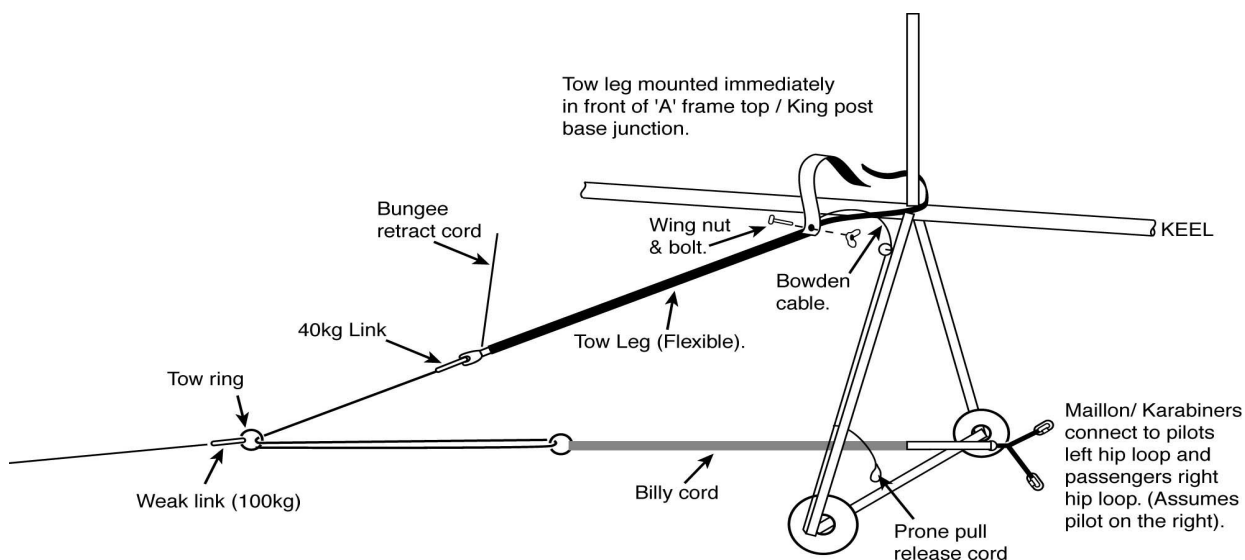


Fig 1 - 2:1 Tow leg set up for aerotowing

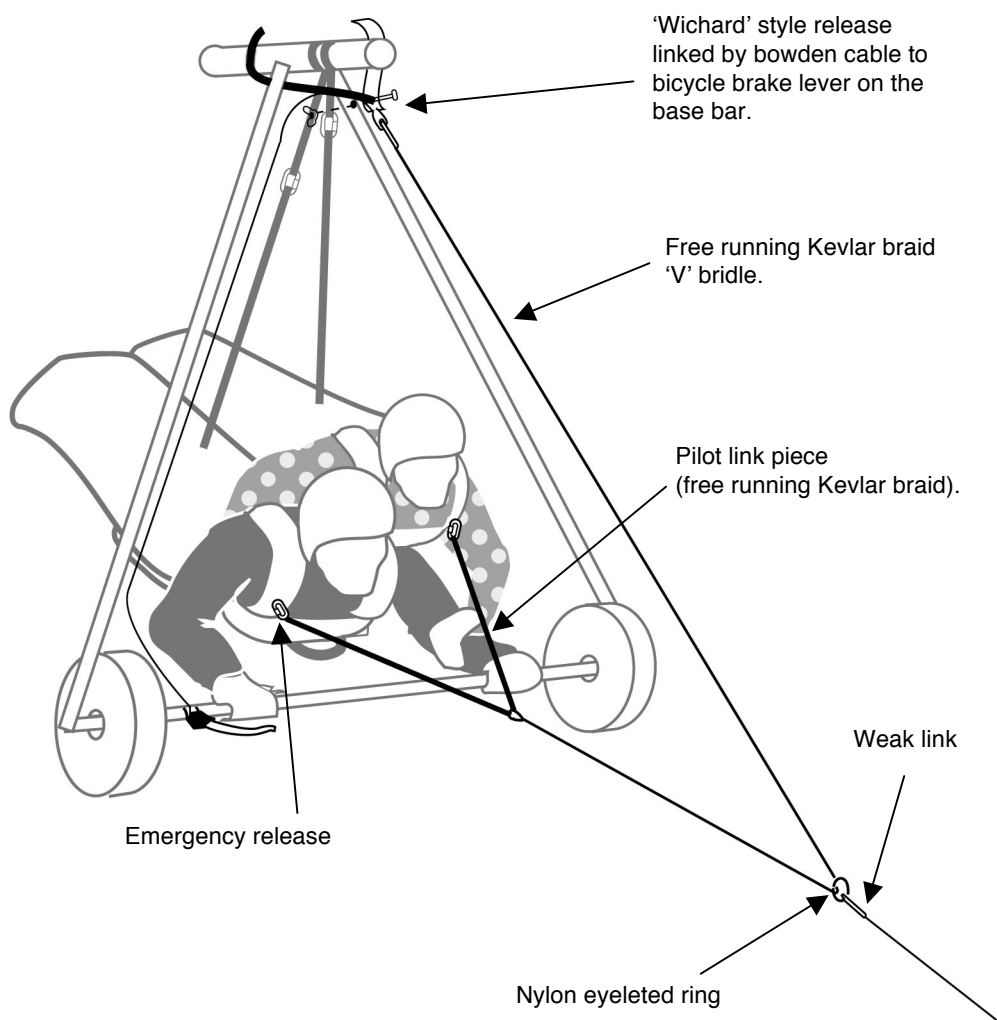


Fig 2. American 50/50 Aerotow bridle set up.

NB. Both ends of the pilot link piece and the main 'V' bridle have eye loops formed by splicing the braid into itself. This ensures that there are no external protrusions which would hinder it releasing freely.

