



Deutscher Fallschirmsportverband e.V.  
Deutscher Aero Club e.V.



# **HANDBOOK for TANDEM DESCENTS**



## **THB PARTS I & II (version 2)**

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## Preface

The aim of the Tandem Handbook (THB) of the authorised associations is to act as a source of information for active Tandem Pilots (TP) as well as an up-to-date work document to aid the Tandem Examiners (TE) in their work. It is also hoped that the publication of requirements by the authorised associations will result in consistent training standards.

The Deutsche Fallschirmsportverband (DFV) and the Luftsportgeräte-Büro (LSG-B) of the German Aero Club (DAeC) consider this THB as part of the permission for tandem descents and a foundation for professional initial and ongoing training of TP candidates and qualified TPs.

This version of the THB is an extensive collection of up-to-date knowledge about tandem descents and TP training as well as the legislation, regulations and guidelines on which it is based.

The THB enables all TEs to conduct learning objective focused TP courses. It tends towards a high safety standard and provides information for examination preparation and beyond. At the same time, the THB also allows the TEs freedom to conduct their courses in their own style and only prescribes definitive actions for the safety related elements.

Ultimately, the diligence and care of the TEs and Tandem Operations will dictate the quality of TP training and conduct in Germany. The current THB is intended to contribute to the technical elements of quality assurance.

The authorised associations would like to thank all contributors for their great technical inputs.

On behalf of the Tandem-Examiner-Konferenz  
Jürgen Mühling

### Notes:

Since 2004 the THB uses predominantly male pronouns. This is solely for ease of reading. It is intended to address all genders equally.

The authors of the THB are grateful for the suggestions received in relation to form and content of this volume.

Every TP is encouraged to contribute to this handbook so that it can continue to meet its objective: A working document for practical application, based on practical experience.

Should any changes to this Tandem handbook be necessary, the relevant page will be revised and reissued.

**The current valid version of the THB is located in the Download area of the websites of the authorised associations.**



## Update status

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5	Adjustments to repeat applications for TP recognition, module 1 pg.5	1.3.1	07/2020	R. Schusser
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8	Mandatory proficiency check for conversion and recognition Chapter 1, Point 1.4 and 1.6 Adjustment cover sum Chapter 1, Point 1.10 Requirement of a training permit Chapter 6, Point 6.3	2	03/2022	R. Schusser



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## Table of Acronyms

BKF	Bundeskommision Fallschirmsport
BV	Beförderungsvertrag = Contract for carriage
HC	Handkamera = handcam
InSiTa	Informations- und Sicherheitstagung = Annual German safety conference
KFK	Kappenfunktionskontrolle = Canopy Control Check
m/GND	Meter über Grund = meters above ground (AGL)
PHV	Passagier-Haftpflichtversicherung = passenger third party insurance
SG	Scheingriff(e) = dummy handles
TA	Tandemausbildung or Tandempiloten-Ausbildung = Tandempilot training
TD	Tandem
TE	Tandem-Examiner
TEK	Tandem-Examiner-Konferenz
TEQ	Tandem-Examiner Qualifikant or Tandem-Examiner-Anwärter = Candidate to become a TE
TG	Tandemgast, Tandemgäste = Tandem guest/passenger/student
TPA	Tandempiloten-Anwärter = Candidate to become a TP
TPC	Tandempilot-Certification = TP certification
TPQ	Tandempiloten-Qualifikant = Pre-qualified TP Candidate
TPQL	Tandempiloten-Qualifikationslehrgang = TP qualification course



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# Chapter 1

## Administration



## 1. Administration

### 1.1 General

Tandem parachuting consists of a novice parachutist being securely attached to an experienced parachutist using a harness system which can accommodate two people. The experienced parachutist is called the Tandempilot ("TP", UK/US: Tandem Instructor) and must be suitably trained, qualified and approved to be permitted to take others onto an aircraft and exit using a tandem system.

The tandem guest (or tandem guest, "TG") could be interested in taking up sport parachuting or may just want a one-off experience. In either case, the TP is responsible for evaluating the physical and mental suitability of each TG wishing to do a tandem descent.

Carrying out Tandem parachuting in Germany requires a suitable location and aircraft, approved and airworthy tandem systems and appropriate staff. Note that all legislation and regulation relating to running a parachute operation and a jump plane applies equally to tandem operations, as do the rules surrounding landing areas, whether inside or outwith approved parachute landing areas. Furthermore, the Air Traffic Act requires third party liability insurance for the tandem system covering both the owner and the TG (see chapter 7 below).

The intended landing area must be suitable for landing RAM-air parachutes, i.e., be free of obstructions and be suitably equipped to enable clear identification of the landing direction (e.g., windsock)

A suitable plan needs to exist and be communicated for dealing with emergencies.

The general safety regulations and requirements from any relevant regulations (e.g., Manufacturer manual, FBO, OM, BKF THB, etc.) must be observed.

Weather conditions always need to be monitored and evaluated by suitably trained staff to ensure all tandem activities are only carried out in suitable meteorological conditions.

Owners of tandem systems as well as those offering tandem jumps to the public (technically, air carriers) must ensure their knowledge is up to date in relation to practical experience, technical notices and bulletins and manufacturers' original instructions and subsequent updates. This is the only way to ensure the highest standard of knowledge and safety is maintained within the tandem operation.

Continued safe tandem jumping is dependent on competent staff. This encompasses continuous professional development, currency training and self-checking in addition to the initial training. Timeframes and jump numbers for currency have been incorporated into the legislation and need to be adhered to.



## 1.2 Permission

Passenger transportation with double-seat air sports equipment (tandem jumping) requires a permission. The approval provided for this is issued by one of the authorised associations (DAeC / DFV) on the basis of the requirements, in conjunction with a valid skydiving license and passing the training and exam to be a TP.

Both training and the TP exam are carried out by the tandem examiners (TE) employed for this purpose. A list of all authorized tandem examiners can be found on the website of the authorised associations in the download area under the heading "Tandem".

The passenger authorization is issued with a validity of up to 3 years (according to the recognized suitability) and can be extended regularly if certain conditions are met.

Within the licensing system, there are also procedures for how, for example, a passenger authorization acquired abroad can be rewritten.

Irrespective of this, foreign TPs can apply for a temporary recognition of their tandem rights (see also point 1.7: "Recognition" in this module).

Note that every TP jumping in Germany needs to be explicitly issued with a German Tandem approval or recognition of their foreign Tandem approval.

## 1.3 First-issue of TP approval

Any licensed German parachutist over 18 years of age can apply to gain a TP rating on meeting the following requirements:

- valid jumper license
- Valid instructor rating (if expired, check with the Authorised Association) or successfully completed a TP-QL and passed the related exam.<sup>1</sup>
- Valid medical certificate recognised by the Authorised Associations (in either English or German)
- Minimum of 500 RAM-Air descents in total
- At least 12 jumps in the last 12 months
- At least 10 jumps in the last 90 days
- At least 5hrs freefall
- Evidence of German language skills
- Successful completion of a TP training course carried out by an authorised TE.
- Exam Pass (theory and cross-check) with a second authorised TE
- Agreement to data protection policy
- Submission of the application form with relevant fee, assurance declaration and optionally a passport picture

For members of the Bundeswehr the following applies:

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<sup>1</sup> According to the TEK content plan, see also sub-item "Tandem pilot qualification" and following sections in that chapter  
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- Instructor approval includes military Ausbildungsklasse A „Ausbilderqualifikation militärisches Gleitfallschirmspringen“ or military Ausbildungsklasse B „Ausbildungsleiter mil. Gleitfallschirmspringen“

#### 1.4 Conversion of foreign TP ratings

A foreign TP rating (incl. manufacturers ratings) can be converted to an approved German TP rating for any holder of a German parachutist licence on meeting the following requirements:

- Valid German jumpers' licence
- valid and current recognised instructor approval or section of the TPQ or valid military Ausbildungsklasse A „Ausbilderqualifikation militärisches Gleitfallschirmspringen“ or military Ausbildungsklasse B „Ausbildungsleiter mil. Gleitfallschirmspringen“
- Valid and current passenger approval or manufacturers' rating or a military license with the military approval to “transport people”
- Where appropriate, membership of the licence issuing body, if required by the body issuing the foreign licence/Tandem rating.
- Valid medical certificate recognised by the Authorised Associations in German or English (foreign certificates)
- Evidence of the minimum jump numbers and necessary freefall time (logbook)
  - o At least 500 jumps in total
  - o At least 12 jumps in the last 12 months
  - o At least 10 jumps in the last 90 days
  - o At least 5hrs freefall
- Evidence of German language skills
- Successful participation in a competence check
  - o Confirmation of theory knowledge (written tandem exam) and practice skills (2 descents) by a TE
- Agreement to data protection policy
- Submission of the application form with relevant fee, assurance declaration and optionally a passport picture

#### 1.5 Extension of TP approval

TP approvals can be extended under the following conditions:

- Valid medical certificate recognised by the Authorised Associations
- 60 tandem descents in the last 36 months; or two (2) evaluation jumps with an authorised TE.
- Submission of the application form with relevant fee, assurance declaration and optionally a passport picture



## 1.6 Renewal of a TP approval

An expired TP approval can be renewed under the following conditions:

- Valid medical certificate recognised by the Authorised Associations
- At least 12 jumps in the last 12 months
- up to 24 months: Expiry within last 3 months: Refresher training and up to three (3) evaluation jumps with an authorised TE
- longer than 24 months: Valid instructor approval (if expired, check with the Authorised Associations) or participation in a TP training course with two authorised TEs and extent of training as determined by the Authorised Association with three (3) evaluation jumps.
- Submission of renewal application with assurance declaration relevant fee and passport picture.
- Note: Note that the 90-day rule needs to be adhered to before recommencing working as a TP

## 1.7 Recognition of a TP approval

A drop zone/tandem operator may use foreign rated TPs to conduct tandem descents on condition that each such individual foreign rating has been recognised by the Authorised Associations. The TP needs to be in possession of a certificate of recognition issued by an Authorised Association.

Each recognition is issued with an expiry date of 31 December of the year of issue. If the underlying rating lapses earlier, the recognition lapses at the same time as the underlying rating and must not be used beyond this date. If the underlying rating was to expire early or was declared invalid or suspended for any reason, the recognition expires at the same time. Any such early expiration should be reported to the Authorised Association and the Tandemverantwortlichen immediately.

A recognition can be renewed as many times as desired if the necessary criteria continue to be met. The Authorised Association can require confirmation of the foreign rating and can refuse, suspend or even revoke the recognition at any time.

The following items/conditions are required for recognition of a foreign TP:

- Valid and legible identity document
- Residential or postal address in Germany
- Presentation of valid foreign licence
- Presentation of a valid foreign passenger rating or manufacturer rating recognised by the authorised associations.
- Where appropriate, membership of the licence issuing body, if required by the body issuing the foreign licence/Tandem rating.
- Valid medical certificate recognised by the Authorised Associations in German or English (foreign certificates)
- Evidence of the minimum jump numbers and necessary freefall time (logbook)
  - o At least 500 jumps in total
  - o At least 12 jumps in the last 12 months
  - o At least 10 jumps in the last 90 days



- At least 5hrs freefall
- Evidence of sufficient command of the German language to ensure adequate communication between the TP and the TG TP who only speak another language may only jump with TGs with sufficient knowledge of that language to ensure that necessary communication between the TP and TG can take place.
- Successful participation in a competence check (on first recognition)
  - Confirmation of theory knowledge (written tandem exam) and practice skills (2 descents) by a TE
- Submission of an application for recognition of the foreign tandem authorization with assurance declaration and the fee
  - plus filling out the form for recording the personal data or jump history for the authorised associations

On renewal of a recognition all necessary paperwork must be resubmitted. A competence check is not required; however, a Tandem-Examiner or instructor examiner (Prüfungsrat) should determine and confirm the suitability of the individual.

### 1.8 TP qualification

The creation and issue of this Tandem Handbook by The Authorised Associations has created a second path to enter the TP training process. The previous requirement to hold an Instructor rating has been supplemented with the Tandempilot Qualification Course (Tandempilot Qualifikationslehrgang "TP-QL"). Participants are referred to as Tandempilot-Qualifikant ("TPQ").

#### **Tandempiloten-Qualifikationslehrgang = TP qualification course**

The TP-QL has the following pre-requisites:

#### **Requirements for participants to register for the Course:**

- 2 years in the sport
- Minimum 450 jumps
- More than 4 hrs freefall time
- Advance participation in a Canopy Flight Seminar (Kappenflugseminar "KFS") before registering
- Advance half day work experience with a basic rigger or senior rigger (mainly relating to tandem rigging)
- Basic understanding of the 7 (seven) core topics of parachuting.
  - This will be tested at the beginning of the TPQ using the licence test for parachutists (no more than 1 error per topic area permitted)

#### **To be provided at the time of the course:**

- Valid medical certificate recognised by the Authorised Association (as recent as possible)
- Certificate of participation at an 8-hour First Aid Course (no more than 24 months old)



### To be completed before the course:

- The course participant should have read the THB, the TE will ask questions to confirm knowledge and awareness.
- Practical knowledge of tandem equipment must be present:
  - Packing
    - The TPQ must have spent time observing packing of tandem systems by a competent person, most likely a TE. The TPQ should know:
      - Drogue setting and rigging
      - Knowledge of functional relationships
        - e.g., Packing bungees, etc.
    - The TPQ can have been introduced to tandem packing before the course
      - Introduction and further consolidation of knowledge will take place during the TPQ Course
  - The TPQ must be familiar with tandem briefings as practiced as drop-zones and be able to answer questions on briefings during the TP Qualification Course.
  - Basic knowledge of tandem AADs such as operation, firing altitudes etc
- TPQ should already be approved to follow-out tandems.
  - If not: If not yet approved to follow-out, this approval needs to be incorporated into the TP Qualification Course and a check-out jump<sup>2</sup> be conducted during the course. This will serve as an example for the subsequent activities of the TPQ after the course before obtaining their full TP rating.

An application to attend a TP Qualification Course with a TE will only be approved if all the above is present.

## 1.9 TPQ Course

Organisational conditions: The course should not be shorter than 3 teaching days, however they do not need to be consecutive. The sequence of the course needs to be documented on the TP Qualification Certificate (training record card). A TP-QL does not necessarily have to be carried out “en bloc”.

### 1.9.1 Practical and theoretical pre-course assessments

- Personal assessment s of the TPQ
  - Physical Strength
    - Does the TPQ have adequate strength to flare a tandem canopy
      - Multiple test flares using break lines suitably weighted over a pulley type system to simulate flaring a tandem

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<sup>2</sup> The term „check-out jump“ is used to refer to a jump during which competence is evaluated in accordance with the regulations issued by the Authorised Association.



- If the TPQ is not strong enough, allow further strength training or release them from the TP-QL.
  - Stable belly to earth freefall skills
    - Check-out jumps with stable exists into the relative wind (evidenced by video)
      - Assess general belly flying skills across all axes.
        - TE to evaluate freefall skills without any coaching of the TPQ
        - Method: No coaching, but strict entrance examination at the discretion of the TE!
      - Performance of at least three (3) jumps to provide TE with complete confidence
  - Practice side-spin recovery with outside video by the TE or suitably qualified videographer.
    - Test physical awareness of TPQ
      - Check TPQs perception of what took place by asking them to provide chronological description of the jump before reviewing the video, then compare this to what happened using the video.
        - If TPQ is unable to demonstrate physical awareness and accurate recall, consider releasing them from the TO-QL.
      - Performance of at least one (1) jump to provide TE with complete confidence
- Evaluation of basic parachuting knowledge which will be assessed alongside the strict requirements for the check-out jumps above
  - TPQ needs to prepare and explain a suitable flight plan to reach the designated landing point appropriate for a student (i.e., large) sized canopy.
    - TPQ needs to demonstrate their ability to carry out this plan by flying and landing a large student canopy within a 25m radius of a landing point designated by the TE on two (2) occasions.
      - The TPQ needs to demonstrate the ability to determine the appropriate exit order for the aircraft from which these jumps are made.
  - The TPQ needs to be fully conversant with how to behave in special circumstances (e.g., recognising, explaining and resolving malfunctions)
    - Reference is the AHB Part 1 Module 5, section on behaviour in special circumstances
    - Test verbally posing questions and practical responses in hanging harnesses

**If there are any concerns regarding the TPQ's abilities or knowledge at this point they should not proceed with the course and carry out more training before returning on a subsequent occasion.**





### 1.9.2 Theory and practical elements of the TP-QL

- Evaluate and consolidate existing equipment knowledge
  - o Identification of equipment/packing errors
    - Visible packing errors
    - Misrouted RSL
    - Incorrectly assembled 3-ring circus
    - Chest and leg strap misrouting, including on the passenger harness
    - etc.
  - o Untangle tandem system with multiple step-throughs
- Lesson topics for the TP-QL
  - o The idea of tandem jumping (philosophy and concept of the sport)
  - o Meteorological knowledge and assessment skills will be continuously evaluated during the TP-QL. This will not be limited to those present during the course but also on how to obtain weather information at other sites, identification of thermals and storms, dangerous and unsafe weather conditions, sources of turbulence and how to avoid them etc.
  - o Knowledge of airspace classification and visual flight rules including how tandem jumping relates to laws and regulations thereof.
  - o Human performance including:
    - Behaviour in extreme situations, including tendency to error and mistakes (as per Prof. Dr Ungerer's findings), conditioning, perception, decision making ability, behaviour, evaluation of dangerous situations as challenges, distress avoidance techniques etc.
    - Human error as the primary cause of accidents
    - Hypoxia (altitude implications and human reaction to low oxygen levels)
  - o Physics of gravity, centre of mass and freefall in relative wind, in particular the differences arising from jumping as a tandem pair rather than alone
  - o Canopy design and aerodynamics and flight behaviour of large RAM-Air parachutes
  - o Emergency procedures in accordance with AHB Part 1 Module 10

All topics above need to be appropriately covered in the TP-QL, they are the foundation of good understanding of the tandem system and assurance of safe tandem descents. Each TE may prepare and use their own lesson plans and approaches to impart this information, including inviting specialists to cover particular topics on their behalf. The TE can select the training style including knowledge testing, location, facilities, lecture vs discussion they consider most appropriate for each course.

