

DHV report – approx 2012? Copied from <http://www.dhv.de/web/en/safety/safety-tests/pod-harness-test/>
Conclusions on page 9. Links to the DHV videos have been omitted from this document.

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Pod Harness Test

Pod harnesses are currently a very successful trend, and an increasing number of pilots are exchanging their old harnesses for new ones with built-in leg bags. However, the positive side of keeping warm on long cross country flights is also accompanied by several negative effects. The latest pod harnesses are generally very expensive, are heavy and voluminous, more complicated to setup and adjust, and require more attention to detail when checking for airworthiness due to their complexity and the use of fiddly components. In addition, pod harnesses can hinder pilots during takeoff and severely influence (increased twist danger) reactions to collapses and extreme flight manoeuvres. A detailed report about this is available in DHV-Info 162 page 36 and also as download under www.dhv.de.

Performance gains while flying through reduced wind resistance are only possible when pod harnesses are carefully setup and aligned to the direction of travel. At a glance the advantages may appear clear, but the non-trivial setup is often ignored and results in no effective gain.

The psychological advantage many pilots feel when warmly packed in a pod harness “when it gets rough, I don't feel so exposed and scared” may also be a reason for the sales success. Market leader Advance report waiting times of three months for new orders.

The DHV Safety and Technical department took a look at the current pod harness models available on the market.

After it became known that the Advance Impress 3 suffers deployment problems when fitted with a large reserve, we concentrated our investigations on the reserve container. In addition we looked carefully at safety systems designed to prevent pilots falling out of their harnesses if they had forgotten to connect the leg loops. In the last few years we have seen several fatal accidents and near-misses where pilots have closed leg bags and attached front-cockpits while forgetting to close their leg loops. Investigations showed that pilots were easily led to believe that everything was correctly closed especially when leg bag and cockpit constructions visibly obscured the leg loop attachment points. On www.dhv.de under Safety and Technical there are several articles and accident reports relating to this problem.

To conclude the tests we looked carefully at the protectors being used in pod harnesses.

Last year we conducted several successful reserve deployment tests while in simulated spiral dives on Thomas Grabners G-Force Trainer. (See DHV-Info 169 page 42 and on the DHV website). Once again, we packed a minibus full of people and equipment and set out for Gröbming in Austria. All deployment tests were conducted at 4G force: this is typical for a spiral dive with sink velocities of >20 m/s.

Advance Impress 3

Advance Impress 3 (including Advance reserve inner container)



Deployment handle: position - good, size - small
Worst-case reachability: good

Reserve deployment tests with different reserves at 4G in the G-Force trainer

Gin Glider Yeti 35
Volume: 4.2L
Easy

Independence Evo Cross
Volume: 5.2L
Easy to difficult according to pull direction

High Adventure Beamer 2
Volume: 5.5L
Easy to difficult according to pull direction

Independence 7 UP L
Volume: 7.2L
Not tested - reserve too big for inner container

Harness strap system: Get Up



Additional safety system when main harness straps not closed: yes
To close the foot bag, two rings must be attached to a small carabiner. This prevents a pilot from falling out of the harness even if the main straps are not correctly closed. It is nevertheless possible to connect the cockpit without using the safety system (right picture).



Attachment strap length: 32cm



Protector: Foam protector, 14cm thick under the seat. Damping according to EAPR Test center: 42.6 G
4cm foam with no penetration protection on back.

Advance Impress 3 (continued)

Deployment tests with the Impress 3 in the G-Force Trainer



2 of our 5 testers had severe difficulties in reserve deployment. With a side pull the container zip can only be opened by using a lot of force or working the handle from side to side (Left picture). Pulling the handle up (middle picture) opens the zip more easily, this should then followed by a side pull to deploy successfully (right picture). As the Impress 3 has no seatboard, different pilot sizes and weights can influence deployment characteristics.

Sup Air Skypper

Sup Air Skypper



Deployment handle: position - forward - arm must almost be fully extended to reach, size - large
Worst-case reachability: not good

Reserve deployment tests with different reserves at 4G in the G-Force trainer

Gin Glider Yeti 35
Volume: 4.2L
Easy

Independence Evo Cross
Volume: 5.2L
Force required - delayed

High Adventure Beamer 2
Volume: 5.5L
Easy

Independence 7 UP L
Volume: 7.2L
Force required - delayed

Harness strap system: T-Lock



No additional safety system when main harness straps are left open - both foot bag and cockpit can be closed.