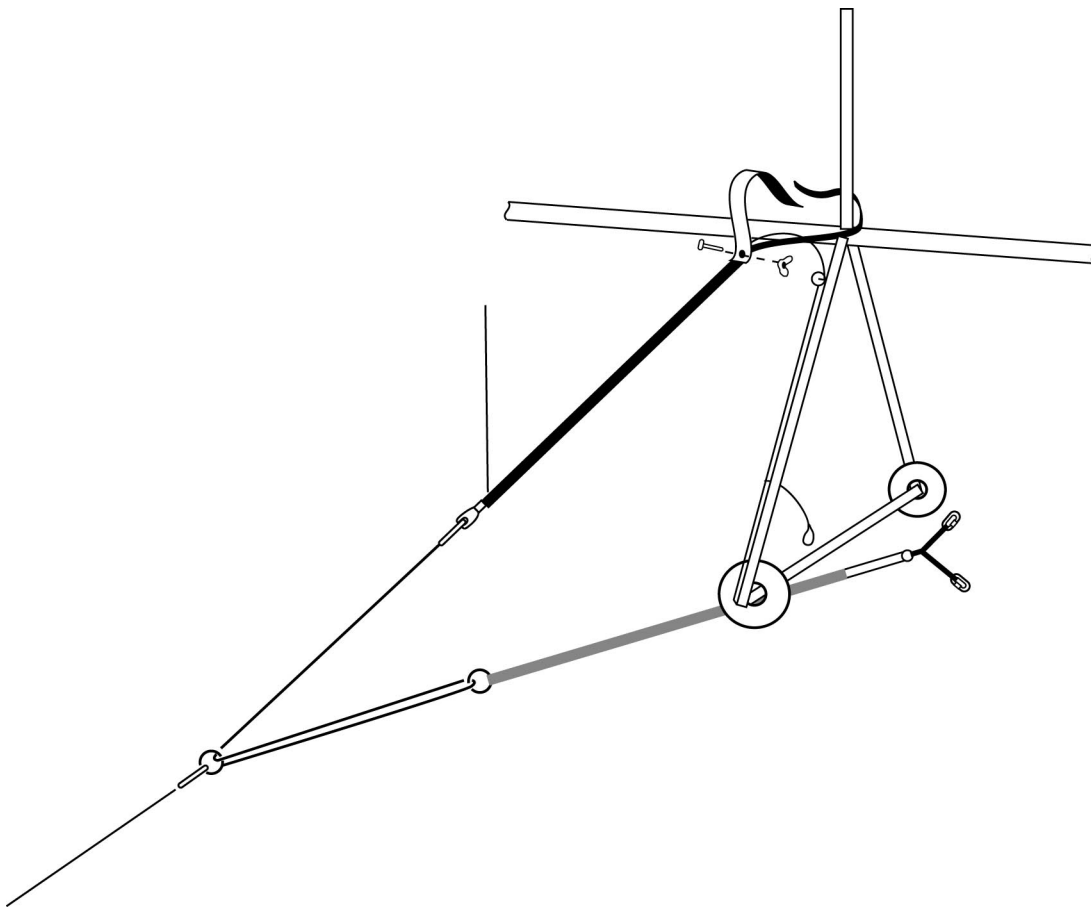


Fig 3 – Tow bridle set up for Winch tow
There is one approved system: the 2:1 Tow leg set up

The Tug - Check that the Hang Gliders all up weight is within the limits stipulated on the tug's Permit to Fly, and that the permit to fly is current.