For the TP-QL to meet its objectives, TEs running the TP-QL are responsible for ensuring only suitable candidates are awarded the qualification.



At the end of the TP-QL, the TEs are required to document either a positive or negative result on the TP Qualification Certificate and inform the participant, the TEK and the Authorised Association of the outcome, if necessary, with justification.

A positive result is necessary as the entrance requirement to attend a TP Course. No more than 12 months can elapse between passing the TP-QL, conversion or recognition and attending the TP Course.

### 1.10 Insurance

**Mandatory:** Required: Tandem operators within Germany must have the following insurances:

- Third party liability insurance as owner of sport parachute equipment
  - o Minimum of EUR 1 million cover for bodily injury and property damage
- Air carrier liability insurance for tandem systems (Luftfrachtführer-Haftpflichtversicherung - Passagier-Haftpflicht)
  - o Minimum of EUR 350.000,- Euro for bodily injury

**Voluntary:** In addition, the following insurances are available and can be taken out if desired:

- Increase in the sum assured for the owner's third-party liability cover including cover for damage to an aircraft.
- Increased level of cover of the air carrier insurance
- Additional individual air carrier insurance beyond the equipment related air carrier insurance
- Passenger accident insurance
- Accident insurance for the TP
- Special Event third party insurance
- Disability/Loss of income insurance (specifically for TEs)

### Additional information regarding air carrier liability insurance (from § 37 & 45 LuftVG)

Under the German Air Traffic Act, an air carrier and its employees/contractors are responsible for the safe and secure operation of passenger transport. This means that both the air carrier carrying the passenger (i.e., the TP) and the air carrier entering the transport contract (e.g., drop zone/tandem operator) can be held liable in the event of damage or injury. When a contract for carriage is in place, the Air Traffic Act identifies three scenarios:

1. The TP is liable to pay up to 128,821 units of account (approx. EUR155,000) for bodily injury to their TG if the TG can demonstrate that  
The TP (or his team) did not commit an actual or negligent unlawful or culpable act; or  
Third parties did commit an unlawful or culpable actual or negligent act (e.g., provision of intentionally incorrect medical information).  
The burden of evidence lies with the TP.



2. If the TP and their team cannot provide exonerating evidence, the TP's liability for bodily injury is unlimited. They become personally liable for any sums above the level of their insurance cover. This liability vis-à-vis passengers can therefore be regarded as very serious because the proof of discharge can rarely be provided.

3. If the TP commits gross negligence or even intentional endangerment, they are personally liable for all costs up to the value of their personal wealth (Civil prosecution in accordance with § 823 Bundesgesetzbuch)

The liability provisions of the Air Traffic Act only apply if there is a contractual relationship between TG and TP in the form of a contract for carriage. If this is not present or cannot be evidenced (for example the agreement is only verbal), then the unlimited liability is shared with drop zone/tandem operator under para 823 BGB. It is therefore strongly advised to always have written agreements for tandem jumps. Scenarios two and three above should hopefully never arise.

TPs and drop zone/tandem operators are at liberty to voluntarily increase their insurance cover, which some insurers are prepared to do. Further information can be obtained from the Authorised Associations.

A summary table of various insurance situations is held at the offices of the Authorised Associations, including situations which are uninsurable. An example of this is TP re-currency jumps with licensed parachutists as TGs and there are others.

## 1.11 Miscellaneous

### 1.11.1 Terms of business

Space for drop zone/tandem operators/air carriers to include their individual terms of business.

- Tandem jumping permissions
- Confirmation of compliance with rules and regulations issued by the Authorised Association(s)
  - o Manufacturers' instructions (which may differ from national rules in some countries)
  - o Tandem regulations as derived from:
    - Relevant laws
    - Handbooks
    - BKF und TEK working groups
    - The OM for jump planes
    - Risk analysis checklist for Non-Commercial Operation ("NCO")
- Special approvals from the Authorised Associations
  - o Demo landing permissions, if relevant
  - o Recognition of foreign approvals



#### 1.11.2 Emergencies

- Existing local emergency plans and procedures should always be followed.
- Local Emergency plan to be included here (see AHB Part I Module 10).
- Keep the emergency contact list easily accessible. If not yet available, see below.

#### 1.11.3 Medical Fitness for Tandem pilots

- A valid medical certificate always needs to be held.
- The medical can be obtained from any General Practitioner, sports doctor or flight doctor.
- The Authorised Association can at any time request a further medical examination of a TP by a specialist flight doctor.
- Medical fitness is assessed on a case-by-case basis.
- Medical limitations which could restrict the safe conduct of tandem jumps will always result in the loss of the TP approval.
- Any temporary medical limitation (e.g., resulting from injury) which would restrict the safe conduct of tandem jumps will not result in a loss of the TP approval, however TPs are expected to cease jumping until they have fully recovered.
- The Authorised Associations must be informed immediately of any permanent change from medically fit, to medically unfit.
- Individuals with any of the following diagnoses/conditions are always considered medically unfit (list last reviewed November 2017)
  - o Diabetes mellitus
  - o Pacemaker
  - o Epilepsy
  - o Multiple Sclerosis
  - o Permanent paralysis or palsy in the musculoskeletal system
  - o Permanent visual impairment or sight loss
  - o Illnesses which can reduce reaction time (including substance dependency)
  - o Neurological findings which forbid the driving of cars



#### 1.11.4 Emergency Telephone numbers

Action	Who?	When?	Phone No	Called by
1. Telephone	Stadtwerke or Elektrizitätswerk (Electricity provider)	If someone has flown into/landed on powerlines		Ground staff
2. Telephone	Feuerwehr/ Fire Brigade	If the aircraft crashes	112	Ground staff
3. Telephone	Notarzt/ Emergency doctor	If someone is badly injured	112	Ground staff
4. Telephone	Rettungshelikopter SAR-Leitstelle/ Med-evac helicopter	If back injuries are suspected	112 (0251) 135757 VHF Frequency 123,1 MHz	Ground staff
5. Telephone	Rettungswagen / Krankenwagen / Ambulance	If Med-evac/air ambulance is not available	112	Ground staff
6. Telephone	Polizei/ Police	If the aircraft crashes or the doctor declares a person dead	110	Ground staff
7. Telephone	Verband und Bundesstelle für Flugunfallunter- suchungen (BFU) Air accident investigation office	If someone was fatally injured	(05 31) Tel 3548 0 Fax 3548 246	Ground staff
8. Telephone	Contracted air carrier	If someone is badly injured		You or your delegate
9. Telephone	Tandem- verantwortlicher	If someone is badly injured		You or your delegate
10. send FAX	Insurance provider(s)	If the doctor declares a person dead		Ground staff/ See example
11. Report incident *	DFV / DAeC	If there are injuries or serious damage to property		You or your delegate form
12. Report incident *	Insurance provider(s)	If there are injuries or serious damage to property		You or your delegate form



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Deutscher Aero Club e.V.



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# Chapter 2

## Organisation



## 2. Organisation

### 2.1 Tandem Operations

#### 2.1.1 Meteorological requirements for Tandem descents

Visual Flight Rules ("VFR") apply to tandem descents. The Visual Meteorological Conditions ("VMC") set out the minimum weather conditions in which aircraft ascents and parachute descents may take place. A TP needs to be familiar with the local air space around the drop-zone in order to be able to comply with the air space regulation bearing in mind their opening altitude is likely to be higher than that of regular Sports Parachutists. Vertical and horizontal distance from cloud needs to be maintained as required by the local air space classification.

General weather conditions should be assessed using appropriate weather services (possibly provided by local airports). Tandem descents should not be conducted if a storm is approaching. Tandem night descents are not permitted by the Air Traffic Regulations.

The upper winds need to be considered when selecting the exit point and subsequent flight plan to ensure the intended landing area is reached. Ground wind strength and direction need to be considered to ensure the safety of the tandem landings is never at risk. Each TP needs to be able to evaluate the prevailing conditions on their approach using appropriate indicators such as a windsock, landing T or flags.

TPs should avoid the implications of turbulence in the proximity of the landing target (whether from buildings or thermal conditions) in their planned final approach. The effect of reduced air density arising from height above sea level also needs to be considered in the flight planning.

TPs should ensure that adequate communication channels are present between ground- and aircraft-crew so that a climb to altitude can be aborted if weather or wind conditions require it.

#### 2.1.2 Operational plan

All tandem operations are based on a solid operational plan. This plan will consist of various stages and people, from advertising for TGs, to the jump itself, to handing over the certificate of completion to the TG. Essentially all elements required for a successful operation.

This is a handbook for safe conduct of tandem descents, not how to run a successful business. It is therefore not providing business skills. Its aim is to inform the stages which need to be incorporated into the operational plan to ensure both legislative requirements and regulations issued by the Authorised Associations are met.

The section of the operational plan relating to the activities at the drop-zone should be arranged in a chronology which is logical and straightforward for the TP and the TG.

This allows the TP to ensure adequate safety throughout the TG's experience. As a minimum, the operational plan should include the following elements:

- Participation/operational preconditions
- Preparation to jump





- Jump briefing
- Beförderungsvertrag = Contract for carriage
- Supervision of the TG during boarding, ascent, freefall, canopy flight and landing
- Supervision of the TG in emergency situations
- Post-jump customer care

The "Tandemverantwortliche" (see 2.1.3 below) is responsible for the detailed planning, sequencing and implementation of each of these steps in conjunction with the wider drop zone operation.

### 2.1.3 The "Tandemverantwortliche"

Every tandem operation must appoint an individual who has overall responsibility for the safe and smooth running of the tandem operation ("Tandemverantwortliche"). This registered person must be an approved German TP (holder of a "Luftfahrerschein mit Tandemberechtigung") and have a good working knowledge of written and spoken German. The air carrier is responsible for registering the Tandemverantwortliche with the authorised associations. Each drop zone operator can choose who to appoint to this position, however an individual may usually only be registered as the Tandemverantwortliche at one drop-zone at a time. In unusual situations an agreement may be reached with the Authorised Associations to waive this. Where the tandem system owner, drop-zone operator and TP are all the same person, this person is deemed to be the Tandemverantwortliche and needs to be registered as such with the Authorised Associations.

As stated above, the Tandemverantwortliche is responsible for safe and smooth tandem operations at their designated drop-zone. They have supervisory control over the tandem activities and local procedures as well as the hiring of TPs and assisting staff.

The role of the Tandemverantwortliche includes:

- Quality management
  - Ensuring the guidelines of the Authorised Associations (i.e., this THB) are adhered to
    - Preparation of a tandem operating procedures adhering to national and local rules which are suited to the locality
  - Preparing the planned sequence of local jump operations
    - Implementing management processes to ensure rules are followed.
- Reaching agreements with other local operators
  - Airfield management
  - Drop zone operator/air carrier (if different from tandem operator)
  - Manifest
  - Pilots and aircraft owners
- Ensuring suitable and sufficient equipment
  - Infrastructure
  - Administration such as agreements with TG and insurance policies
  - Tandem parachute systems which are certified as airworthy



- Additional equipment
- Choice of staff
  - Coordination between different stages
    - Jump management, manifest list etc.
  - TPs, packers and videographers
    - Authorisations depending on experience, ratings or proficiencies
- Evaluating weather conditions
  - Where appropriate decision making can be delegated to a competent person, responsibility for operating within the weather regulations remains with the Tandemverantwortliche
- Supervision of the tandem operation
  - Supervision of people and processes
  - Observing jumps and providing feedback
- Quality assurance
  - Ensuring that fitness and approvals are valid (incl. the 90-day rule, hand camera proficiency)
  - Induction of new staff members
  - Team meeting management
  - Safety meeting management
  - Continuous Professional Education management

Individual responsibilities can be delegated for day-to-day operations for example to a TP present at the drop zone. The registered Tandemverantwortliche does not need to be present all the time, it does need to be clear who has taken on their responsibilities in the event of tandem operations taking place in their absence.

#### 2.1.4 The Tandem pilot

Every TP jumping in Germany needs to hold the relevant German permission to do so. As at 12 March 2019 this means registered approval, a valid medical certificate and 12 jumps in the last 12 months, of which 10 jumps need to be in the last 90 days.

An approved TP can work at any Tandem Operation if they have a type rating for the local tandem harness container systems or after an appropriate induction if they are not. A Tandem Operation does not need to be large, it could consist of a single TP.

TPs must ensure they are familiar with the local operational procedures and act in accordance with the instructions of the local Tandemverantwortliche. They must be able to assess their TGs and know how to act accordingly.

The TP is responsible for ensuring guidelines and legislation surrounding tandem operations are met throughout the TG's experience. They should carry out the jump in such a way that its overall objectives are met, and no unnecessary risks are taken which may endanger the TG or themselves.



In addition, each TP is an ambassador of the sport. They are increasingly the primary contact the general public has with the sport and is therefore able to influence the general perception of the sport. The Authorised Associations have set the standards for approved TPs high, particularly with this aspect of the role in mind. The ambition is to maintain a continued high level of quality and safety.

#### 2.1.5 The Tandem Guest

Broadly speaking, anyone can be a TG. Although, certain physical and psychological standards need to be met, as a general rule medical certificates are not required. Some tandem operations may request one in some circumstances.

Included in the physical standards is the requirement that the TG together with an available TP meet the requirements of the tandem parachute system and do not exceed its limitations. This can include maximum weight, height and size, or minimum height and size to fit into the harness and meet maximum weight limits of the equipment being used.

There are no age limits for TGs. It is strongly advised to enquire of a TG's health and receive positive confirmation before the descent. This could be part of the contract for carriage.

The TP taking the TG on the jump is ultimately responsible for assessing the suitability of each TG for their jump as part of the pre-jump briefing. If the TP is satisfied with the suitability they can proceed with the jump. If the TP is not satisfied the TG is suitable, they should not proceed until their concerns have been addressed.

As long as the TP is able to safely carry the TG for the jump and landing, there are no reasons to exclude a TG. It is perfectly possible that a suitably trained and experienced TP can conduct tandem descents with TGs with limited physical ability including paralysis. As a general rule, the TP should seek to find a way to enable the jump to take place rather than refuse it without considering options. There is however no legal duty for a TP to conduct a tandem descent with a TG whom they cannot transport safely.

If in doubt, for example TGs with significant physical or mental disabilities, cardio-vascular diseases, breathing difficulty, arthritic movement restrictions, obvious frailty or alcoholism, seek advice from a doctor and request a medical certificate. If this cannot be obtained TGs may need to be declined.

#### 2.1.6 The contract for carriage

All tandem jumps should be supported by a formal contract for carriage (Beförderungsvertrag "BV") between the TG and the tandem operation or TP as appropriate. Only on execution of this contract does the tandem descent fall under the jurisdiction of the Aviation Act and items such as the liability limitation and third-party liability cover comes into force. If there is no payment for the jump, the third-party liability insurance is only effective if the TP is at fault. If there is payment (could be non-



monetary) the insurance pays out the legal minimum and possibly up to the sum insured regardless of fault. Which is beneficial for the TP!

The BV should set out that the jump is being conducted on mutual agreement. The TG confirms they have been briefed on the jump and the associated risks. They confirm they accept these risks, not least because they contribute to the excitement and experience of jumping from an aircraft. As long as the TP conducts themselves within the guidelines for tandem operations, the liability agreement of the BV stands, and the TP is protected by the legal minimum and any voluntary insurance cover.

A handshake can be considered a contract of carriage; however, it is strongly recommended to enter into a signed written agreement with the TG to be able to subsequently demonstrate a contract was entered into. An example BV is in the download area of the websites of the Authorised Associations, alternatively, locally adapted versions are usually available at larger tandem operations across the country.

A valid BV limits the liability of an air carrier or TP as set out in the Aviation Act. Insurance cover is mandated for the indicated liability limits which should protect the air carrier, the TP and the TG from the financial consequences of a claim.