Attachment strap length: 24cm



Protector: Foam 14cm thick from seat to lower back, protective plate in upper back region for penetration protection. Damping according to EAPR
Test center: 34.3G

Woody Valley X-Alps GTO

Woody Valley X-Alps GTO



Deployment handle: position - forward - arm must almost be fully extended to reach, size - large
 Worst-case reachability: not good

Reserve deployment tests with different reserves at 4G in the G-Force trainer

Gin Glider Yeti 35	Independence Evo Cross	High Adventure Beamer 2	Independence 7 UP L
Volume: 4.2L	Volume: 5.2L	Volume: 5.5L	Volume: 7.2L
Very easy	Very easy	Very easy	Very easy

Harness strap system: Get Up



Additional safety system when main harness straps not closed: yes
 To close the foot bag, two rings must be attached to a small carabiner. This prevents a pilot from falling out of the harness even if the main straps are not correctly closed. It is nevertheless possible to connect the Leg bag without using the safety system (right picture).

The red webbing straps used are well visible even in the shade of the leg bag



Attachment strap length: 30cm



Protector: 14 cm thick under the seat, thickness decreases progressively. Damping according to EAPR Test center: 42.6G



Protector detail: the protector has penetration protection only under the seat, the back is protected only via a 12 cm foam block

Ava Sport Tanto light

Ava Sport Tanto light



Deployment handle: position - forward - arm must almost be fully extended to reach, size - large
Worst-case reachability: not good

Reserve deployment tests with different reserves at 4G in the G-Force trainer

Gin Glider Yeti 35
Volume: 4.2L

Independence Evo Cross
Volume: 5.2L

High Adventure Beamer 2
Volume: 5.5L

Independence 7 UP L
Volume: 7.2L

Very easy

Very easy

Very easy

Very easy

Harness system: T-Lock



No additional safety system when main harness straps not closed.

Cockpit and leg bag can be closed when the main harness straps are still open, but they hang loose in front of the pilot (right picture) and does not impede visibility to the leg loops. Cockpit and bag are fixed under tension once the pilot stretches legs after launching.



Attachment strap length: 37cm



Protector: Foam, 16cm thick reducing progressively under seat and on back. No penetration protection. Damping according to Air Turquoise Test center: 32,6 G

Gin Gliders Genie Lite

Gin Gliders Genie Lite



Deployment handle: position - good, size - Large
 Worst-case reachability: good

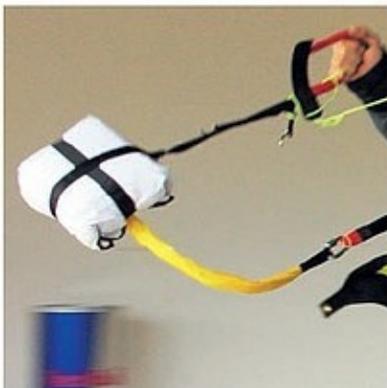
Reserve deployment tests with different reserves at 4G in the G-Force trainer

Gin Glider Yeti 35	Independence Evo Cross	High Adventure Beamer 2	Independence 7 UP L
Volume: 4.2L	Volume: 5.2L	Volume: 5.5L	Volume: 7.2L
Very easy	Very easy	Very easy	Very easy

Harness system: Get Up



Additional safety system when main harness straps not closed: yes
 To close the foot bag, two rings must be attached to a small carabiner.
 This prevents a pilot from falling out of the harness even if the main straps are not correctly closed. It is nevertheless possible to connect the cockpit without using the safety system (right picture).



Attachment strap length: 45 cm



Protector: Foam, 14cm thick under seat, reduced thickness on back. No penetration protection. Damping according to EAPR Test center: 37.5G.



Protector detail: 8cm simple foam protector on back, 14cm layered foam construction under seat

Sup Air Delight

Sup Air Delight



Deployment handle: position - good, size - Large
Worst-case reachability: good

Reserve deployment tests with different reserves at 4G in the G-Force trainer

Gin Glider Yeti 35
Volume: 4.2L

Independence Evo Cross
Volume: 5.2L

High Adventure Beamer 2
Volume: 5.5L

Independence 7 UP L
Volume: 7.2L

Very easy

Easy

Very easy

Not tested - harness container too small for this reserve

Harness system: T-Lock



No additional safety system when main harness straps not closed. Both cockpit and leg bag can be closed.



Attachment strap length: 52cm



Protector: foam, 14cm thick under seat, thin on back. Penetration protection on back. Damping according to EAPR
Test center: 48.3G

Conclusions follow...

Conclusions

The product concept pod-harness has several systematic safety problems. Recreational pilots without the need for top performance should carefully consider if the additional risks inherent in flying with such a harness are really necessary for them to enjoy the sport.