Launch Trolley – Use of a launch trolley (or similar BHPA Approved castoring wheeled launch system) is mandatory when aerotow launching two-place gliders in winds less than 10mph, and is recommended for all tow launching of two-place hang gliders.

Launch Trolleys should comply with the Technical Manual 2.7.4.g

Equipment - Paragliding:

Harness - The pilot should have a harness with a wide seat or of a split leg design that allows him/her to easily spread his/her legs either side of the passenger. The pilot's harness should also have an efficient back pad or airbag system as if the pilot falls backwards the passenger will fall on top of him. If the passenger's harness has an emergency parachute in the back it must be removed, as there is a risk that it could accidentally deploy when the two harnesses move apart in flight. Check that the passenger's leg loops are not too tight and that they can get into a sitting position. If the passenger can't get into a sitting position the leg loops may dig in and restrict their blood circulation, causing them to feel faint.

Passenger harnesses that have foot stirrups, pods, or speed bars fitted, can cause a trip hazard on launch and landing. Ideally they should be removed entirely or at least stowed securely out of the way.

Passenger harnesses with full-length airfoam protectors are also a problem as they can be bulky and make the pilot position uncomfortable. Ideally you should use a dedicated passenger harness with an underseat protector but no other accessories.

Helmets – Both helmets should be CE96 certified types. The pilot should wear a full face helmet as the back of the passenger's helmet will be directly in front of the pilot's face and there is a very real danger of the pilot receiving mouth / chin injuries in otherwise very minor mishaps. The pilot must ensure that the passenger's helmet is of a suitable size and that the chin strap is fastened before clipping in.

Canopy - Only certified dual gliders may be used, with due regard to the correct weight range and the manufacturer's recommendations. You must ensure that the Maillons / Carabiners used are adequately rated for dual loads. Most dual paragliders come with spreader bars as standard. Spreader bars cause a cantilever between the pilot and passenger. If they are used with a passenger who is much heavier than the pilot, the pilot will be positioned higher. If the passenger is significantly lighter than the pilot, then the pilot's position will be lowered (this may cause difficulties for the pilot in seeing around the passenger and reaching the big ears etc). V-connectors (soft spreaders) solve this problem but do not separate pilot and passenger so well; and so are less comfortable for longer flights. Simple climbing slings are only suitable for use with smaller children who are effectively sitting on the pilot's lap.

Emergency Parachutes - Dual emergency parachutes are much bulkier than solo ones and may not fit in the parachute container of some harnesses without modification. The container is an awkward size to mount on the side of your harness or in front on your passenger's chest strap. Consider the parachute bridle to harness attachment point. If the emergency parachute is steerable will you be able to reach the steering toggles? How far below you will the passenger hang after deployment? Reserve parachutes should be connected to the spreader system at or near to the riser connection. In this way even under a reserve descent the pilot / passenger configuration remains normal. Do not use harnesses containing solo emergency parachutes. Any deployment (accidental or deliberate) of these will almost certainly lead to enough drag to stop the glider flying, but will then result in a high descent rate that may not be survivable.

Ballast. If you require ballast to stay within the weight range of the paraglider this must be in the form of water or fine dry sand carried in a ballast bag. Solid objects such as rocks, bottles or flasks in the rear of the passenger or pilot's harness are very hazardous in an impact and are totally unsuitable.

Quick Release connectors (Quick-outs). Before using quick outs it is vital that the pilot is very familiar with their use - you can fit them and practice on a solo glider.

Their function is to allow the pilot to easily release one or both connections points where the risers meet the spreader bars, when you have landed in wind and collapsing the canopy normally may be difficult.

When you are familiar with these devices they can be a very useful tool in certain situations, however they do have some drawbacks. They can be hard to operate with gloved or cold hands, and because the block connected to the risers is released either forwards or backwards from its seat, there can be a delay between pressing the release buttons and disconnection. *(Pilots have been lifted a metre or more off the ground, or been pulled off their feet during this delay).* The blocks themselves are a hazard as the canopy snatching them away can result in them hitting the pilot or passenger in the face.