If no BV is concluded in advance of the tandem descent, or the BV is considered invalid for any reason, the air carrier (i.e., tandem operator) and/or their TP have unlimited liability under §823 BGB. For this reason alone, the value of a BV should not be underestimated. Liability is also unlimited in cases of negligence or worse still intentional misconduct. Both of these are completely unacceptable for TPs.

BVs can only be entered into by legally competent people. For any underage TGs or those who are wards of court or others, agreement is needed from all legal guardians. These guardians can either agree in advance under full power of attorney or attend the tandem briefing and sign the BV at the drop zone.

Any powers of attorney need to be provided in written form with legible copies of identification documents and clearly stating the purpose of the power of attorney. The documents provided (even if just in copy) must demonstrate the legal or family relationship giving rise to the guardianship between the TG and the guardian providing the legally binding authority to jump.

#### 2.1.7 Tandem Briefing

Each TG must be briefed at a tandem briefing, sometimes referred to as a Sprungeinweisung. The tandem briefing can be carried out by the TP taking the TG or delegated to another suitably qualified member of staff.

The tandem briefing should include fitting the tandem harness to the TG, TG positions for exit, in freefall and on landing. This allows the TP to fully evaluate the physical capabilities of the TG in advance of the jump. The TG needs to demonstrate their ability to take up the body positions necessary during the descent, i.e., at exit, in freefall and on landing. The BV can include a specific



reference to these positions so that the TG will have signed that they meet the physical requirements.

TGs who are unable to adopt these positions should not be taken on a tandem jump. This should be conveyed in a polite and professional manner to limit any possible damage to the image of sport parachuting or the tandem operation.

#### 2.1.8 Jump routine

The routine of a jump is driven by the practical circumstances and arrangements at any drop-zone. The Tandemverantwortliche is responsible for setting the local routine.

TGs should be accompanied by suitably qualified or knowledgeable people for each transition between stages in the jump experience. The accompanying people should be familiar with the requirements of TGs and how the jump will progress to be able to answer any questions the TG may have.

All preparatory stages can be carried out by a TP or their support staff.

Videographers must meet the proficiency and currency requirements of the Authorised Associations. Furthermore, they must be authorised by the TP and/or air carrier and they must have agreed procedures relating to the jump.

After the tandem briefing the TG must always be accompanied by their TP to ensure the safety of the TG and enhance their experience of the sport.

Following the successful jump, the TG should continue to be cared for, for example assisted from the tandem harness so that it can be used for the next TG.

To complete a positive experience of our sport, each guest should feel welcome until they wish to depart. This is an opportunity to provide jump certificates and encourage TGs to join the sport.

## 2.2 Equipment requirements

### 2.2.1 The Tandem system

A tandem system is a 'two-seater' parachute system designed and licensed for use by two people. It is manufactured out of materials and components of suitable strength and the main canopy includes a drogue system\* to limit the fall rate. Only tandem systems which have been officially designed and built by their manufacturers for this use are permitted for tandem descents. Initial operation should be in accordance with the manufacturers' handbook. Furthermore, the authorised associations have issued certain additional rules for tandem equipment used in Germany. Among these is the requirement that the TP has been briefed on the particular system and that the system is equipment with an automated activation device (AAD).



A tandem system consists of a main and passenger harness. The adjustable main harness is connected to the container which is carried on the TPs back. The container contains the main canopy, reserve canopy and the necessary handles to operate them are part of the harness/container system.

The passenger harness is also adjustable and is individually adjusted for each TG. It is attached to the front of the main harness using specified attachment points for the duration of the jump. Operation should be in accordance with the manufacturers' handbook. Specific additional requirements have been made by the authorised associations.

To be suitable for operational use, tandem systems need to meet the maintenance and inspection requirements evidenced by a valid airworthiness certificate. Owners of tandem systems are responsible for working with an appropriately rated tandem rigger to meet these requirements. It should be noted that individual components of tandem systems from different manufacturers are not necessarily compatible. If in doubt, an owner should seek confirmation and guidance from a rigger, the manufacturers or Authorised Associations. Further information is given in the Tandem safety requirements in this handbook.

Technical information for each tandem system should be taken from the manufacturers' information. This includes the maximum exit/suspended weight of each of the components. Note that the limits of the main and/or reserve canopies may be lower than that of the harness/container system. The lowest limit of any one component must be adhered to for the full system.

\* The drogue system is a two-stage deceleration device specifically designed for tandem jumps to reduce the terminal velocity of the tandem pair to an acceptable level. It also acts as the pilot chute to deploy the main canopy. The drogue is manually pitched into the airstream approximately 3 to 5 seconds after exit from the aircraft.

The drogue remains connected to the main container by a releasable system, to slow down the tandem pair in the first part of the jump. At the end of the droguefall, the TP operates a handle to release the drogue ("drogue release handle") which disconnects the drogue from the container, enabling it to extract the main deployment bag and main parachute. The drogue is collapsed partway through the main opening sequence so as not to slow the opening of the main canopy too much.

The opening speed of the main canopy is also influenced by the actual fall rate at the time of the release as well the condition of the drogue fabric. It is therefore important for a TP to understand the interrelation of freefall time, drogue condition and release altitude.

The construction and functioning of the drogue are part of the manufacturer TP training. Details on type-training, type-extension and type-re-currency is included in a subsequent chapter of this handbook.



### 2.2.2 Additional equipment for tandem jumps

In addition to the tandem system, the TP should have the following additional equipment:

- Suitable clothing to ensure full control throughout the tandem jump.
  - For example, this may be a two-part, loosely cut jump suit to enable freefall stability.
- Two separate and independent altimeters, of which one should be a visual, wrist/hand mounted altimeter.
  - Depending on personal preference, the second altimeter can be a second visual or an audible altimeter.
- Head protection
  - Hard helmet or frap hat with visor or goggles as appropriate.
  - fitted altimeter (audible or visual) as the second required altimeter
- Well-fitting gloves with good grip are recommended
- Hook knife
  - which can be mounted on back of the TG harness
- Suitable shoes, with slippery soles for a standard slide-in landing without lacing hooks (sandals are not suitable)

Personal equipment for the TG (in addition to the passenger harness)

- Well-fitting outer clothing allowing the TG full range of movement which is unlikely to have any aerodynamic influences on the necessary movements of the TP.
  - Guidance on necessary layers underneath should be given in advance depending on the expected weather conditions.
- Head protection
  - Hard helmets should only be provided if the TP is also wearing a hard helmet. Whichever is chosen, it should include a visor or goggles as relevant and be able to accommodate contact lenses and/or glasses
- Suitable shoes, with slippery soles for a standard slide-in landing without lacing hooks
- Gloves, depending on prevailing temperatures.

Other equipment, as needed:

- Goggles in different sizes, including spares possibly held in the jump plane
- Tape to cover lacing hooks on shoes
- Sick bags in case of travel sickness
- Hair bands/hair nets
- Spare altimeters in the jump plane
- Possible additional harnessing to enable harness adjustment for different TGs, e.g., people with dwarfism, amputations or other disabilities.

Note on taking items on the jump:

Only those items should be taken on a tandem jump which are specifically required for the jump. This can include prescription glasses, neck warmer or a knee or elbow support.



It is strongly recommended to remove all unnecessary items before the jump and to leave these on the ground, remind TGs that "all pockets should be empty". If any items are taken along, they should be properly secured so that they cannot be lost or impact on safety. Accidental dropping of an item is unacceptable, and the TP is responsible for this negligence.

Examples of unnecessary items which should be left on the ground (especially relevant to TGs):

- Bracelets, watches, keys, pen knives, pens, pointed items
- Loosely fitting rings or earring which could fall off
- Jewellery such as necklaces, anklets or belly-chains or any accessories which could get caught on something resulting in loss or injury to the wearer
- Piercings which are not covered by clothing or headgear and could be pulled out resulting in injury. Note also that some metals used in piercing are good temperature conductors and could cause irritation if worn in cold weather.
- Chewing gum or sweets
- Lighters, baseball caps, mp3 players
- Loosely fitting false teeth or braces
- External hearing aids
- Any similar items
- Cameras, mobile phones<sup>3</sup>

Ultimately, the decision on whether items can be taken rests with the TP.

### 2.2.3 The tandem main canopy

Main canopies used for tandem descents are specifically designed, constructed and reinforced RAM-AIR canopies. Their main differentiator is that they are intended to decelerate and fly at a speed appropriate to carrying two people. Maximum Suspension Weights ("MSW") are provided by the manufacturers who publish these in MSW-tables in addition to stating the limit on the warning label on the canopy itself.

Overall, tandem main canopies are the same as any other RAM-Air canopy, steerable and can be braked for landing by the TP. Most have special double brake lines to facilitate this.

The outer (primary) steering lines are intended to allow easy steering during the canopy flight, the inner (secondary) brake lines, also called flare lines, are to ease flaring the heavy total suspended weight. They should only be used for landing and TPs should only take those handles as their approach their landing.

For landing this style of main canopy, all four (4) steering lines must be used, and the related toggle pressure requires a certain level of fitness or strength on the part of the TP.

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<sup>3</sup> Where these items are not intentionally required for safety or documentation, they should be transported and/or used appropriately by the TP or videographer





Another peculiarity of some tandem main canopies is that they often have double loops on the toggles attached to the outer, primary, steering lines. They are vertically lined up to allow the TP to take the upper loops and the TG takes the lower loops. This allows the TG to initiate steering during part of the canopy flight like training a parachute student in canopy handling. The TP can decide on a case-by-case basis whether to allow the TG to steer the canopy, bearing in mind that the TP is responsible for safe flight throughout the descent.

Under no circumstances are TG permitted to contribute to (or even hinder) the approach and landing by continued holding of the lower loops. For landing, they should remove their hands from the steering loops and use them to assist with adopting their landing position.

TPs must take particular care not to confuse the TG assisting loops with the flare toggles attached to the separate flare lines in order to avoid insufficient flare on landing.

For tandem main canopies with only one set of steering lines each side, cascading higher up the lines provides the desired aerodynamic adjustment for landing. The strength required to land these canopies can be higher.

More rarely, flare and steering lines have been joined and a single line leads to the steering toggle. Although this is technically allowable, it also requires greater strength for steering.

Operating instructions for tandem main canopies are generally provided by the manufacturer in their manuals. This includes the use or not of two stage flaring and recommended flare height. They also provide maintenance and care information and packing instructions.

Additional guidelines have been issued by the Authorised Associations on deployment heights. The pull and release altitudes should be chosen to ensure that the tandem main canopy is fully open by 1,200m/GND (4,000ft ft AGL). This is to ensure that the TP can conduct control checks before reaching decision altitude deal with any malfunctions with sufficient altitude. In turn, this means that a main canopy with slow openings need to be released higher. The minimum release altitude for a tandem main in Germany is 1,500m/GND (5,000ft AGL).

A TP first learns how to handle a tandem main canopy as a TP-candidate (Tandempilotenanwärter "TPA") in their Tandem Training (Tandem-Ausbildung "TA"). Good canopy flights and landings are predominantly a result of the experience and good judgement of TPs. Ultimately their goal should always be to land their TG safely at the intended landing area.

If a TP is ever in the situation that they are expected to jump a tandem main canopy they are unfamiliar with, they need to get a briefing on packing and flight characteristics from a TP experienced in handling said canopy. The brief should include a practice jump with the briefer or an airworthy tandem- dummy before taking 'real' TGs. A logbook endorsement of the briefing and practice jump is sufficient.



This type of briefing is only needed for different canopy planforms or manufacturers, not when jumping a different size of the same canopy type.

#### 2.2.4 Tandem reserve canopy

Like the main, the tandem reserve canopy is a specifically designed RAM-Air canopy. It is designed to accommodate the opening and canopy flight of the suspended weight of a tandem pair. The reserve needs to be able open at both high and/or normal speed after deceleration following a malfunctioning main. This feature is specifically tested for in their development.

Tandem reserve canopies are designed and manufactured for this purpose both in terms of cut and the use of appropriate line types. Their ability to function must be ensured in any conceivable situation.

This is why the compatibility guidelines of manufacturers of harness/container systems and canopies must always be followed.

The maximum suspension weight is given in manufacturer manuals and the MSW table. The MSW of many tandem reserve canopies is on their warning label.

Tandem reserve canopies are the same as any other RAM-Air canopy, steerable and can be braked for landing by the TP. Unlike the main, the tandem reserve canopy only has a single set of steering lines either side. Considering the likely situation when a tandem reserve could be used, this is sensible.

It does result in higher steering pressure although flare pressure is equivalent to that of landing a tandem main canopy. Depending on the situation and canopy, the TP may perceive this differently. Control checks, flight pattern and landing flare should be approached the same as for the tandem main canopy. Practice flares should be carried out whenever possible.

As part of their type-rating or type-extension, every TP should familiarise themselves with the opening and flight characteristics of their tandem reserve canopy. For example, some tandem reserve canopies tend towards longer opening times which, if unexpected, could give the TP cause for concern. In a high-speed malfunction situation however, it may be desired.

For this very reason, the decision altitude for tandem malfunctions is at 1,000m/GND (3,000ft AGL). Not only because of the dynamics of acceleration of a tandem pair require a different level of altitude management, but because of the duration of the opening of a tandem reserve canopy. Furthermore, AADs on tandem equipment need to have a higher release altitude to allow for higher terminal velocity of a tandem pair and the opening time of the reserve canopy. May no TP of clear mind ever recklessly fall short of these limits and challenge earthly physics in the process.

Some tandem reserve canopies open close to their stall point and risk what is referred to as a "rock'n'roll" flight where the canopy alternately tips backwards and forwards. This can be swiftly remedied by releasing the brakes.



All details relating to packing and operation of tandem reserve canopies is governed by the manufacturer's handbook. The 'Behaviour in special situations' lesson during the TP training course covers the situational awareness and necessary procedures in emergency situations.

#### 2.2.5 Tandem Automatic Activation Device ("AAD")

AADs in tandem equipment must operate on an electronic (rather than mechanical) basis and be able to open the reserve container in appropriate circumstances. The AAD on tandem equipment must be easy to identify and operate. No tandem equipment may be used without an airworthy and operating (i.e., switched on) AAD. The requirements for maintenance and operation issued by the manufacturer and Authorised Associations must be met. Operating instructions for all AAD are issued by their manufacturers.

AAD may only be installed into tandem equipment by suitably trained staff as part of the reserve packing process.

#### 2.2.6 Safety checks

Safety checks need to be carried out at various times during the tandem descent. Their main objective is to ensure that the equipment is in order, but also provides confirmation that the TP is familiar with the sequence of procedures during a normal or unusual descent. This is of particular value when encountering unexpected situations.

The TP should carry out the following safety checks:

- Visual inspection that the whole harness container system is in order before jump operations
- Visual inspection that the whole harness container system is in order before putting on, taking particular care of handle positioning, sufficient and correct container closure and that the AAD is switched on.
- Touching of all handles in order of use after putting on the tandem harness container system by TP wearing the system
- Visual inspection that harness (TG) and harness container system (TP) are correctly worn before getting on the airplane
- If necessary, repeat touch test of all handles and other pertinent points such as attachment hooks or knives during the climb to altitude, especially if there has been significant movement in the aircraft or another occurrence giving rise to concern that things may be become dislodged or moved.
- Visual and touch testing of all 4 attachment points to the TG harness after attachment and tightening of TG harness.
- Complete equipment check before the descent:
  - Helmet, goggles, other additional equipment for both TP and TG
  - Leg straps, chest strap and belly band (if present) for both TP and TG
  - Attachment hook check
  - Handle check in sequence of use
- Drogue and release check just before exit



- After exit and setting of the drogue, further handle check and the remaining sequence during drogue fall. It is recommended that TPs repeat the release sequence checks whenever possible during the drogue fall.
- Check that drogue release is reachable at about 300 - 500m (1,000 - 1,600ft) above release height to prepare for the drogue release
- Visual check of the canopy opening after the release including connector links on the risers, three ring circus, RSL and the position of the TGs hands
- Handle check including position of remaining handles (cut-away and reserve) for the event of emergency procedures being necessary
- Control check of the main canopy
- Decision on whether to release RSL around 300m/GND (1,000ft AGL) for landing
- On final landing approach have full control of brake lines by 100m/GND (300ft AGL) to enable preparation and execution of correct landing flare.

#### 2.2.7 Type ratings

The following types of tandem harness container systems are treated as sufficiently different to require specific training and rating

- CLASSIC tandem systems (e.g., Vector 2, Ultra/Next, Galaxy/Atom, Omega und Advance)
- SIGMA
- DUAL HAWK (including TNT and Wings/Plexus)
- ELITE
- TOUCH

During their training TPs will receive technical training and instruction on how to operate a one of these types of tandem harness container system depending on the equipment available on the training course. The approval will indicate this type rating which in turn must be kept current with regular descents on equipment of this type.

To gain permission to jump tandem systems of a different type, a further type rating must be obtained. The training for such a type rating follows a clear training plan and can be carried out with the manufacturer or a TE.

As a minimum, the Authorised Associations require type rating training to include:

- Introduction to the equipment (how it functions and is packed)
- Normal operation
- Behaviour in special circumstances such as alternate handle sequence
- Hanging harness training
- Performance review (theory Test, hanging harness test + at least 1 jump with the briefer or a suitable dummy).