Reserve deployment

Under the six models tested, the Impress 3 from Advance had the most problems with our tests. As the problems did not occur with all the combinations of reserve canopies we packed into the harness, it is difficult to make a general evaluation of the harness. We are of the opinion that several factors play a role for the successful deployment of a reserve: reserve size, direction of pull during deployment and the weight and sitting position of the pilot. Pilots using this harness are recommended to give careful attention to, and follow the instructions Advance have printed on the harness inner container: even if the volume of the reserve used is within the allowed limits of the harness, several different deployment tests are to be conducted by the pilot prior to flight.

The following models performed particularly well under our tests, with no deployment problems: Woody Valley X-Alps GTO, Gin Gliders Genie Lite and Ava Sport Tanto light. Here, a pull on the deployment handle was all that was required to successfully deploy all reserves of differing sizes. Harnesses from Sup Air, the Skypper and Delight, had a few problems. The Skypper requires additional force on the deployment handle when fitted with some reserves, whereas the Delight has a long reserve attachment strap, and is only released from its container at arms length. Several manufacturers have optimised the length of the attachment strap – this is important for a forceful throw of the inner container when deploying. The shorter the attachment strap, the better. The Genie Lite with 45cm and the Delight with 52cm were at the top end of the scale, while other harnesses were all under 40cm, and some under 30cm length.

Deployment handles must be easily reachable, should a pilot tip severely to the wrong side after a collapse. Not all harnesses fulfilled this requirement – in some cases the handle could only just be reached with a fully extended arm and in other cases not at all. It is important to check whether your arms are long enough when choosing a new harness.

Harness closure systems

Firstly: all the tested harnesses had leg-loop safety systems to prevent pilots falling out of them as required by current certification standards. Models with T-lock buckles have an extra strap from the cheststrap to seat board to automatically retain the pilot once the chest strap is closed. Models using the Get-Up system automatically connect the seat board to the chest strap when their buckles are closed. In spite of these required safety systems present in all harnesses, we have had at least 8 fatal accidents in Europe over the past two years, where pilots have fallen out of pod harnesses because their harnesses were not correctly closed. Harness bags and front cockpits were attached and closed, but the important harness straps beneath them were left open. After two fatalities in Germany, the DHV contacted manufacturers and the PMA with suggestions for additional safety systems to prevent harness bag closure before the main harness straps were correctly closed.

Harness closure systems (continued)

Three of the tested harnesses have this feature – all in the form of two rings on the bag ends which must be closed by a third small carabiner: Advance Impress 3, Woody Valley X-Alps GTO and Gin Genie Lite. The closure systems have a double function: in order to close the harness bag a third strap connected to the leg loops holding the attachment carabiner must be used. This reduces the probability that the leg loops themselves are forgotten, and in order to operate the closure comfortably, the pilot should have already closed the leg loops and chest strap. Optically, the thin straps used do not inspire much confidence, but they should withhold loads of more than the maximum pilot weight limit for the harness. Gin Gliders and Woody Valley intend to replace their systems with more comfortable T-lock systems in the near future. Sadly it is to be noted that even these closure systems used by Gin and Advance could not prevent all the associated accidents with pilots falling out of their harnesses.

In February 2012 there was a Swiss fatality with a pilot falling out of an Impress 3, in May a German pilot managed to hold on long enough to steer his glider into the slope and land uninjured. In both cases the pilots had not closed their leg loops, chest straps and harness bags / cockpits with the closure systems. The closure system used on the Impress 3 is only attached on one side of the harness – the harness bag and cockpit remain fixed on the other side of the harness, which could mislead pilots into thinking everything was correctly closed.

The closure system of the Woody Valley X-Alps-GTO made the best impression on our testers: to close the front cockpit, pilots are compelled to use a strap which activates a safety system preventing the pilot from falling out of the harness. Woody Valley have also made the leg loop straps from red webbing. This is an important point which became evident in the accident investigations: with closed cockpits pilots find it difficult or impossible to check whether leg loops are correctly closed. Other pilots at the launch could however recognise open straps if they differ from all the surrounding black webbing used. The red webbing used in the X-Alps GTO is easily recognisable even in the shade of the leg bag, and could signalise to other pilots that something is not correctly closed.

Ava Sport use a different method to ensure pilot protection from falling out of their harnesses: leg bag and cockpit can be closed without the use of a safety system, but they hang loosely in front of the pilot. This allows for a clear view of chest strap and leg loops and also does not suggest to the pilot that all is strapped in tightly. The bag and cockpit are tightened and fixed when the pilot sits back in the harness and legs are stretched.

Protectors

Many of the tested pod harnesses have reduced-size protectors, both in length and width when compared with normal harnesses. In several cases, full protector damping is only available directly under the harness seatboard. This is certainly the most important region requiring protection, in order to reduce the forces transmitted into the spine to a minimum. Nevertheless, the question remains, on how sensible it is to reduce protection to a minimum in order to nominally reduce aerodynamic drag and harness weight.

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