To sum up, if you are fully conversant with their use they can be helpful, but to routinely land relying on using quick-outs for canopy control is poor practice. They should be used as back up system only.

3. THE SITE AND CONDITIONS

Most dual hang gliders and paragliders are noticeably less manoeuvrable than solo machines; consequently you use up much more sky. For this reason, you need a big un-crowded site. Take off and landing, will both be more involved, and therefore you won't want to contend with any additional complications. Pick a site with large rotor free take off and landing areas. If you're flying a hang glider you may end up landing on the wheels, so check that the landing field is smooth enough. Is there enough room to make a sensible approach? Obviously good conditions are essential, though these will be different for each discipline. Paragliders require conditions similar to those suitable for solo flying, less two or three mph.

Check the forecast to ensure that there won't be an increase in wind strength. It's far more difficult to land a tandem in breezy conditions than it is a solo. Hang Gliders should avoid scratching and so require good soaring conditions i.e. 20mph +. This will make take off and landing easier by reducing your groundspeed. It's worth taking a test flight on a solo glider to get a feel for the conditions, and ascertain whether they are suitable for dual flight.

For dual aerotow flights a larger site may be necessary due to the reduced climb rate when towing dual gliders. The tug pilot should be briefed to keep the hang glider within gliding range of the site at all times to prevent an unplanned wheeled landing in a strange field with an unknown surface.

Section 2 - Common Practice

BRIEFING

A dual flight for a passenger with no experience of our aircraft is a fairly major event and is likely to create a good deal of excitement and anxiety. In this heightened state the passenger is less likely to take in lots of new information. Therefore for a briefing to be effective you must **Keep It Simple - KISS**.

Your briefing should result in everyone involved understanding what their role is, what to expect, and how to respond if things don't go as planned. Make sure that the information has 'sunk in' by using the instructor 'Question and Answer' technique. There is an awful lot of information that you could include in your briefing but it would probably get forgotten or confused, so it's essential that you focus on the key points necessary for a safe take-off, flight and landing. Much of the information on things such as the way a wing produces lift could be explained casually as you rig or do your pre flight checks.

The procedure for take-off must be clearly explained to the passenger including what they can and can't hold on to, what to expect from the glider and how you want them to respond. Explain to the passenger that you will be able to talk to each other throughout the flight and you will remind them of what to do at each stage of the flight. Check their weight and always ask about why they want to fly, *(If it's because their mates dared them the alarm bells should start ringing)*. If a passenger seem nervous, especially if they are one of a group, it is often helpful to leave their flight till last, seeing some successful flights might boost their confidence or if not you can always make some excuse to decline to fly them, do not try and cajole or persuade anyone to fly who seems reluctant. Before take off always give them an estimate of how long the flight will take. (You can always extend it if conditions allow and you are both having a good time).

'Anchor men', 'Wing tipplers', and 'Wiremen' must all be thoroughly briefed as to their duties, otherwise you could find them being more of a hindrance than help. Anyone helping in these capacities should be a BHPA member (and therefore be insured). Just prior to take off reiterate the main points of the take-off procedure again so that they remain fresh in the passenger's mind.

Cameras: Lots of passengers want to take cameras with them. Ensure that they have a safety line attached. If they wish to use extendible "selfie sticks" that is fine but these must be retracted and stowed away safely for take off and landing. Carrying a long pole, or any heavy object is not recommended and could be hazardous.

On hang-gliders, a fixed camera mount pole can be fitted provided it does not interfere with control or obstruct the view of the pilot, cameras mounted on or near wing tips should be very light weight as any significant weight or drag may affect control.

On paragliders cameras may be fixed in the centre of the wing using magnetic mounts but the use of these is not recommended near the wing tips as they can cause entanglements and cravats, both on take off and whilst airborne.

IN FLIGHT

After take-off be very gentle doing your first turn as you need to get used to the glider. During the flight explain to your passenger what manoeuvres you are about to do and why, and then execute them gently. What may seem like a gentle turn to you could be very disconcerting to a first time passenger, and could possibly cause them to feel airsick. If the passenger does complain of airsickness try to get them to concentrate on something else. If it persists then land as soon as possible.

You will be flying with restricted visibility, altered control and possible loss of concentration due to chatting; in addition your glider will be covering a large area quickly. It is vital that you remain alert and compensate for these limitations by executing all manoeuvres cautiously. Obviously you must only allow the passenger / student to handle the controls if you have plenty of height and are well clear of other pilots, and certainly not below 500ft or whilst on tow.