Endorsement in the TPs logbook is sufficient evidence of successful type rating. It is important to retain this endorsement as the tandem license does not indicate which types a TP is rated for. This logbook endorsement therefore provides evidence of the proficiency of the TP for a specific tandem system.

**Note:** Note: Changes between tandem systems within any of the type groupings above do not require a type rating, merely type extension.

#### 2.2.8 Type Extension

Tandem systems made by different manufacturers which are of broadly the same construction, where handles are in the same places are a single type. For example, Next, Vector II, Omega, Galaxy etc are all the same type. Within a type class, the TP only requires a briefing to gain the type extension. The prerequisite is currency within the type class. A type extension consists of an introduction to the equipment, the handles and packing, no jump is necessary. A logbook endorsement of the briefing and practice jump is sufficient.

Type extensions can be carried out by manufacturers, TEs and experienced TPs. For these purposes "experienced" means a TP with at least 100 jumps on the relevant tandem system and is current in introducing others to this manufacturer's equipment.

#### 2.2.9 Type Refresh

If a TP has previously held a type rating but has not been able to jump equipment of this type in the last 12 months, they must have a type refresh before jumping equipment of this type again. The longer since the last jump on this type, the more detailed the refresh needs to be. Type refreshes can be carried out by the same people as type extensions. The refresh should be noted in the TPs logbook.

### 2.3 Safety regulations

Repetition and redundancy in these lists and the wider THB are possible and partly intentional. The order of the regulations is random and has no relevance to importance.

#### 2.3.1 Procedures

- Minimum exit altitude for tandem descents from aircraft is 2000m/GND (6,500ft AGL). For descents from balloons, the minimum exit altitude is 2,500m/GND (8,200ft AGL).
- The minimum drogue release altitude is 1500m/GND (5,000ft AGL). If a particular tandem main canopy consistently is not yet open by 1,200m/GND (4,000ft AGL), this minimum needs to be permanently increased for that canopy to allow the tandem main canopy to fully open by 1,200m/GND (4,000 ft AGL).
- Training of TPs may only be conducted using tandem main canopies of at least 340 sqft.
- The minimum exit altitude during TP training is 3000m/GND (10,000ft AGL), the minimum drogue release altitude is 1,700m/GND (5,500ft AGL).



- The carrying of a hook knife is compulsory on tandem descents for use in the appropriate special situations and eventualities.
- If during the climb to altitude exits take place from the aircraft at altitudes below those above, the TP must attach their TG by all 4 attachment points before the aircraft door is opened. TPs are not permitted to carry out other activities during the ascent which require unrestricted movement with an open aircraft door (e.g., despatching static line parachutists).
- If freefalling parachutists are on the same load as tandem pairs, the exit altitude for the freefallers must be at least 1200m/GND (4,000ft AGL).
- If static line parachutists are on the same jump plane as tandem pairs, the exit altitude for the static line parachutists must be at least 1500m/GND (5,000ft AGL).
- If aircraft emergencies occur below 500m/GND (1,600ft AGL) TPs and their TGs should remain in and land with the aircraft, where possible wearing seat belts.
- If aircraft emergencies occur between 500m/GND and 1,500m/GND (1,600ft to 5,000ft AGL), a tandem can exit the aircraft with an immediate deployment of the tandem reserve canopy. The TG needs to be properly secured to the TP. Where necessary, the TP needs to communicate their activities and intentions to the aircraft pilot
- The absolute minimum attachment of a TG to the TP in the event of an emergency descent is the left upper hook of the TG harness to the TP harness container. The TP should seek to use their legs and their right arm to hold onto the TG and pull the reserve handle with their left hand as soon as possible.
- For an emergency exit, a TG should be attached to the TP by the left upper hook. If time and space allow, as many other attachments as possible should be made
- For emergency exits over 1,500m/GND (5,000ft AGL) the TP should use their own judgement to decide whether to follow normal or emergency procedures on exiting the aircraft.
- The basic rule for all tandem descents is: Stay in sequence All other procedures are described in the "Behaviour in special circumstances" section.
- Decision altitude with regards emergency procedures for TPs is at 1000m/GND (3,300ft AGL)
- TPs must use common sense to ensure safe tandem descents. This applies to all steps in the process.



### 2.3.2 Rigging matters

- Safety bulletins issued for any tandem harness system must be noted and followed. A good relationship with a local rigger will facilitate this and allow for consistent clarity.
- Tandem harness container systems may only be fitted with parts designated as compatible with that system.
- The maintenance schedules for harnesses and parts need to be adhered to.
- A tandem harness should only be used with a drogue and at the intended opening speed. Frequent high-speed use should be avoided.
- If falling with a collapsed drogue-in-tow, the TP should avoid high speed terminal velocity by an early deployment of the main canopy.
- Tandem harness container systems must contain an Automatic Opening Device (AAD). AADs in tandem harness container systems must be designed for and set to ,tandem`.
- A tandem harness container system may only be used with manufacturers' Reserve Static Line (RSL) attached. Detaching the RSL may be permitted in some isolated circumstances, however it must never be removed entirely because of its right-hand reserve handle function.
- An RSL with a properly installed and split Collins Lanyard may never be detached.
- The RSL should be used in conjunction with a Collins Lanyard to link to the left-hand cut-away cable. If no Collins Lanyard is present, it should be installed post-manufacture. The RSL may be detached, but only if the reserve handle is a loop rather than a pillow
- The release cables of a drogue attached with a 3-ring system may never be fed through the same loop of the closing system.
- The cables forming part of the drogue release may not be kinked.
- The correct routing of the closing and safety pins needs to be ensured with tandem harness systems with a disc release system
- 2nd release handles used in conjunction with cut-away pillows should only be pulled straight down, parallel to the body to prevent the unwanted peeling of the cut-away pillow.
- TG harnesses which rotate the TG tightly towards the TP when under load may not be used with tandem harness container systems which use an "override" handle as a right-hand



reserve handle instead of an RSL. For example, when combining a SIGMA TG harness and a Galaxy container system, it could be difficult if not impossible to activate the reserve with the right hand.

- If permitted by the manufacturer, TG harnesses may be fitted with short assisting tabs at the attachment hooks and side stabiliser ("Quick-Ejectors"). Long loops are not permitted.
- Tandem harnesses should be fitted with a hook knife for emergencies. It is recommended that the hook knife is accessible with either hand, e.g., in the middle of the back on the TG's harness.
- The TG harness should be fitted in accordance with the manufacturer's instructions. It should be fitted to each TG. Attempting to use a single setting for all TGs, regardless of their body shape is not permitted as it could endanger the TG.
- Tandem reserve canopies tend to settle in their bag. This can lead to the spring in the reserve pilot chute shifting slightly, which in turn could affect the reserve closing loop. If this occurs, the closing loop must be shortened by a suitably rated professional. The procedure must be noted in the equipment document "Gerätebeiblatt"
- A broken brake line will prevent the controlled landing of a tandem pair. It should be considered a malfunction and emergency procedures should be initiated to land under the reserve canopy.
- When landing in winds over 5 m/s (approx. 10kn), the RSL can be detached below 300m/GND (1,000ft AGL)

### 2.3.3 Users

- Tandem descents may only be carried out by current approved persons (TPs), noting the 90-day rule.
- Tandem harness container systems may only be used by persons with the necessary and current type-rating/type extension.
- A TP who does not meet the 90-day rule is deemed uncurrent even if their approval remains valid. Should a TP knowingly (or unknowingly) jump when uncurrent, they are fully personally liable and are not covered by the third-party insurance for the TG.
- Tandem descents should only be conducted when a valid contract for carriage is in place to ensure respective liabilities are clear.





- The TG must be briefed on how to behave in Special Circumstances while being briefed for their descent. As a minimum, the TP must explain to the TG how to behave in such situations. It is important to ensure that any language barriers are overcome for these briefings. The suggested approach is presented in this hand book.
- All tandem harness container systems must be covered by valid owner and TG third party liability insurance.
- A TP may only conduct tandem descents with airworthy systems which are adjusted to fit themselves and the TG as appropriate.
- The TP should ensure that the additional equipment to be used by the TG is clean and functional.  
The TP should have sufficient additional equipment to be able to accommodate different TGs.
- Paragraph 3 of the Luft-VO requires parachutists to wear suitable head protection. This applies to both the TP and the TG.  
A TG may, for example, wear a frap hat which also acts as protection from facial injuries to the TP
- TGs may wear hard helmets as head protection, however only if the TP is also equipped with a hard helmet with chin protection and full-face visor.
- The TG briefing and practice movements must be carried out in such a way that the TG is not endangered. This refers to both the training venue and the training aids
- The clothing of the TG needs to enable all necessary movements to conduct the descent safely however not to gain aerodynamic control of the descending pair. Sleeve and leg length should allow TG movement to allow seated slide-in landings or prevent scrapes or damage to own clothing during a non-standard landing.
- The TP must conduct all necessary safety checks in the correct chronological order.
- To maintain the conditioning of the handle sequence, a TP should regularly go through all necessary movements in the correct sequence. This applies on the ground or during the climb while wearing the equipment as well as during the droguefall, as circumstances permit.
- A TP always needs to remain conscious of the TGs stress levels during a jump. If in doubt, additional tasks should be avoided. This could be permitting them to refuse to enter or exit the aircraft, early deployment of the main canopy, omission of extreme manoeuvres in drogue fall or under canopy.



- A TP needs to be prepared to respond with dignity to unusual occurrences such as nausea, vomiting, dizziness or loss of consciousness. A TP should remain current in First Aid and if possible, practice landing with an unconscious TG.
- There are no age restrictions for tandem descents. It is strongly recommended to ensure physical and psychological suitability of each TG.
  - The TG must be able to fit into the adjustable TG harness, usually manufactured to accommodate people of between 1.4m and 2m tall. Harnesses manufactured for specific body sizes (e.g., children) are acceptable.
  - The bodyweight of the TG must not endanger the tandem pair either by under or overloading the tandem system. This applies to the maximum exit weight on the harness container system and the maximum suspension weight under the main canopy as well as minimum weight requirements to permit a smooth opening and adequate wing loading to fly and land the pair in the prevailing weather conditions. Separately, the skill and experience of the TP will dictate whether they are able to fly and land a tandem falling outside the recommended window of 40kg to 95kg. Each TP needs to decide whether they are prepared to jump in such a situation, bearing the maximum weights above in mind.
  - It is vital that children understand how to equalise pressure in their ears. The ear is still in development and pressure trauma must be avoided at all costs. It is generally recommended that children should be at least 7 years old before doing a tandem descent.
  - Elderly people suffering from physical frailty or movement restrictions should not be taken on tandem descents, as shouldn't those with an osteoporosis diagnosis.
  - TGs with suspected cardio-vascular issues or hypertension should always seek medical advice.
  - As a general rule: If in doubt, it is preferable NOT to take a potential TG. The final decision on whether to take an individual, lies with the TP.
- Seatbelts need to be worn by both the TP and TG for take-off and landing in the jump aircraft in accordance with the standard operating procedures ("SOPs") of the aircraft operator. The SOPs dictate the course of action in the aircraft. An SOP briefing must be given for each jump plane. A TP is responsible for obtaining such a brief when encountering an unfamiliar jump plane.
- If the TP loses the use of a hand after exit, they should seek to complete all necessary tasks with the other hand. The reserve canopy should be deployed on reaching Decision Altitude.
- TGs should be issued with gloves as soon as weather conditions suggest it may be cold (around 10°C) in drogue fall or under canopy. Most suitable are the TGs own gloves and relevant notice should be given in advance.



- TGs should not wear shoes with heavily profiled soles or high heels which could get caught on the ground in the event of a slide-in landing.
- TGs should not wear shoes or boots with hooks for their laces. If necessary, cover any hooks with suitable tape.
- TGs must not sign the contract for carriage or conduct the tandem descent while under the influence of alcohol or narcotics. The agreement could be deemed as invalid, removing all third-party insurance cover, if in doubt, the TP may refuse to take the TG on the basis of liability risks.
- If TGs are unable to equalise pressure in their ears, they should not conduct the tandem descent.
- TGs must wait at least 36 hours between scuba diving (either for sport or professionally) and the tandem descent.
- TPs must have completed 5 tandem descents after gaining their approval before being permitted to allow other jumpers to follow them out and accompany the tandem descent.
- Other skydivers wanting to follow a tandem out must be deemed as proficient by the tandem operation, the air carrier and/or the TP and have been suitably briefed.
- TGs with special needs, such as blindness or deafness can present a challenge, however a suitably experienced TPs should be able to work with such TGs. New TPs should seek as much information from experienced TPs on such matters as possible. Sharing of knowledge and experience between experienced TP is always desirable and encouraged.
- Any unusual emotional or psychological state of a TG which may put the tandem descent at risk should lead to refusing to take the TG. This includes (but is not limited to):
  - Under the influence of alcohol or drugs
  - Obvious confusion
  - Any disability which may lead to a loss of movement control
  - Epilepsy
  - Anxiety and/or tendency to panic attack
  - ...
- The TG must be attached by all four attachment points throughout the canopy flight and landing. They may be briefly released to loosen the laterals and then hooked back in for the remaining canopy flight as long as it does not put the tandem pair at risk.



- While working as a team of TPs, each TP should demonstrate confidence in their colleagues to maintain team objectives. For example, decisions on weather conditions should be reached together so all TPs understand and can explain them.
- Tandem descents should only be carried out from aircraft which are suitable for skydiving. A TP must ensure they are briefed on any new jump plane. The briefing is best conducted by a TP experienced in exiting this aircraft. Ideally, TPs will practice an exit from the aircraft with a dummy TG on the ground as exit procedures can vary between C-182, DO-27, hot air balloons etc.
- Packing of the main canopy should be in accordance with the relevant manufacturers packing manuals. This also applies to packers employed to pack on behalf of a TP or the air carrier.
- TPs may only take part in demo landings with TGs on completion of at least 50 tandem descents. Higher requirements may be demanded on inspection of the demo landing site and will be indicated in the relevant demo landing permission (Außenlandegenehmigung).
- Special circumstances must be reported to the Authorised Associations. A detailed list of such circumstances has been published by the Authorised Associations.
- Tandem descents with hand-held cameras can only be carried out by TPs with at least 200 tandem descents, of which 50 in the last 12 months. Briefings must be conducted by TPs with at least 100 hand-held camera descents. The briefing should follow the order of the list provided by the Authorised Associations.
- Tandem descents using a drogue release fitted to the TG harness and operated by the TG may not be followed out by other skydivers.
- TPs who frequently work at different drop zones with different exit altitudes should pay attention to time managed during drogue fall to ensure the drogue and main canopy are released at the correct altitude.
- TPs must be familiar with the interrelationships between high-speed descent, braking action of the drogue and opening speed. For example, it is not physically possible to conduct an intentional high-speed descent from 2500m/GND (8,200ft AGL) and meet all necessary safety regulations.
- For high altitude descents from FL130 or each FL180MSL necessary oxygen must be provided to pilots, TPs and TGs. This includes both the necessary amounts and delivery mechanisms being suitable for the intended exit altitude. It is advisable for TGs to obtain a medical certificate from a General Practitioner for tandem descents from over FL150 and provide this to the air carrier.



- Note the terminology of 'business use' of air sports equipment. The Air Traffic Act (LuftVG) does not consider tandem descents as commercial passenger transport, the Finance Ministry on the other hand consider transport in return for remuneration as commerce. To operate a tandem system, it is better not to start a "Luftfahrtunternehmen", however all income must be declared to the relevant authorities.

#### 2.3.4 Tandem descent restrictions issued by the authorised associations

**The following are NOT permitted during tandem descents:**

- Hook turns on landing (defined as: greater than 90° turn under 150m/GND (450 ft AGL))
- Night jumps
- Use of hand-held camera with less than 200 tandem descents
- Demo landings with less than 50 tandem descents
- Intentional water landings
- Descents into covered stadia
- Jumps with "Pole-Stick" (e.g., for film purposes)
- Tandem fly-bys with Wingsuit flyers
- Canopy formation jumps



Deutscher Fallschirmsportverband e.V.  
Deutscher Aero Club e.V.



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# Chapter 3

## Operating instructions



### 3. Operating instructions

#### 3.1 Operating instructions for Tandemverantwortliche

##### 3.1.1 Operational planning

For effective quality management and quality control, the Tandemverantwortlicher should organise the processes within their tandem operation to meet the rules and regulations.

The following is a guideline<sup>4</sup> to facilitate this.