Keep a two-way conversation going with your passenger in flight, this helps to calm them and lets you know how they are feeling and if they are enjoying it. Always explain what you are doing and tell them before making a manoeuvre.

FLYING WITH OTHERS

Remember that the wake turbulence of a loaded dual glider is much greater than that of a solo glider, particularly when turning or flying slowly. This can be quite disconcerting to solo pilots who have not experienced it before, so a discussion with other pilots who may be flying with you is advisable.

APPROACH AND LANDING

Brief the passenger for landing well in advance and get them into the position for landing early. Do a fairly high circuit with a long straight final glide into wind: putting in last minute turns at low level is asking for trouble. Make a good hard flare for a one step landing; a fast running landing with two pairs of legs is likely to result in a fall. Once you have landed unclip the passenger from the glider first. Never leave the passenger clipped into the glider alone.

Section 3 - Techniques

HANG GLIDING - HILL

(a) Pre -launch

After doing your pre flight checks, clip your passenger into the glider to get them used to the feel of the harness and getting into and out of prone (it should go without saying that you should never leave your passenger clipped in with the glider unattended). Clip in yourself and check the relative height of the two harnesses (the passenger should be suspended ~25cm higher than the pilot). Once airborne and prone tell your passenger to lock him-self or her-self to you by placing one arm across your shoulders (but not holding the parachute handle), and the other hand on your wrist. Practice some control movements explaining how the glider will respond to these inputs. Emphasise the need to move in unison and make it clear that they should not hold the control frame. During the briefing you must stress to the passenger that they should continue running throughout the whole take-off even when they feel the harness straps lifting them (to prevent them from trying to jump into the air at the first tug on the harness). Make it clear that they should not go prone until you tell them to do so. If you intend to top land, again choose a site with a large top landing area. It's worth briefing your wiremen as to when and where you intend to land so that they can secure the nose of the glider when you land in windy conditions.

(b) Launch

The technique for take-off is basically the same as for solo flight. The passenger should be positioned to the side and slightly behind you, with one arm across your shoulder holding your harness at the armpit so that you can feel their knuckles. Their other hand should be holding your harness at the nearest armpit. Before you start your take off run, make it clear to the passenger which foot to put forward first, the idea being that your neighbouring legs move in the same direction at the same time to avoid tripping each other. During the take-off run your passenger will be lifted from the ground first, but you must continue running to gain extra airspeed.

(c) In Flight

Once airborne the pilot should go prone first and then instruct the passenger to do so. Make your first turn very gentle, away from the passenger, and warn them before you start the turn. If at any point in the flight you begin to get low, cut your losses and head for the bottom landing to set up an approach with plenty of height, rather than trying to scratch back up. While you still have plenty of height tell the passenger to get their legs out of prone and place their hands on your shoulders and then get out of prone yourself. Get onto the uprights early and level the glider into wind with plenty of height. Remember that a dual glider with passenger will be less manoeuvrable than a solo glider, the handling will be heavier and you will cover much more ground on your approach.

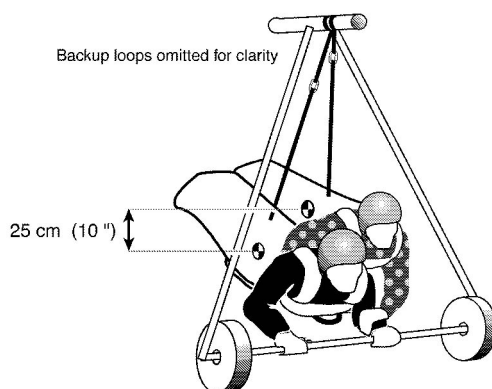


Fig 4 – HG Dual Passenger Position

(d) Landing

Do not attempt an 'S' turn approach, as this commits you to making numerous turns, close to the ground. This will not only be physically demanding, it will be difficult to judge where you will land and it could be very disconcerting for the passenger. Use the constant aspect approach to position yourself into wind with a long final glide. If the landing field is smooth and flat enough you are advised to land on the wheels (check out the landing field first). Most hill sites don't have smooth, flat, bottom landing fields though so in this case on final approach you must maintain plenty of airspeed and flare hard for a stand up landing. If you try to run off the landing you risk at best ending up in a pile of tangled legs! Once down, unclip the passenger first and then yourself. When top landing in windy conditions wait for assistance from wiremen before unclipping.

TOW / AEROTOW

Dual tow and aerotow hang gliding activities must comply with the operating procedures laid down in the BHPA Technical Manual section 2 chapter 2 and section 2 chapter 7 pages 1-17 Appendix A, B, C.

For dual aerotowing the use of a launch trolley or wheeled under carriage is mandatory in winds of less than 10 mph and is recommended for all dual launches. The launch trolley removes the hazards caused by two pairs of legs running in close proximity, allows both pilot and passenger to go prone before take off and provides an opportunity to rehearse in flight controls and allows the pilot to get correctly positioned off centre of the base bar. (The natural tendency of the solo pilot to position in the centre of the base bar must be resisted, as this will lead to a turn immediately on lift off, due to the passengers weight being to one side. The combined mass must be central.)

Warn your passenger to lower their head when slack is taken up and later when the line is about to be released. That way if the line springs back it will only strike the top of the helmet.

Dual Aerotow pilots should aim to keep the tug's kingpost on the horizon as any lower than this and you run the risk of flying into the tug's propeller wash.

Line Breaks

The passenger must be thoroughly briefed on the procedure to follow in the event of a line break. If you are being winch launched you should explain that the glider will be in a stalled attitude and they should expect the nose of the glider to drop suddenly. Explain that this is normal and they should not panic. Recovery from a low line break is the same as for a solo tow although you should always land on the wheels rather than attempting to land on your feet.

AEROTOW HAZARDS

1. The difference between being a little out of position and being locked out is very small on a dual glider.
2. On tow the Pilot in Command must have his **hand actually on the release at all times**.
3. Tug pilots should be specifically briefed if the tandem pilot is thinking of letting the student do any part of the tow.
4. If the student is flying the glider on tow and gets the least bit out of position **release immediately!** You will not fight it back into position, and the situation will go from inconvenient to dangerous in the twinkling of an eye. This is especially important when near the ground, the dangers diminishing as height is gained.

Only Aerotow Coach qualified dual pilots, training other already aerotow solo qualified potential dual pilots have any need to allow the 'student' to handle the controls near the ground. **Six fatalities have occurred in America with this activity.**

5. Unless the student is actually learning to aerotow, the benefits of letting them have a go during the tow are few, and probably not worthwhile. Even with Aerotow environment courses, the main benefit of a dual flight is to show the trainee the positioning: a quick 'shot' on the controls is unlikely to massively increase their preparedness. This is especially true if you consider that the pitch forces, glider response rate and release system are all totally different to those they will experience when they tow their own glider.

PARAGLIDING - HILL

Get into your harness and attach the spreader bars and canopy to you first. Build a wall, check the canopy out and get ready to take-off. Lastly attach the passenger.

In general, use forward (alpine) take-offs for light winds and reverse techniques for moderate winds. For stronger winds with the help of an anchorman, it may be easier to revert to a forward take-off technique, as you will be lifted off the ground immediately in a flying position.

Spend time selecting your launch area. The most suitable area to launch from will consist of a gentle slope with a gradual increase in gradient. If you try taking off over a sharp edge the passengers weight comes off the ground first pulling you and the wing forwards. This is extremely dangerous if the wing is not already flying properly.

On a steep slope you may have to stand side by side along the slope to take-off. If your passenger stands in front of you down the slope you may not be able to stand up straight.

With all reverse take-offs a good 'crossed-brake' technique is mandatory in order to keep the canopy under control at all times. Due to the position of the passenger, one riser is much further away from you than the other. You must compensate for this as you pull up.

Take-offs have to be more precise because if the canopy does not come up straight you cannot easily side step to make a correction.

Anticipate being pulled back a fair way before getting the canopy flying and make sure you have a large 'drag back' area.

A heavier or taller passenger will still be running long after you are airborne.

Take-off techniques can be divided into the following categories. They are all made easier by having well briefed helpers of sufficient skill available.

Be aware that because the canopy attachment points are in front of the pilot when flying dual, in the correct flying position the leading edge of the canopy will seem to be a lot further forwards than when flying solo. A common mistake on take-off is to let go of the risers too soon on the pull up.

Reverse take-off 1.

The pilot faces the canopy, the passenger faces down hill. This is probably the easiest reverse technique. The pilot does a reverse take-off procedure and as the canopy comes up, turns to face forwards.

Advantages - the passenger is facing direction of travel and just has to stay standing and run forwards also the passenger can help brace against drag loads as the canopy is pulled up.