##### **Tandem preparation:**

Allocate harness container system & TG harness to particular tandem pair		Visual check, switch on AAD, adjust Tandem Guest ("TG") harness length, identify colour of main canopy, prepare for the jump
Equipment	Jumpsuits	} Check condition, suitability and cleanliness
	Head protection:	
	Goggles:	
	Altimeter:	
	Audible Altimeter:	Switch on
	Gloves:	Identify need
	Hand camera (if relevant)	Function check, including battery live
Tandem briefing area		Preparation of tandem briefing area, cleanliness and tidiness

##### **Tandem briefing:**

Initial contact	Evaluate TG, meet accompanying persons and provide them with relevant information (e.g., main canopy colour, see above)
Preparation	Fit jumpsuit, TG harness (adjusted to fit) Explain attachment points, introduction to briefing
Briefing	Explain, demonstrate and practice exit position depending on jump aircraft Practice drogue fall position while lying down Explain, demonstrate and practice landing position (including leg position), either seated or suspended (were possible)
Additional equipment	Fit to TG
Beförderungsvertrag = Contract for carriage	Explain BV and emergency procedures Ensure properly signed
Readiness to jump	Proceed to jump aircraft fully kitted up and ready to jump

<sup>4</sup>This guideline is available in an A4 colour print (in German) for display





### Tandem descent:

Boarding	Safety and supervision on emplaning
Climb to altitude	Ensure safety, fit seat belts, care and encourage positive experience, exit preparation in time, Hook up and tighten attachment
Exit	Controlled
Freefall/drogue fall	Smooth and controlled with regular handle checks
Pull/Release	Main canopy open by 1200m/GND (4,000ft AGL)
Canopy flight	Hook up lateral straps, ensure TG comfort, practice landing position
Landing	Standard seated landing, consider if exception relevant, Secure stabilisers, assist with removing head protection and goggles, lengthen leg straps

### Tandem aftercare:

Return to tandem area	Keep TG supervised
Removing equipment	Take off harness/container system in preparation for packing, Assist TG out of their harness and set straps to maximum length Request TG remove jumpsuit
Awarding	Congratulate TG with a certificate, leaflet/flyer and appropriate small talk, if relevant download footage from hand-held camera
Departure	Polite, wishing them well and thanking them for their business

### Overall:

Manifest	Ensure good communication, Call-up TGs in time and in order
Team spirit	Support and encourage teamwork, Be fair towards packers, Offer assistance if needed Work together with video team
TG care	Be friendly and professional
Equipment problems	Take responsibility or find responsible person to resolve
Wear and tear	Continuously scan and review and feed back any observations
End of work	Ensure all equipment is returned in good condition, ensure cleanliness etc action any maintenance needs



### 3.1.2 Jump supervision

The Tandemverantwortliche is responsible for supervising all the tandem pilots ("TPs") working in their operation. The aim is to ensure the quality of experience and safety as required by the Authorised Associations granting the permissions.

Spot checks should be carried out throughout the day as well as observations of descents to establish that they meet the regulations and expectations in terms of interactions with TGs. Any observations not meeting expectations should be fed back to the TP and may lead to organising refresher training. This should not be seen as a Tandemverantwortliche seeking to punish, rather to enable the TP to understand weaknesses and improve their performance.

The Tandemverantwortliche is responsible for the induction of all new TPs to their operation and drop zone rules. This includes ensuring that foreign rated TPs with recognition to operate in Germany are familiar with the German regulations such as opening and decision altitudes.

Together with the Authorised Associations, the Tandemverantwortliche can, with sufficient grounds, suspend a tandem approval for any TP requiring re-examination by way of a competence check by a Tandem Examiner ("TE")

### 3.1.3 Reporting requirement

The Authorised Associations require that deviations from normal occurrences and special circumstances are reported to one of the Authorised Associations.

Every Tandemverantwortliche must ensure that everyone involved in the tandem operation is aware of this reporting requirement.



## List of reportable events:

### 1. Events reportable by **Tandem pilots**:

- a. Landing with (even minor) injuries to the TG and/or TP
- b. Activation of reserve (including description of circumstances)
- c. Activation of reserve by AAD
- d. Emergency situation in freefall that was only resolved by deploying the drogue or main canopy.
- e. Unusual damage, such as (not exclusive list!)
  - i. Bent Hardware (e.g., rings, hooks etc.)
  - ii. Broken main lift webbing
  - iii. Stitch damage on weightbearing webbing
  - iv. Material weaknesses which could affect airworthiness.

### 2. Events reportable by **drop zone operators, Tandemverantwortliche, air carriers and tandem examiners**

- a. Apparent safety infringements in the jump operation, such as with a TP:
  - i. TP forgets partial attachment of TG
  - ii. Lateral straps not sufficiently tightened during freefall
  - iii. Individual TP having frequent landing problems
  - iv. Uncontrolled exits and frequent long periods of instability of a particular TP frequently only becoming stable on deployment of the drogue (could become apparent from tandem video footage)
- b. Breaches of safety regulations and guidelines on tandem descents as issued by the Authorised Associations.

### 3. Events reportable by **Riggers**:

- a. Be made aware of packing errors on tandem reserves
- b. Demonstrable incompatibility of components on a full tandem harness container system
- c. Unusual damage:
  - i. Bent Hardware (e.g., rings, hooks etc.)
  - ii. Broken main lift webbing
  - iii. Stitch damage on weightbearing webbing
  - iv. Material weaknesses which could affect airworthiness.
- d. Non-observance of safety bulletins or maintenance/repack cycles.

### 4. Reporting timeframes and consequences of **non-reporting**:

- a. All reports should be made within 3 days of the occurrence. Additional time is available for 'routine reserve activations', these must be reported within 14 days.
- b. Non-reporting can result in disciplinary action from warnings, suspensions to permanent withdrawal of a rating or approval.



## 3.2 Operating instructions for tandem pilots

### 3.2.1 General

All tandem descents should meet the goals of this handbook.

The TPs gain the basic knowledge and skills to be able to do so in the training course (Tandemausbildung "TA") to gain their approval. In the long term, a TP needs to base their performance on their own experience and evaluations. Within the framework of this guidebook, a PT retains room to exercise judgement.

TPs must use their discretion to create a positive experience for the TG while meeting all safety regulations.

TPs must maintain their physical fitness to be able to carry out tandem descents safely and if necessary, demonstrate this in a medical evaluation.

TPs also act as ambassadors for the sport and need to represent it positively and professionally when interacting with the TGs and their accompanying friends or family. This applies to look and sound of the TP including appropriate etiquette and choice of language.

The TP must ensure that the following and any related safety regulations are met:

- Legal requirements
- Provisions of the jumping permission/licence
- Instructions in the tandem handbook ("THB"), this manual
- The local rules set by the drop zone operator for jumping at their drop zone
- Special instructions from the Tandemverantwortliche
- Standard Operating Procedures for the drop zone and airfield
- Air Traffic Control (Deutschen Flugsicherung GmbH, "DFS") regulations
- Minimum weather conditions for tandem descents

Before engaging with the TG, each TP should carry out a self-check to include:

- Validity of tandem approval and medical
- Current health, fitness and motivation are good
- Knowledge and experience is sufficient for local requirements
- Personal equipment meets all requirements



### 3.2.2 Checking the tandem system

Every TP should visually inspect the harness/container system before each use and carry out a safety check. The tandem system should always be in a good and suitable condition. The relevant type-rating provides the TP with ability to make this assessment. The check should be carried out conscientiously and never be regarded as incidental to the jump. Careless handling of the equipment can quickly lead to an incident or even accident.

### 3.2.3 Packing tandem main canopies

During their type rating, every TP learns how to pack main canopies properly into a particular container in accordance with the manufacturers' guidelines. The TP is therefore wholly responsible for the correct packing and subsequent use of the tandem harness/container system.

The task of tandem packing can be delegated to others referred to as tandem packers.

Any tandem packer must always be able to demonstrate their qualification for packing tandems, including instruction on the respective tandem system. They must therefore complete every pack job assigned to them to the best of his knowledge and belief. Random quality control can be conducted by the TP as the client at their discretion.

When using a tandem system packed by others, the TP retains the legal and functional responsibility when taking on and using the tandem harness/container system.

TPs can therefore not make any claim for malfunctions against anyone assisting them the ground. Not least because in various cases problems are inherent in the system or arise during use by the TP. In the event of demonstrable negligence, claims under the BGB can be made against ground support, including packers.

If a check or observation shows any actual or technical packing errors, the TP should intervene immediately and require re-training or competence check. In the event of repeated packing errors or lack of care by a tandem packer, their qualification should be called into question and if necessary, removed.



### 3.2.4 Intended sequence of events during a tandem descent

(Example presented conducting a seated exit from a C-208 B, 4000m/GND - 13,000ft AGL)

#### Introduction / Planning:

- ⇒ Note the registration requirements for TGs,
  - Age, weight, height, health and constitution, consider recent scuba diving
- ⇒ Registration for an appointment including phone number
  - Offer photo or video if relevant
- ⇒ Confirmation
  - Possibly call ahead of time for
    - \* Weather conditions
    - \* Video of jump yes/no
    - \* Advice on clothing and/or shoes
- ⇒ Preparation
  - Tandem harness system
  - TG harness
  - Additional equipment

#### Arrival on site:

- ⇒ Greeting
  - Introduction (Name, Du/Sie, short getting to know each other)
  - Approximate timing (e.g., load number, manifest order, duration)
  - Prepared contract for carriage (capture personal information, finalise payment, ensure that contract is only signed after the briefing)
  - Double check height/weight if needed
  - Brief accompanying persons (if relevant) on facilities, access restrictions, alcohol consumption
  - Advise TG on suitable clothing and shoes, if needed cover hooks on shoes with tape, find jumpsuit of appropriate size
  - Recommend that any small items are removed from pockets and jewellery is left with accompanying persons and if relevant contact lenses and false teeth are suitably secured or removed.
  - Possibly remind TG to visit the WC before the jump
- ⇒ Double check weather situation and go, or:
  - Share time to waiting (use for small talk, video introduction)
  - Explain stand-by (if possible, give time indication)
  - If weather does not clear, explain cancellation due to weather conditions.
- ⇒ For GO status: talk through order of events
  - Approximate stages of the whole activity with approximate time indications
- ⇒ TG Equipment



- Select and don suitable jumpsuit, ensure shoes secure
- Prepare goggles, helmet/frappe hat and gloves if needed
- Show TG harness (where straps sit, attachment points)
- Aid TG in putting TG harness on (in accordance with manufacturer's handbook and adjust to fit to TG)

⇒ Start the briefing while standing with chronological description of the activity

- Walk to the aircraft and emplaning
- Seating in the aircraft (e.g., back to pilot)
- Attachment and tightening of TG harness to TP harness, demonstrating on a harness present
- Movement towards the door (explain how to move if there are benches or on the floor to sit in open door)
- Explain airflow at the door (loud, cold, windy)

⇒ **Exit instruction**

- Explain and demonstrate exit position while standing: hands on the harness, elbows close to the body, head back, hips forward and arch
- Move to kneeling position
  - Training of exit position while kneeling including arm position and arch
  - Practice hip movement (provide support to prevent TG falling)
  - poss. If needed train "arms out" and brief on a clear signal
- Move to lying on the belly

⇒ **Freefall position**

- Arch
  - Arch the back
  - Arm position, either parallel or cross over the chest
  - Head back
  - Bent legs, either parallel or crossed
  - Leg position, knees high, heels toward the bum
- Train body position
  - Correct position, advise that in free fall sensations may be different
  - poss. Demonstrate ,arms out` signal
  - Practice maintaining the body position (ca. 10-15sec)
  - Advise TG of duration of free fall
  - Advise TG on breathing and relaxation tips to aid the body position
  - Advise that in freefall, it is easier to maintain the body position
  - Advise that conversation is impossible in freefall due to airflow, hence the physical signals.
- Relax and transition to seated position



⇒ Provide a positive Experience (relaxed chatting while seated)

- Fascination of skydiving
  - Acceleration from 0 to 180km/h (120mph) in 10 seconds
  - Then at a speed of 50m/s you fall for approx. ...sec about ...m downward (adjust for exit altitude)
  - Reminder to maintain the body position, ⇔ possibly providing the 'arms out' signal to fall like the experts
  - Possibly a 360° turn to enjoy the panoramic views
  - Remind TG to keep their eyes open and look forward to the horizon and try to appreciate the freedom of freefall

⇒ Peculiarities of freefall

- Fright at exit?!
  - Breathe! (= don't hold your breath)
  - Tensing up (= try to relax and concentrate on the arch position, trust the TP and don't tense up)
  - Allow the TP to adjust your position
- relative wind (= may result in short loss of orientation)
  - High stimulation of all the senses is normal
  - You quickly get used to the freefall sensation
- at 1700-1500m/GND (5,500-5000ft AGL) the main canopy will be opened
  - There is a bit of an opening shock and TP immediately checks the canopy

⇒ Canopy flight (remain sitting relaxed)

- Equalise ears first thing (holding nose and mouth closed and breathing out, yawning, swallow, move lower jaw)
- Double check whether equalisation could cause problems
- Reconfirm TG has not been scuba diving in the last 36 hours  
(= in some cases, depending on diving depth, skydiving is dangerous and should not be carried out)
- Reminder: "leave hands in front of you"
- „... then we will make ourselves a bit more comfortable ..." (only if canopy check is 100% positive)
  - Loosen laterals (explain positioning, such as placing feet on those of TP)
  - Adjust leg strap covers forward
- Fall rate under canopy
  - It is now possible to have a conversation





⇒ **Practice landing** (seated position)

- Take up landing position
  - Hands under the knees
  - Pull knees upward toward the chest
  - Lift feet and hold ahead of you
  - Hold for approx. 5-10sec
  - Practice more than once if needed
- Description of the landing (e.g., it can be like coming down a slide)
  - Do not put feet on the ground
  - Seated landing is the safest landing
  - In some circumstances it may be possible to land standing, TP will inform TG of this. Assume seated landing.

⇒ **Summary**

- „... You now know everything you need for the jump ..."
- Answer any questions.

⇒ **Hand out additional equipment and check sizing**

- Goggles (check the following)
  - Fits well, close fitting around the nose
  - How to handle fogging up, where to leave goggles until door opens
  - When ready to jump, put on goggles and if necessary, tighten slightly
  - What to do if they move during freefall
- Frap Hat/helmet
  - Sizing of helmet and chin strap, adjust as needed, tuck away excess
  - How to manage long hair
  - If appropriate, how and when to open visor
- Gloves (optional, but advised if ground temperature is 10°C or lower)
- If relevant, attach to the TG chest strap and remind them not to lose anything

**Determine readiness to jump: "well, we can go jumping now..."**

**Go through the contract for carriage in preparation for signature and/or arrange for signed confirmation of briefing:**

⇒ **Discuss and review contract for carriage**

- Confirm personal health and fitness
- Was Briefing complete?!
- Emergency procedure briefing, topics to cover:
  - + Active airfield: propeller, distances, etc.
  - + Aircraft emergency: seatbelts, minimum attachment TP to TG etc.
  - + Exit / Fall: no need to kick, don't reach around, no need to hold on to anything, avoid impeding TP



- + Holding on: If absolutely necessary, use the front main lift web left and right
- + Breathing problems: hold hands in front of face like a mask
- + General: loud „Stop" in freefall means - please deploy main canopy - (e.g., if too stressful, dizziness or fear)
- + Canopy malfunction: what to do...
- + Nausea: what to do if you feel sick...
- + Landing: legs up and implications of this NOT happening, e.g., broken legs and ankles, even if landing is rolled, significant bruising and spraining is possible - reminder that total weight of 200kg is travelling at 10-20km/h
  
- Insurance
  - + Third party liability cover is in place, possibly accident insurance.
  - + explain liability caps and if this exceeds personal risk appetite, this is the chance to stop and get your money back
  - + + ...or carry on? Of yes:
  - + Note: reminder: The opportunity to say stop remains until the point of exit.
  - + However, once the plane has taken off, there may not be the possibility to get your money back
  
- Return to the main objective
  - + Tandem descents are a quite normal leisure activity these days
  - + the tandem operation has been approved to carry out tandem descents
  - + the tandem equipment is the equivalent to being „TÜV-tested"
  - + As a TP I have a specific approval which I could only gain with appropriate training and experience
  
- Video set up
  - + There is always a risk that the equipment fails due to technical problems, although is increasingly less likely with advances in technology
  
- Contact lenses
  - + Identify whether they are present and how to deal with them
  
- **Signatures**
  - The TP first with license number
  - The TG with date
  
- **Now getting ready to jump!**



⇒ Preparation to jump

- Gear check: Drogue functionality (if appropriate drogue 3-ring), check handles in the correct order, general visual check of container, BOC, main canopy 3-ring, closing flaps
- If appropriate, explain to the TG as you go along
- Put on and conduct safety check Handle check in order
- If available, check under suspension
  - Freefall body position
  - Landing position
- If possible, permit TG time with their accompanying friends and family
- Ask all accompanying persons to move to the visitor/viewing part

⇒ Walk to the aircraft

- Keep TG under control

⇒ Boarding

- Ensure safe boarding (e.g., secure ladder if present, reminder to not hit head on doorframe)
- If appropriate, explain that some jumpers will be leaving at lower altitudes so attachments will need to be secured throughout the climb