Disadvantages - the passenger has to be able to stay standing whilst possibly being pulled backwards. The risers are not of equal length making pulling canopy up difficult (one riser pull up and brake works well on some canopies). The passenger is not in a position to help control the canopy (see technique below).

Offsetting the canopy position so that you are pulling up one side first is a useful technique to minimise the sudden surge of power as the canopy come up. Dual pilots are strongly advised to become proficient with this variation.

Reverse take-off 2.

Both pilot and passenger face the canopy, side by side. The passenger ducks under one set of lines and both turn quickly as the canopy comes up.

Advantages - risers are of equal length for the pilot making it easier to co-ordinate the pull up. The passenger can see canopy and can react accordingly. The passenger can easily help with launch i.e. helping to pin canopy with 'C lines' prior to take-off. It is also easier for the passenger to stay standing if the canopy is blown backwards.

Disadvantages - needs a relatively experienced passenger who turns quickly and in the right direction!

Reverse take-off 3.

As 1 above, but with the passenger sitting. This is only possible with soft V spreaders, or significantly extended passenger connection points. As the canopy comes up, it lifts the passenger off the ground. The pilot then turns and runs the passenger/canopy combination forward. (This technique is much more difficult if using spreader bars as the cantilever can mean that the passenger may not be lifted off the ground at all.)

Advantages – The passenger cannot fall over and injure themselves. Ideal position for the passenger to be in if dragged backwards. Often used for flying dunes, *(ie launching from steep slopes in good winds)*

Disadvantages - Ground handling must be precise, as the passenger anchor can lock the canopy out if it comes up crooked. Not possible in light winds.

Forward take-off.

Advantages - No complications of having to turn around.

Disadvantages - Good forward take-off technique needed. You cannot check the canopy as it comes up. Some dual canopies are difficult to forward launch without using correct trim settings. The canopy will only be flying properly when the canopy appears (relative to solo canopy) to be a long way in front of you.

You may need to run side by side to reduce the risk of tripping each other up and kicking each other in the shins. In all but the lightest breezes, the power of a dual canopy means you will require an anchor person.

In flight.

An important part of the dual flight experience is the two-way conversation between pilot and passenger. Tell the passenger what you are doing and why, and encourage their questions. If your passenger is not a student under training it is not advisable to pass them control unless you are certain there are no other craft or obstacles in the vicinity. *(Imagine trying to explain to an investigation why the person in control was neither a pilot nor a student).*

If handing over control to a student the standard aviation statements of "I have control" and "you have control" are helpful. You must brief students to look before turning. Do not let students attempt radical manoeuvres. It is important that any difference in control positions is explained, as a dual glider may have a significantly different position to a solo wing that the student has been or will be flying.

Always keep your passenger informed, if you find a good thermal for example don't just bank over and start winding it up, tell them what is happening and check that they are OK with it. Never do radical manoeuvres without the passenger's agreement, including low passes in front of friends/ family etc.

If you need to use big ears on a dual it is recommended that the trimmers are not set to slow as tandems do have an increased tendency to enter deep stall. Ensure that you are familiar with your gliders manual for advice, but if in doubt set half-trim before initiating ears, you can always trim for max speed once they are in. Be aware that passengers will be quite nervous, a manoeuvre such as a spiral dive may seem fine to you but can be terrifying to an unprepared passenger.

Landing.

Dual landings should only be made by the Dual licensed pilot in command. Take control in plenty of time. Brief your passenger for landing well in advance. Ensure that your passenger gets out of the sitting position early and into a standing position, ready to run.

Remember that due to stepped hang-points on the spreader bars the passenger's feet can be up to two feet closer to the ground than yours.

You may find that the brake pressure on some duals makes flaring very hard work. Sometimes taking wraps can help but be ready for it. Know your canopy peculiarities before taking off. You must try to land into wind. It is difficult to run out a down-wind landing with two pairs of legs!

For bottom or top landings, the circuit needs to be well planned, as there is little margin for error. It needs to be larger than for a solo canopy due to the lack of manoeuvrability. Normal field selection procedures are appropriate but take a longer landing run into account. Last minute changes must be avoided as any late turns can result in a very fast and heavy landing.

Brief your passenger to turn around to face the canopy immediately on landing and tap them on the shoulder just to confirm the direction. On landing, turn to face the canopy yourself, then bring it down whilst running side by side after it.