⇒ Take-off & climb

- Put on seatbelts for take-off (up to 500m/GND ~1,600ft AGL), explain seat belt, attach lower attachment points if relevant, possibly wear head protection for take-off
- 500m/GND (1,600ft AGL): release seatbelt and remove head protection if relevant
- With mixed loads (such SL students, hop 'n' pops): every time the door opens, attach student at all 4 attachment points
- 1500-1700m/GND (5,000- 5,500ft AGL) = Show TG altimeter at deployment height
- approx. 1500m (5,000ft) before exit, talk through freefall position
- approx. 1000m (3,300ft) before exit
  - + Attach main attachments (if not already done) and secure as needed
  - + Goggles, helmet/frap hat, possibly gloves
  - + Jumpsuit(s) zipped up
- + check TP equipment and TG harness approx. 500m (1,600ft) before exit
  - + Tighten and securing of lateral straps
  - + Safety check incl.TG (touch handles in order)



⇒ Exit phase

- Open door, if appropriate goggles on and tight
- Exit order, gaps, proceed towards door as aircraft empties
- At the door: Check drogue- and (1st) Release / close visor
- Support TG body position, if needed aid into position
- If relevant, exit count
- Good presentation to the relative wind, good arch

⇒ Freefall phase

- Stabilise as much as possible
- Set the drogue at 2500m/GND (8,200ft AGL) at the latest
- Handle check in order
- Business as usual
- Conduct free fall as briefed, e.g., arms out, turns

⇒ Release phase

- By 2000m/GND (6,500ftAGL) conduct the release check (if appropriate separation of others on the jump)
- 1st Release (no lower than 1500m/GND (5,000ft AGL))
- If needed, release higher to enable landing area to be reached
- If relevant, use trap-door effect as release indicator

⇒ Canopy flight

- Check canopy
- If canopy check is good:
  - Start talking to TG - have you equalised your ears yet?
  - Keep watching TG, specifically with regard to arm position
  - Orientation/flight plan
  - Comfort matters
    - Loosen laterals
    - Move leg straps forward
- Practice landing (above 1000m/GND (3,300ft AGL))
- Possibly explain how the canopy is steered
- From 500m/GND (1,600ft AGL) take over full control of toggles
- (optional: release RSL at 300m/GND 1,000ft AGL)
- From 100m/GND (300ft) grip secondary toggles + At around.
- 50m/GND (150ft AGL) prepare for landing = hands to the backs of knees
- From 30m/GND (100ft AGL) lift knees as instructed
- From 10m/GND (30ft AGL) legs/feet up as instructed
- Maintain emphasis on position through talking to TG (e.g., "...hold on..., keep legs up, keep legs up, keep legs up")



⇒ Landing

- Lean back, place legs either side of TG
- Set-up solid position to land
- if needed, slide on the ground after completion of the flare

⇒ After Landing

- Collapse canopy, detach TG at upper then lower attachment points, secure lateral straps
- Remove helmet & goggles
- Congratulate the TG
- Loosen leg straps and accompany TG off the landing area
- (If there any injuries, ensure appropriate actions are taken)

⇒ Debriefing and kit return

- Remove TG harness downwards
- Provide seating to permit removal of jumpsuit
- Ensure all pieces of kit have been returned to the tandem operation
- Return any valuables to the TG
- Debrief and remain conversational
- If appropriate, reconfirm TG is aware of content of contract for carriage
- Provide with certificate and any other promotional items
- Encourage return for another tandem descent or transition to full training
- Remain available to answer any questions
- Wish them goodbye „...see you next time..."☺



### 3.3 Behaviour in special circumstances

#### 3.3.1 General

Experienced Skydivers must expand their knowledge and skills with regards to "behaviour in special circumstances" to include the additional situations presented by tandems. They must become fully familiar with the new causes and changes arising and re-familiarise themselves with them repeatedly.

For example, a skydiver who regularly swaps between sports jumps and tandem jumps, has to be equally prepared to execute their emergency procedures on either system.

The emergency procedures in the presence of a TG and the combination of 5-6 handles differs considerably from that of a sports jumper, who has trained their emergency drills with just two handles.

Accordingly, tandem jumping requires a high degree of concentration and training from the TP in order to exclude human error as a source of error. Constant practice of grip sequences, corresponding mental focus on the respective task, as well as a regular repetition of the emergency drills training, are a must. It starts with the changed decision altitude of 1000m/GND (3,300ft) for tandem malfunctions.

Each special circumstance is different, which means that only the TP can determine how to react. However, the following tandem emergency procedures can still be agreed in principle, should a definitive malfunction of the main canopy occur at some point during the tandem descent:

- Check altitude: if 1000m/GND (3,300ft) and higher...
- look right to the cut-away handle and grasp it with your right hand
- look left to the reserve handle and grasp it with your left hand
- Peel and pull the cut-away handle (ensure canopy departure)
- Peel out the reserve handle and pull
- if circumstance and time allow:
  - If necessary, instruct the guest to take the freefall position again if possible,
  - Suggest to the TG to cross their legs
- below 1000m/GND (3,300ft), the TP may choose to deploy the reserve in addition to the malfunctioning main.

Notwithstanding the overarching guiding principles for the behaviour in special cases for tandem descents, there are also some system specific problems, which only apply to certain tandem types. This is why every TP must take care to note which tandem type they are jumping, and which procedures apply to special circumstances arising on that system. The purpose of the type-rating is to train the TP on these differences.

These problems can be divided into the following problem areas:

- Human factor
- Emplaning, take-off and climb
- Exit phase
- Drogue function



- Free and Drogue fall
- Release and opening
- Canopy ride and flight
- Landing approach and landing.

Before going into the deviations from the norm, remember the normal sequence of events:

A tandem pair goes to the jump aircraft after a proper briefing, experiences a completely normal take-off and event-free climb. At the agreed exit altitude, the properly kitted up pair moves to the open door and completes a controlled and stable exit, presents to the relative wind and then the TP pulls the drogue after about 3-5sec stable acceleration. This is followed by an equally normal drogue fall with a talented TG without any unusual events. All handles are properly seated, and the altimeter works. Thus, the drogue is released at the desired altitude, the expected trap-door effect occurs, and the main canopy opens reliably and completely. All control checks are completed and there are no other issues with the parachute, air traffic or wind. This allows the cooperative TG, after successful landing practice, to enjoy the canopy flight without stress or nausea right up until the soft landing at the planned landing site.

If a video or accompanying jumper or a hand-held camera had been present, then in our normal case there would of course also have been no negative influences from this direction on the proper conduct of the tandem descent.

This description applies about 95% of the time. A TP must always be prepared for the other 5%, be ready to recognise them and react accordingly. The following standards approaches provide guidance to TPs:

### 3.3.2 Human factor

Certain physical aspects in relation to the human factor (e.g., weight, height, shape, fitness, etc.) mentioned in this manual, can only be assessed by the TP.

In particular, the perceived mental and physical aptitude of the TG during the briefing needs to be considered.

Of course, an air carrier or TP also has a certain duty of care for TGs under his supervision. For example, he could take care that his TG does not spend too much time in the blazing sun or other dehydrating activity while waiting to jump, or to have a completely empty stomach. Not to mention a requirement to abstain from alcohol and drug use before jumping.

From experience, it is also important that during the briefing a TG develops trust in their TP and the equipment. This should reduce the likelihood of stressed refusal to jump or swimming movements during the jump.

Of course, the reactions of a TG will arise from basic human reflexes, such as holding on to the TG harness during exit. Advice on how to recover from overstimulation on exit or breathing techniques in freefall should give the TG a sense of safety and confidence.



A good fit of the equipment, i.e., jump suit and TG harness, also enable good blood circulation during the descent. Especially if a newcomer experiences the high-speed climb in a turbine aircraft from sea level to heights with hypoxia potential. It is important to follow the manufacturer's instructions on the individual adjustment of the TG harness to the TG stature.

Only conscientious behaviour can prevent that multiple TGs suffer issues with the same TP. This principally refers to the apparent "fun" of strong spiralling under canopy where centrifugal force quickly induces blood flow to the legs. This is not always fun for everyone.

Care, caution and explicit preparation must always be given if a TG does not fit "into the norm". This could be any human features, such as lack of mobility or lack of strength due to physical disability. If any deviations from the norm are noted during the briefing, ensure enough practice is conducted on the ground to demonstrate sufficient suitability to jump. This may well mean multiple repetitions of landing posture practice until the TP is satisfied with the performance of the TG.

The approach to profoundly deaf, blind or paraplegic passengers must be different again. Similarly, amputees, quadriplegic TGs or MS sufferers will require TPs with a solid foundation of tandem experience if not past knowledge or experience of working with such TGs.

A TP should consider technical or interpersonal aid and assistance to enable a safe tandem descent whenever encountering an unusual situation.

Globally there is now a wide range of expertise on these topics both with particular TPs and accessory manufacturers. Further information can be found via the Authorised Associations or the TEK of the BKF.

On matters of safety and professionalism, it is also important that a tandem operator and their team demonstrates competence to the outside world through sound decision making.

It is advisable never to show varying assessments of the same thing or even confusion to TGs. This applies to technical issues, weather and wind decisions, different personal opinions of individual TPs on the same matter or arbitrary shifts of priorities of individuals depending on the time of day and current motivation.

Therefore, it is essential to avoid that any uncertainties are discussed or deliberated in front of TGs. They should be discussed and evaluated internally first, so that every participant in the tandem operation is given the opportunity to contribute to the decision or at least understand the rationale for the decision being made. No such situation should be discussed in front of an audience or possibly even escalate into a personal dispute among experts. The latter is highly unprofessional and not in the interest of the sport.

The main objective remains the safe induction of a layman into an unusual experience with latent threat potential by an expert parachutist.





Conversely, a TP needs to continuously train themselves over and over on special circumstances, so that they maintain the upper hand in special circumstances and does not become a problem in the problem itself (note: "Be a Pro and not a problem").

### 3.3.3 Take-off, climb, descent and (emergency) landings

There are common behaviours in jump aircraft with which the TP should already be familiar before starting their TP training. The following additional situations could arise from the presence and responsibility for the TG:

- a) Duty to supervise the TG on the airfield, particularly in relation to dangerous areas
- b) Duty to supervise the TG while emplaning
  - i. TP and TG harness must be jump-ready
- c) Seatbelt requirement during take-off and, if it arises, landing including emergency landings between 0-500m/GND (1,600ft AGL)
  - i. Loading order per local drop zone rules
  - ii. Fix attachment points per local rules
  - iii. Inform TG of how to close seat belt
  - iv. Remain seated with seat belt fastened in any emergencies below 500m/GND (1,600ft AGL)
  - v. Instruction of the TG in the event of an actual emergency
- d) Emergency exit between 500-1500m/GND (1,600-5,000ft AGL)
  - i. If under time-pressure
    - 1. Minimum attachment, hook legs around TG legs, possibly hold TG with right arm
    - 2. Deploy reserve canopy with left hand
  - ii. If more time is available
    - 1. Attach as many attachment points as possible (if possible, one top hook, then diagonally opposite bottom hook, other top, fourth hook)
    - 2. Tighten lateral straps
    - 3. Deploy reserve canopy directly with left hand
- e) Emergency exit over 1500m/GND (5,000ft AGL)
  - i. If under time pressure, as above
  - ii. If more time is available
    - 1. Attach as many attachment points as possible (if possible, one top hook, then diagonally opposite bottom hook, other top, fourth hook)
    - 2. Tighten lateral straps
    - 3. Either immediate deployment of the reserve on exit with the left hand
    - 4. Or set the drogue on exit and release after appropriate drogue fall

**Note:** If seatbelts in the aircraft only permit one person per seat belt, the TP and TG must wear separate seat belts for take-off and landing. For ease, the TG can be shown how to use the seat belt at any time and then fit it themselves. The TP remains responsible for their TGs seat belt.



**Note:** In tightly seated aircraft (e.g., Pilatus Porter or Cessna Caravan) it is advisable to hook up the lower attachment points on emplaning. If take-off is aborted or there is an emergency landing it will be a lot easier to release the TG than to find the attachment points on exit in a full aircraft.

**Note:** In the event of an emergency exit, it is advisable not to waste time with setting and releasing the drogue if at a critical altitude. A drogue needs about 5 - 10 seconds to fully deploy after which the release and main opening could be slower due to the shortness of drogue fall. This in turn results in a long total opening time for the main canopy to fully open, depending on the amount of power the drogue has developed by this time. When there is a long slow opening, the risk remains that the AAD deploys the reserve canopy as the firing parameters are met despite an opening main canopy. The drogue should only be used in emergency exits if at a sufficient altitude.

**Note:** Opening distances of tandem main canopies can vary depending on the fall rate resulting from the suspended weight and the pull of the drogue. See also the section on drogue problems.

#### 3.3.4 Emergencies on exit and in freefall

The list below is also limited to those additional emergencies arising from being a tandem pair. Matters relating to knowledge of exit altitudes and related time management is assumed knowledge. Minimum release altitudes and tandem decision altitudes should always be adhered to. In addition, there is a sequence-emphasising table of actions for the possible situations in each category (see Annex).

##### a) Unstable exit/freefall

###### i. In general

- a. Arch harder
- b. Attempt to stabilise ⇔ the tandem if successful, set the drogue and continue as for a normal descent.

###### ii. Stabilisation is unsuccessful

###### i. If a TP considers it feasible

- a. Set drogue into free air in order to regain control over the tandem pair
- b. If successful ⇔ continue as for normal descent

###### ii. If there is no possibility to set the drogue

- a. Seek to avoid high speed main deployment
- b. Pull reserve handle
- c. If still in freefall without any stability by 1000m/GND (3,300ft AGL) pull reserve handle

##### b) Side-Spin Situation

###### i. General advice:

- a. Bring arms alongside the TG
- b. De-arch and aim for back flying



- c. Straighten legs and proactively stabilise using a hard position<sup>5</sup>
    - d. If successful ⇔ continue as for normal descent
  - ii. Stabilisation is unsuccessful
    - i. If a TP considers it feasible
      - a. Set drogue into free air in order to regain control over the tandem pair
      - b. If successful ⇔ continue as for normal descent
    - ii. If there is no possibility to set the drogue
      - a. Pull reserve before the continued rotation result in loss of consciousness
      - b. If in still in freefall without any stability by 1000m/GND (3,300ft AGL) pull reserve handle
- c) TG blocks TP by holding on
  - i. In general
    - a. Start by calmly instructing the TG to let go
    - b. If there is no reaction, try to remove TGs hands or arms with force (avoid persistent restraint by TG)
    - c. If successful ⇔ continue as for normal descent
  - ii. Release from TG grip not possible
    - a. Continue with whichever hand is available in the usual sequence:
      - a. If right hand available
        - i. Set drogue
        - ii. Release main canopy with the 2nd Release handle
        - iii. If malfunction: cut-away
        - iv. If RSL does not function
          - a. Pull on RSL with hand
          - b. Pull reserve handle
          - c. Pull ROD<sup>6</sup> handle
        - v. Remove blocking hand once under canopy
      - b. Left-handed
        - i. Deploy reserve
        - ii. Remove blocking hand once under canopy
    - b. If successful ⇔ continue as for normal descent
    - c. If unsuccessful ⇔ use any possible yet appropriate manoeuvres to release TG grip (shout, punch, head-butt)
    - d. If release of either hand completely impossible ⇔ prepare for reserve opening by AAD and continue to landing area as intended

<sup>5</sup>Refer also to Bill Morrissey's "Tandem Side-Spin Phenomenon"

<sup>6</sup>For certain tandem types there is an additional right handed reserve handle called the Reserve-Override-Device (ROD) as the RSL is not built for right handed deployment. (e.g., Galaxy-Tandem).



- d) TP injures their arm or hand during the descent
    - i. Injured hand/arm cannot be used
      - a. If otherwise not restricted ⇔ continue sequence with the remaining hand
        - a. If right hand available
          - i. Set drogue
          - ii. Release main canopy with the 2nd Release handle
          - iii. Malfunctions: Cut-away...
          - iv. If RSL does not function
            - a. Pull on RSL with hand
            - b. Pull reserve handle
            - c. Pull ROD<sup>7</sup> handle
          - v. Under open canopy interact and brief TG on situation
        - b. Left-handed
          - 1. Deploy reserve
          - 2. Under open canopy interact and brief TG on situation
      - b. If neither hand/arm usable and no other alternative ⇔ is present prepare for reserve opening by AAD and continue to landing area as intended
    - ii. On occasion, the TG may be able to deploy the canopy under instruction from the TP and can be instructed on how to assist the TP with flying and landing the canopy
      - a. Practice flares at sufficient altitude
      - b. Prepare for hand landing, protect the body and PLF
- e) Loss of altitude awareness/altimeter malfunctions
  - i. In general
    - a. In Freefall, set drogue and immediately release to open main canopy
    - b. During drogue fall, release immediately to open main canopy
    - c. If in close proximity to the ground, pull reserve handle
  - ii. Malfunctioning main canopy
    - a. Proceed with rehearsed emergency procedures calmly
    - b. If in close proximity to the ground, pull reserve handle
- f) Container opens before drogue is set
  - a. If possible, set drogue immediately
  - b. If a malfunction ⇔ arises tandem emergency procedures
  - c. If other situations develop (such as horseshoe malfunction), proceed as per emergency procedures for the specific situation

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<sup>5</sup> see footnote 4



- g) Tandem continues to rotate despite drogue being set
  - i. In general
    - a. Arch harder and initiate counter turn manoeuvres
      - i. Consider transfer to centre of gravity if TP cannot fully present to the relative wind behind the TG
      - ii. Consider counter movements using arms and legs
  - ii. Rotation remains
    - a. Seek to manoeuvre TG back into a symmetric position using upper attachment hooks
    - b. Consider grasping TGs legs with own legs of
    - c. Consider moving arms of TG
    - d. If in doubt, release drogue before the situation goes out of control

### 3.3.5 Drogue problems

Of all possible problems, drogue incidents are a high priority, because the higher weight of a tandem pair needs to be sufficiently braked before the main canopy is deployed, and release of the drogue turns it into the pilot-chute for the main canopy. If the drogue is missing or if it does not work properly, the main canopy may not deploy reliably. The well-known saying is: No drogue - No main / with drogue 180-200 km/h (110-120mph) / without Drogue 250-300 km/h (155-185mph).

Overall, it is important that a drogue is only used for its intended purpose. Therefore, drogue should only be thrown during controlled or stable descent as the drogue can only be used as a stabilization aid in an exceptional situation.

Unstable or uncontrolled setting or poorly packed drogues increase the likelihood of drogue malfunction. Probably the most critical situation requiring a special response is an entanglement of the drogue with the tandem pair. This must be avoided at all costs.

In addition, there is a sequence-emphasising table of actions for the possible situations in each category (see Annex).

Furthermore, a drogue can only function properly if it is kept and used in good condition. For example, drogues start to turn due to wear and tear and pack worse. Drogue that are worn out may not brake sufficiently or pull worse after release. Therefore, a drogue should be inspected and maintained regularly, so that malfunctions can be prevented.

Although a drogue can stabilise a tandem pair as a force application point, it is first and foremost designed to slow the descent. The TP should therefore not use the drogue as a quality compensator for poor stability.



## List of known drogue problems

(Pre-supposes that altitude awareness remains throughout any of these reactions and decisions as made accordingly)

- a) Drogue release is accidentally pulled first
  - i. If still in the aircraft ⇔ remain seated
  - ii. If in freefall ⇔ set drogue immediately \*
    - a. If successful ⇔ continue as for normal descent
    - b. If unsuccessful ⇔ Tandem emergency procedures

**\*Note:** Should the drogue collapse during the throw, the resulting opening distance of the main canopy can be up to 700m (2,300ft). In addition, during this time, there is no stabilization effect from the drogue. The Drogue initially lacks the necessary air resistance to act as a brake function which requires wind speed and thus acceleration, thus time, thus distance. If there are still no main canopy deployment at 1200m/GND (4,000ft AGL), there is no value in throwing the drogue.

A TP should never consider a release as a precautionary measure to be faster. In any case, some systems do not technically allow this in the first place.

- b) Drogue cannot be set
  - a. One additional attempt to set with maximal force
  - b. If successful ⇔ continue as for normal descent
  - c. If unsuccessful ⇔ Tandem emergency procedures
- c) Drogue handle cannot be located
  - i. Drogue or drogue handle have slipped from BOC
    - a. Possibly pull drogue out by its fabric and set
    - b. If drogue cannot be located or reached Tandem emergency procedures
  - ii. Drogue completely slipped from BOC
    - a. If drogue is open as usual continue as normal
    - b. If drogue remains in the burble or is tangled see below
- d) Drogue in the burble
  - i. Avoid this in the first place with good drogue throw
    - a. Try to actively move drogue from the burble including reaching behind and grab drogue to pull it out of the burble



- e) Drogue is tangled
  - i. Remain altitude and time aware
    - 1. Drogue open ⇔ Fall rate will have slowed
    - 2. Drogue deformed ⇔ Fall rate unlikely to be reduced
  - ii. In general
    - a. Pull 1st Release, if no reaction...
    - b. Pull 2nd Release, if no reaction
    - c. Punch the container once
    - d. If generally unsuccessful Tandem emergency procedure
    - e. If successful continue as for normal descent
- f) Drogue has been set but it is collapsed (i.e., was not properly cocked)
  - a. After some acceleration (approx. 4-6sec) pull 1st Release
  - b. If successful continue as normal
  - c. If unsuccessful after a further 2-3sec pull 2nd Release
  - d. If still no reaction, punch container once
  - e. If unsuccessful Tandem emergency procedures
- g) Drogue torn off
  - i. Before the release
    - a. Pull 1st Release, if no reaction...
    - b. Pull 2nd Release, if no reaction
    - c. Punch the container once
    - d. If generally unsuccessful Tandem emergency procedure
  - ii. After release
    - a. Baglock Tandem emergency procedure
    - b. If main canopy is open extended control check
      - i. If negative Tandem emergency procedures
- h) Drogue/tandem pair entanglement
  - i. Avoid this situation by good and powerful drogue throw. Never pull the drogue and hesitate or keep hold of drogue with bridle is in the air flow.
  - ii. If entanglement arises despite the above
    - a. Attempt to remove drogue and/or bridle through relevant appropriate movement and actions
    - b. If successful continue as normal
  - iii. Drogue entanglement remains
    - a. DO NOT Release \*
    - b. DO NOT initiate or complete a cut-away \*
    - c. Seek to avoid high speed main deployment
    - d. Pull reserve at the timeliest point, at the latest by 1000m/GND (3,300)ft AGL



iv. Remain altitude and time aware

1. Drogue open Fall rate will have slowed
2. Drogue deformed Fall rate unlikely to be reduced

**\*Note:** The main canopy must not be released under any circumstances! A release would definitely lead to the opening of the container, resulting in a horseshoe malfunction which cannot be cleared. This can only be avoided by going directly to pulling the reserve. The reserve is equipped with a spring-loaded pilot chute and freebag which give it a chance to open through or alongside the entangled drogue.

Since some systems also have a connection between the cutaway pad and the release, do not cut away under any circumstances. This situation is an absolute **exception** to the usual sequence! An entanglement must therefore be clearly identified.

For reasons of stress avoidance in emergencies, the distinction between individual tandem types is therefore dispensed with in behavioural training.

Real cases from practice have now confirmed this solution strategy on several occasions. A drogue entanglement with the tandem pair is never a frivolous situation to accept.

i) The container opens during drogue fall

i. In general

Systems react differently to a slipped pin vs a torn closing loop. The type-rating for each system therefore covers the correct response.

ii. If the deployment bag stays in the container (if observable)

- a. Pull 1st Release, if no reaction
- b. Pull 2nd Release
- c. If successful ⇔ continue as normal
- d. If unsuccessful ⇔ Tandem emergency procedures

iii. Deployment bag leaves container in the classic harness/container types

⇔ possible horseshoe malfunction

- a. Pull 1st Release, if no reaction...
- b. Pull 2nd Release, if no reaction
- c. Cut away and check risers are releasing. \*
- d. Once risers have released pull reserve

**\*Note:** Experience has shown that a horseshoe or baglock type malfunction on a tandem may not result in sufficient tension on the two 3-ring circus to fully release the risers. The already loose TP risers may be deflected, further weakening the tension and the tandem pair is usually too heavy to be pulled into upright by the pull-force of the deployment bag without canopy escaping.

Both circumstances mean that the 3-ring system is open after cutting away, but the risers remain in place. If this arises, a TP must first actively release or remove the main risers before activating the reserve. Under no circumstances should a TP deploy his reserve canopy into a still latently attached horseshoe or the baglock.





However, deploying the reserve by RSL is highly probable as a direct consequence of cutting away, as the risers leave the harness. If the RSL does not deploy the reserve, the TP can do so immediately themselves.

The risk of main reserve entanglement exists but is minimized by following the sequence above and the presence of a reserve freebag. There have also been reports of reserve canopies being damaged by main canopies and their attached part while flying away. Such a situation should be avoided by taking care to have the correct loop length, ensuring good loop and pin condition as well as packing pressures and packing bungee condition, but also general movement in the aircraft or in free fall.

This includes, among other things, the reduction of rocking behaviour in drogue fall, so that the bent legs of a TG in motion can never strip, touch or even change the bridle of a drogue or the container closure.

j) Drogue release

- i. 1st Release cannot be located
  - a. Search one more time, if unsuccessful...
  - b. Pull 2nd Release
  - c. If successful ⇔ continue as normal
  - d. If unsuccessful ⇔ Tandem emergency procedures
- ii. 1st Release blocked
  - a. One more full-strength attempt, if unsuccessful...
  - b. Pull 2nd Release in parallel
  - c. If successful ⇔ continue as normal
  - d. If unsuccessful ⇔ Tandem emergency procedures
- iii. 1st Release pull and no reaction
  - a. Pull 2nd Release
  - b. If successful ⇔ continue as normal
  - c. If unsuccessful Tandem emergency procedures\*
- iv. 1st or 2nd Release dangling loose from their position
  - a. Follow the release cable to the handle and pull

**\*Note:** It is important to ensure that both the release function and the container closure are in a technically sound condition at all times. Packing errors due to lack of care are also unacceptable. Faulty release handles or a damaged closure pin (incl. soft pin) can also pose a risk for the safe deployment of the tandem main canopy and subsequently also for the reliable function of a tandem emergency procedures. The latter must be ruled out.



- k) Drogue twists during drogue fall and thereby winds up the drogue bridle tighter and tighter
  - i. Danger of the bridle jamming on release resulting in a hard opening and its related injury risk
    - a. If problem is recognised soon enough and permits earlier release to avoid the problem
    - b. If appropriate, swap asymmetric or damaged drogue before next descent
    - c. If the drogue does not collapse because of the twisted bridle see below.
- l) Drogue does not collapse on releasing
  - i. On normal opening continue as normal
  - ii. If opening is very hard
    - a. Extended control check (to identify any possible structural damage to the main canopy)
    - b. If all is well continue as normal
    - c. If main canopy is not controllable by 1000m/GND (3,300ft AGL)
    - d. Let go of all steering toggles Tandem emergency procedures including grasping TG with legs and giving them instructions
- m) Drogue entangled with the main canopy
  - i. If main canopy looks normal
    - a. Enhanced canopy control check
    - b. If successful ⇔ continue as normal
    - c. If main canopy is not controllable by 1000m/GND (3,300ft AGL)
    - d. Let go of all steering toggles Tandem emergency procedures including grasping TG with legs and giving them instructions
  - ii. If main canopy malfunctions on opening or has a persistent turn
    - a. Remain altitude aware
    - b. Tandem emergency procedures



## Unusual situations relating to drogues

- n) 2nd drogue release handle has been moved to the TG harness (possible on some US certified equipment) and the TG should release as part of their parachutist training
  - i. TG needs a briefing on how to release
  - ii. TG must have their own altimeter and be briefed on how to read it
  - iii. TG must know the release altitude (e.g., 1700m/5,500 ft AGL) 1700m)
  - iv. If TG does not release, TP must do so using the 1st release by 1500m/GND (5,000ft AGL)
  - v. If this does not result in a deployed main canopy, the TP must use the 2nd release on the TG harness
  - vi. If the 2nd Release is pulled by TG first, but the main canopy does not start opening, the 1st Release must immediately be pulled to maintain the usual pull sequence
  - vii. If the TG is meant to release the drogue and deploy the main canopy on their own initiative with their own altimeter, the pair may not be accompanied on the descent by other jumpers
- o) Safety information
  - i. On the classic tandem harness container systems, the 1st and 2nd release must be individually routed through one or other of the double closing loops i.e., no cable may not be routed through both loops.
- p) Classic harness container system with 2nd release with cable running through cut-away pad
  - i. If experiencing a hard pull on 2nd release, peel the 2nd release handle forward to reduce the overall pull force and then pull downward
  - ii. Never cut-away if the drogue is entangled with the tandem pair
  - iii. If the 2nd release needs to be used, do not pull outward to limit the risk of pulling the cut-away pad at the same time



- q) Drogue entanglement with another jumper
- i. Should be avoided by keeping other jumper(s) in sight at time of throwing the drogue
  - ii. If it does occur stay calm and operate the handles from top to bottom on the right-hand side:
    - a. First, disconnect RSL shackle at the top right
    - b. Pull the right-hand cut-away handle (although at that point nothing departs)
    - c. Then pull the 2nd Release with the right hand, which will open the container, let the deployment bag and main risers leave
    - d. Check whether all entangled items/people have been removed, i.e., the pair is falling as a two-some again and is accelerating to free fall
    - e. If not, attempt other methods to free the pair of others
    - f. If yes, and there is sufficient time, cut-away and pull reserve
    - g. If yes and there is not sufficient time, just pull reserve



### 3.3.6 Unusual situations on opening of tandem main canopies

In order to properly identify the unusual cases below, it is important at this point to re-describe the normal procedure in advance as a reference. This applies both to the opening and problems during the canopy ride:

#### **Standard, orthodox procedure:**

- 1) After the release, there is the trap-door effect, and the main canopy opens smoothly without turning or line twists.
- 2) The control check starts with checking the lines are running free, then that drogue and slider are in the right position and a visual check that the connector links, the 3-ring circus and RSL are in good condition.
- 3) A conversation is started with the TG, reminding them to clear their ears and remind them they must keep their arms in front of them.
- 4) Swiftly a touch check is carried out on the remaining handles cutting away and pulling the reserve in to ensure they are in place if they are needed at a later time.
- 5) Then conduct a canopy control check, ensuring steering and flaring can be executed with the relevant steering lines; the TG remains tight in their harness in case following the control check emergency procedures need to be carried out.
- 6) During the control check, the TP can check their position over the ground and steer the canopy in accordance with the flight plan to optimise the remaining canopy flight.
- 7) After this, the relevant adjustments can be made to make the TG more comfortable, e.g., loosening the lateral straps, lengthening the leg straps by about 3cm to enable a better seated position, loosen goggle if needed etc.
- 8) Once the TG is comfortable, start practice landings, ideally above 1000m/GND (3,000ft AGL) to maintain altitude for any eventualities
- 9) Even while conducting the landing practice, the TP remains aware of the in-air position and ensures a clear flight plan to ensure the landing area is reached. If that is not possible the TP seeks appropriate off-landing areas.
- 10) At 300m/GND (1,000ft AGL) the TP makes their decision on whether the RSL remains attached or not during the landing depending on the prevailing wind conditions.
- 11) By 100m/GND (300ft AGL) all necessary brake lines (primary and secondary) are under the TP's control to ensure a good landing
  - i) The landing approach should only be over a landing area suitable for tandem landing with appropriate surface conditions for a sliding landing if needed



## **Behaviour in special circumstances during tandem main deployment:**

Again, these descriptions are limited to tandem-specific situations. The TP is responsible for identifying any problems and they need to include their pre-existing knowledge as an experienced, licensed skydiver.

- a) How to react to an obvious malfunction should already be known and will not be re-iterated here.
- b) Steering line breaks
  - i. Should immediate be considered a malfunction on tandems as a safe landing with the TG cannot be guaranteed.
    - a. Remain altitude aware
    - b. Tandem emergency procedure including leg-lock and directing TG
- c) Drogue entangled with the main canopy
  - i. See Drogue situation above
- d) Connectorlink on main riser damaged
  - i. Should immediate be considered a malfunction on tandems as a safe landing with the TG cannot be guaranteed.
    - a. Remain altitude aware
    - b. Tandem emergency procedure including leg-lock and directing TG



e) 3-Ring circus damaged

i. If broken

1. Left hand side: Pull cut-away paid and prepare for RSL deployment
  - i. If RSL does not deploy main canopy
    - a. Swiftly pull reserve
2. Right hand side: Collins Lanyard may disconnect risers and RSL/ MARD deploys the main canopy
  - i. If no deployment takes place
    - a. Swift cut-away and complete tandem emergency procedures

ii. If jammed because of misrouting of any segment

1. If main deployment is uneventful
  - i. Evaluate sturdiness of 3-ring circus
    - a. If possible, continue as normal
    - b. If in doubt, cut 3-ring loop with hook knife (if present) above decision altitude to initiate cut-away
    - c. Tandem emergency procedure
2. In event of malfunction where pulling the cut-away handle will not release the risers because of the fault:
  - a. cut 3-ring loop or riser with hook knife (if present) above decision altitude to initiate cut-away
  - b. Tandem emergency procedure

f) Baglock

i. If directly on release and the tandem pair continues to fall in a horizontal position

- a. Initially ONLY cut-away, DO NOT pull reserve at this time<sup>8</sup>
- b. Ensure that first left and then right the 3-ring system is open and has released the risers
- c. Consciously remove the risers if needed so that both depart
- d. If needed, remove RSL on right hand side if still attached with Velcro or caught on something else
- e. Once everything has departed pull reserve so that RSL does not activate it

ii. If in a more classic malfunction situation

- a. Remain altitude aware
- b. Tandem emergency procedure

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<sup>8</sup>Research has shown that the force of a baglock while remaining in the belly to earth position is insufficient to permit the release of the three ring circus and hence allow a smooth departure of the main canopy.



g) Two-out

- i. Situation is stable
  - a. React as per sport parachuting guidance on biplane, side by side or down-plane
  - b. Brief TG on the issue and decisions being made
- ii. Main and reserve entanglement
  - a. Aim to detangle, including cutting lines with hook-knife as long as sensible
  - b. Avoid directional manoeuvres which may negatively affect the situation
  - c. Prepare for a hard landing including possible off-landing

The above list is simplified and cannot reflect all possible dynamic situations which have arisen in the history of tandem descents. Although people prefer straightforward solutions, the complexity of a tandem jump does not always allow this. The most sought-after "solution" to almost all problems remains prevention. Tandem jumping can be completely problem-free with appropriate care, both for equipment and people. Nevertheless, malfunctions are inherent in the system and therefore they should always be responded to with the same or technically logical reactions.