On landing, after getting the canopy safely collapsed, unclip your passenger. **Never** leave a passenger clipped to the glider on their own.

i) In light wind landings your passenger must be ready to run. Either sweep them to one side so that you land side-by-side or get them to run to one side on landing. If you are going to land side by side, sweep your passenger over early, as it will cause you to swing about (not sensible close to the ground on finals).

ii) In fresh winds without helpers, you must be able to turn around and collapse the canopy efficiently. It is difficult to stop a 43m² canopy dragging you if you get it wrong. Never try to bring the canopy down until both of you have turned around. Collapsing your canopy is a crucial skill. Some respond best to C line collapses, others have B line handles with a 2:1 advantage, which are very effective.

iii) In strong winds making a controlled landing and collapsing the canopy without assistance or using quick-out connectors is almost impossible. You should never get in a situation where this is possible. **Remember your legal duty of care to your passenger!**

Flying in the UK where you are likely to be top-landing in a soarable wind, the safest and most effective technique is to land accurately next to an experienced helper, and hand off the controls to them so that they can stall and collapse the canopy (by stepping backwards with a powerful flaring action). In this way neither the pilot nor passenger has to move from the touchdown until the canopy is fully controlled and they can unclip.

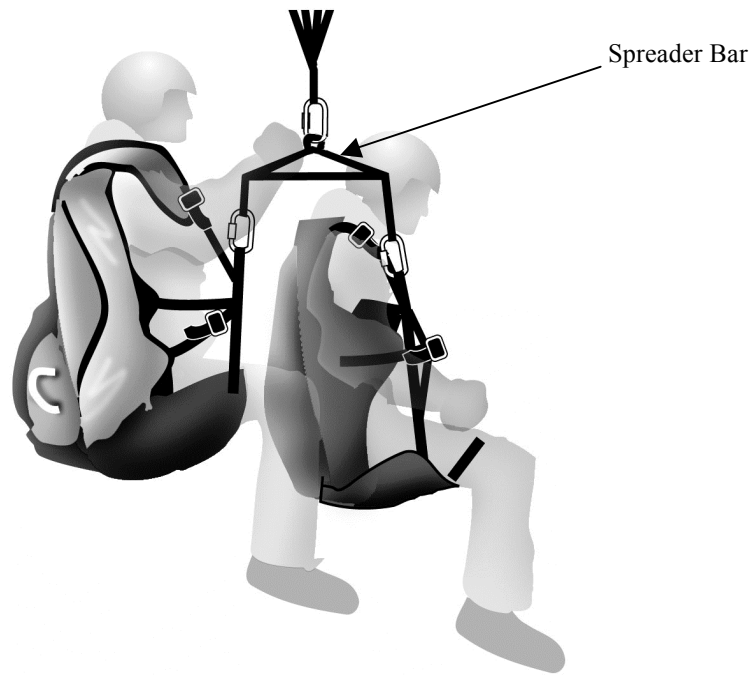


Fig 5. Dual paraglider harness set up.

PARAGLIDING – TOW (modern high performance canopy)

Dual tow launching should not be attempted if the wind is too strong to forward launch, and certainly in no more than 15mph wind. As in the hill launch the passenger should be clipped in only when the pilot has clipped in.

The tow line should be connected either to:

1. the canopy risers just above the maillons or karabiners.
2. the passenger's harness tow straps at a point just below the harness maillons or karabiners.

A short three ring circus release can be used or a spinnaker clasp release, whichever release is used you must ensure that there is no chance of it becoming tangled or disappearing from view during the tow. The passenger should be briefed on the operation of the release mechanism in the event that the pilot is unable to release. A second cord is threaded from the release over the passenger's shoulder allowing the pilot to operate the release.

Use the standard tow launch technique. (See Pilot Handbook.)

During the passenger's briefing the pilot should stress the need for them to keep running throughout the launch. The passenger should be made aware that you might shout directions to them during the launch, ie. 'run right' or 'run left', so the pair of you remain beneath the canopy during launch. The pilot will leave the ground first and should not be tempted to pull the passenger off the ground by pulling on the controls. The canopy must be 'flown' off the ground. The passenger must therefore continue to run, although this will probably become more like 'moonwalking strides'. During the first 60ft of the flight it is important that the winchman does not apply too much power and should be thoroughly briefed on this. Following the release the procedure for the flight and landing are the same as for hill flying.

It is advisable to use an airbag harness for the passenger with an internal back protector. The passenger should be briefed thoroughly on low-level line break procedure (not enough height to pendulum through). Brief the passenger to put their legs forward on the 'legs forward' command, and then land them on the airbag.