### 3.3.7 Special situations under tandem canopy

As the canopy flight is with the TG, this adds certain problem areas to the usual canopy flight and landing.

In addition, no tandem pair should descent unobserved so that the additional person is able to assist in unusual situations such as off landings.

- a) TG takes hold of handles
  - i. Usually directly on opening as fright can lead to a reflexive need to hold on.
    - a. Take hold of TG wrists in their position
    - b. Instruct TG not to pull anything explaining why
    - c. Request TG releases their hands, offering alternative places they can hold on to (e.g., TG harness)
    - d. If necessary, hold wrists throughout this conversation and move hands to alternative position
    - e. If needed, seat any loosened handles in the Velcro
  - ii. If too late and TG has pulled hand
    - a. Depending on the situation, follow logical sequence
      - i. If reserve has been activated, consider reaction
      - ii. If cut-away
        - a. Release any hold on the main canopy
        - b. Anticipate RSL activation
        - c. If no RSL activation pull Reserve directly





b) TG vomits

- i. Usually arises from harness being too tight or breathing difficulties during freefall or under canopy
  - a. If TG alerts TP of nausea, try to calm TG and offer opportunities
  - b. Offer sick bag if present
  - c. If no sick bag available, request head is moved to the side so that vomit falls past tandem pair
  - d. Alternatively, if high enough and possible, perform a "Blind-Man" manoeuvre up to 90° to permit vomit to fall away to the side
  - e. Try to avoid that any stomach content (specifically stomach acid) comes into contact with the harness webbing or risers
    - i. If this does occur, wash webbing immediately on landing and treat with gall soap to neutralise the acid
- ii. During landing
  - a. Lead the TG to the side and wait until vomiting has concluded
    - i. If appropriate, loosen leg straps to remove any circulatory constriction
    - ii. If needed, suggest TG lies down or is otherwise stabilised.
  - b. Try to avoid equipment contact with any vomit.

c) TG loses consciousness

- i. Under canopy
  - a. Address TG by name and raise their head if relevant to aid breathing
  - b. If relevant, loosen chinstrap of head protection and/or goggles
  - c. Make TG as comfortable as possible, to remove any circulatory restrictions
  - d. If relevant and possible, attempt sternum stimulation to trigger wake-up reflexes
  - e. If none of the above are successful, no steep spiral, fly and land as gently as possible
- ii. On Landing
  - a. Before landing instruct even unresponsive TG as loudly as possible to raise their legs
    - i. Depending on stress levels and sub-conscious perception, this may wake a TG
  - b. Flare as usual, with wide legs to attempt a surf landing
  - c. Fly straight while flaring to avoid any sideways landing falls or turns



- d. If possible while surfing, move TG to the side to enable them to slide in with as little tension as possible
    - i. Depending on the wind, it may be possible to perform a near stand-up landing transitioning gently to a seated position
  - e. After landing, place unconscious TG into recovery position and conduct necessary First Aid, possibly calling for further medical assistance
- d) Lateral straps jam while loosening under canopy
- i. In general
    - a. Tandem can be landed perfectly normally despite not being able to complete this improvement to comfort
    - b. Ensure you remain aware of surroundings, flight plan, landing area and airspace.
    - c. After landing, loosen leg straps first to reduce the tension on the relevant side to allow the laterals to release.
  - ii. Lateral strap cannot be extended and re-attached after unhooking
    - a. Situation can be partially ignored, as long as no other unexpected things occur (e.g., canopy collisions, riser break, TG cuts away)
    - b. Ensure you remain aware of surroundings, flight plan, landing area and airspace.
    - c. If possible, wrap lose strap around main lift webbing
- e) Canopy collision
- i. Generally, this should not arise because of the high core-experience level of jumpers on a tandem load. However, there can be situations when non-professional jumpers could cross paths with the tandem pair, such as wing suiters, tracking groups, faster student canopies, especially as the landing patterns start converging.
    - a. If there are wingsuiters or students on the same load
      - i. Discuss and agree flight plans to avoid collision possibilities
      - ii. Stay vigilant for other jumpers under canopy
    - b. Wingsuiters often arrive at unexpected times in the shared airspace. Space, which was clear a moment ago, may now be occupied by an unexpected jumper
    - c. Students can make mistakes and may not act as expected under canopy in the shared airspace
    - d. Any other jumpers in the same airspace pose a possible collision danger



- ii. Canopy collision has happened
  - a. Altitude appropriate reaction, usually tandem emergency procedures.
- f) Possible off-landing
  - i. This situation should have been avoided by good flight planning and flying the plan
    - a. If it does occur, locate alternative landing area taking into account current wind and drift conditions
    - b. Identify landing direction and new landing pattern as early as possible to avoid landing stress.
    - c. On landing, seek most appropriate method to return to DZ, either walking or being collected
  - ii. If exit point was wrong
    - a. Consider opening higher to still be able to reach original landing pattern
    - b. If not possible adjust landing plan and pattern
  - iii. If under reserve canopy and unable to reach original landing point
    - a. Adjust landing plan and pattern as quickly as possible
- g) TG harness too tight
  - i. In general
    - a. Use all possible comfort adjustments
      - i. Primarily, loosen laterals
      - ii. Aim for a seated position
      - iii. Adjust harness tension if possible
      - iv. Encourage TG through verbal support
  - ii. Shoulders are uncomfortably far back
    - a. Tighten chest strap (if possible)
    - b. If this arises frequently Review basic settings of harness to ensure they still meet manufacturers' recommendations
  - iii. TG is uncomfortable hanging in the harness
    - a. Offer short rests offering opportunity to stand on TP's feet
    - b. Practice landing position
      - i. Movement will encourage circulation and distract from hanging
      - ii. Adjust weight in harness to prevent pressure points



h) Landing in high winds

i. In general

- a. To avoid landing problems, weather conditions should be evaluated before every take-off
- b. Evaluation of the conditions should be in accordance with relevant parameter \*\* Definitely land seated.
- c. Stand-up landings may appear easier, however the impact of being pulled backwards and dragged as the canopy collapses is greater from a standing position the risk of injury to the TG is too great
- d. If possible, land with a tandem catcher who can assist with fast collapsing of the canopy.

ii. If it does occur

- a. Release RSL high enough to permit cutting away the main canopy on landing to prevent being dragged
- b. Adjust flare height and do not flare too high risking popping up and losing altitude quickly or falling backwards
- c. Aim to stall the canopy with the main risers on landing to speed up its collapse
- d. If not possible, pull on a single brake line
- e. Limit being dragged by cutting away the main canopy
- f. If being dragged under a reserve, focus on collapsing it if there is a risk of not being able to do so and no other opportunity exists cut away with hook knife

i) Landing on/by obstacles

- i. This situation should be avoided by good planning, executing the good plan or early identification and avoidance of the obstacle.

ii. If it does occur

- a. Improvise depending on the situation, this is never a planned occurrence
- b. Never land on an obstacle in full flight
- c. In the event of injury, offer/request assistance

j) Water landings

- i. Generally, the possibility of a water landing should have been well anticipated, be briefed and determined whether all participants can swim. Ideally, this is included in the contract for carriage which is signed by all parties.
  - a. Floatation devices can be very useful to have
  - b. Consider refusing non-swimmers



- c. As far as possible, water landings with tandems should be avoided. Intentional water landings with tandems are not permitted in any case
- ii. If unavoidable
  - a. Remain altitude aware as this is always unplanned
  - b. Inform TG of impending water landing
  - c. Release RSL
  - d. If relevant, remove safety pins on the hooks of the TG harness
  - e. Loosen lateral straps and stow on TG harness
  - f. Open chest strap on TP harness
  - g. If relevant, open visor on full face helmet (or remove helmet)
  - h. If relevant, ensure floatation device is available
  - i. Leg log for landing
  - j. Deep breath just before touching the water having briefed TG to do the same ...

...aim for a smooth flare above water and as it is reached. Distances can be difficult to judge, fly towards nearest edge and avoid waves

- k. After landing, possibly cut away main canopy and unhook TG as quickly as possible (buoyancy in the water should reduce tension on the hooks), push TG away
- l. Possibly climb out of harness and reach the surface (not under the canopy)
- m. Swimming on your back takes less effort
- n. Try to reach hard ground as quickly as possible
- o. Work with the TG
- p. Offer assistance if needed
- q. Prioritise your own safety





### 3.4 Accompanied tandem descents

#### 3.4.1 Evidence of proficiency

You need to demonstrate proficiency in order to accompany a tandem descent (fun jumper or videographer). This proficiency can be determined and granted by a TE, a Tandemverantwortlicher or an Ausbildungsleiter/chief instructor. An informal endorsement in the jumper's logbook or on a separate qualification sheet is adequate evidence. To grant the proficiency endorsement the accompanying jumper must have:

- Minimum of 300 jumps, of which 50 in the last 12 months, principally FS skills and experience
  - o If wanting to jump with a camera, the "jumping with camera" proficiency must have gained und 100 camera jumps logged
- Basic briefing
  - o Briefing on normal tandem descent
    - Broaden knowledge of tandem equipment
      - Operational details and how they fit today
      - Timing of actions on climb and descent (hooking up, exit, drogue delay etc)
      - „Dos and Don'ts", including forbidden manoeuvres such as „Fly-Bys" or CF/CRW
      - Explain necessary professionalism when working with TGs
    - Working as a team
      - Match weights and fall rate, note canopy colours, where can accompanying jumper assist, kit check, confirming spot before climb-out etc.
  - o Briefing on tandem problems - "what to do, if..."
    - Explain all unusual situations which could of value to the accompanying jumper
    - Behaviour in Special Circumstance briefing in the form of "what would you do if..."
      - Exit is mistimed
      - Drogue malfunctions
        - o Differential fallrates between drogueless tandem pair and solo jumper if drogue is in tow, what will TP do, how does that affect what the accompanying jumper should do
        - o How TP will react to a drogue entanglement
      - What does the TP do if they are unstable?
      - Approach sector, taking grips, wave off at 2,000m/GND (6,500AGL)
        - o Brief on common hand signals
      - Trap-door effect and maintaining distance
        - o Take care - tandem pair does not just fall straight down at this point
      - Self-awareness, especially if too focussed on great footage
        - o Remain altitude aware
        - o How to deal with high pulls in the event of distance from landing are
      - Cut-away, especially in the event of a total malfunction



- Insufficient horizontal distance can create danger
- Landing area, traffic, burbles and obstacles
  - Tandem requirements, appropriate landing behaviour of solo jumper
- Proficiency to follow out
  - 2-way check-out jump<sup>9</sup> evaluated by an appropriate jumper from the tandem operation, including flight planning of candidate
  - Check-out jump
    - Discuss check-out jump plan
    - Evaluate translation into practice, possibly check video quality and framing
    - Determine result positive: Endorse logbook
      - ⇔ negative: refuse endorsement and offer/recommend further training opportunities

### 3.4.2 Briefing Accompanying jumpers

Regardless of their ability and an existing proficiency, each accompanying jumper needs an up-to-date authorisation and a briefing by the respective TP to accompany them.

If the authorization is current and both jumpers know each other through previous jumps, then the briefing can be reduced to the essentials.

Each TP must be able to conduct a basic briefing for his tandem accompaniment. In terms of content, the basic briefing is based on the following sections:

- General Teamwork between TP and other jumper(s), including clarifying canopy colours. The videographer is expected to capture all the TG's important moments; briefing, climb, including hooking up, exit etc. If possible, a videographer should document all key events, including later (if possible) the landing command of the TP
- Exit Co-check of spot, jump position, no holding on to the tandem pair, exit count and exit timing between tandem pair and fellow jumper, Time of the planned drogue throw
- Approach approach the tandem pair only in the agreed sector from the front, in the TP's field of vision, observe the position of the sun if necessary, for image quality.
- Position Do not fly over or under tandem pair, take up agreed position changes up to 2000m/GND (6,500ft AGL] (e.g., fly, up and down), below 2000m/GND (6,500ft AGL) no longer approach and start clear horizontal or lateral separation (possibly marked with signals) before the release.
- Grips Only take grips on TG, not TP

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<sup>9</sup> The term „check-out jump“ is used to refer to a jump during which competence is evaluated in accordance with the regulations issued by the Authorised Association.





- Actions Regular tasks of the TP during exit and drogue fall such as handle checks, if necessary, orientation to the sun to prevent glare, specific actions depending on the situation and experience of the TG, Drogue release check at 2000m/GND (6,500AGL).
- Signals Action, direction, eye contact, cancellation signals, "Exit was too far" signal followed by earlier drogue release and earlier Separation, normal 2000m (6,500ft) signal, waving off, pull signal, wave or canopy signal on the ground.
- Release "Trap door effect" when drogue is released, separate from the centre horizontally or track away, if possible, across the run-in.  
Never open under the tandem!
- Landing Tandem-compatible landing site, where everyone should be able to land reliably. If necessary, identify possible assistance for landing, such as help to collapse the canopy in the event of a strong wind landing.
- Behaviour in Special Circumstances:  
Excerpts question-and-answer game on Behaviour in Special Circumstances tandem questions, among others always remember key altitudes and "jumpers in the drogue" procedure and how the videographer should react if something gets caught in his helmet camera.
- Camera work Keep the recordings comprehensible and aesthetic.  
Tandem videography is not a skills camp for experimenters, but a service of quality and professional safety message of our sport.



### 3.5 Tandem descents with TP wearing a hand camera

#### **Personnel preconditions:**

- ⇒ This is an additional approval to the TP approval (Passagierberechtigung)
- ⇒ Minimum descents: 200 Tandem descents as TP, of which 50 in the last 12 months

#### **Equipment preconditions:**

- ⇒ Suitable left-handed mount, possibly with a further altimeter mount which could also be on the right hand (2nd altitude measuring device such as an audible altimeter is obligatory)
- ⇒ Camera mount must not limit the movement of the TP or their ability to use any of their handles

#### **Content of basic practical induction Theory**

- ⇒ Induction may only be carried out by an experienced hand camera TP who has conducted at least 100 hand camera descents
- ⇒ Philosophy of use of hand cameras
  - + History/ ambassador of the sport / up-close emotions/ ethics
  - + Extreme emphasis: Tandem descent has higher priority than capturing footage! Possible alternative TG briefing in the event of using hand camera
- ⇒
  - + Mention the camera at the TG briefing
  - + Do not touch the TP's hands!
- ⇒ Tandem safety when jumping with a hand camera
  - + More effort required
  - + Safe tandem descent takes priority over good footage: parts of the tandem descent require 100% concentration. At various times in the descent, the TP may need to focus 100% on the safe descent and the TP must be prepared to ignore the effect this could have on the footage.
  - + Still conduct touch check on handles, despite the camera presence
  - + Handle sequence!
  - + Do not alter the 2nd release to allow for "a better video". Muscle memory must be retained. In the event of an emergency all handles need to be findable and activated in the correct order
  - + During opening, hold the camera with a straight arm to keep it out the TG's head area.
  - + Air-space check under canopy with the hand camera
  - + Additional landing preparation: film landing practice / switch camera on in time for landing/ then ONLY concentrate on safe landing
  - + Exit-Training with hand camera
  - + Additional requirements of Outside-Video when also using a hand camera
- ⇒ Behaviour in special circumstances when conducting tandem descents with a hand camera
  - + Stability in freefall with the camera may require more leg input



- + Line twists: risk of camera being caught in lines - ensure there is a camera cut-away mechanism
- + Known occurrences and what to learn from them (e.g., hook knife use)

### **Content of basic practical induction Practical**

- ⇒ 1 Solo jump with hand camera with anticipating its use in tandem descents
  - + The candidate should be familiar with the use of the camera and be able to simulate how it will fit into the end-to-end tandem descent
- ⇒ 2 tandem descents with hand camera with the briefer or a dummy weight as TG
- ⇒ Possibly more practice activities, at the discretion of the briefer

### **Confirmation from the briefer and the Tandemverantwortlichen or a Tandem-Examiner in the logbook or a separate proficiency card**

#### **Additional development after the permission has been granted:**

- ⇒ Frequent and regular tandem descents with a hand camera
- ⇒ Discussion and sharing of experiences with others

## **3.6 Generally**

### **3.6.1 Being/staying current**

A TP is encouraged to remain current throughout the duration of their approval.

The minimum requirement for this is 60 tandem jumps within the last 36 months. Of course, more tandem jumps in the period are always better, because the minimum requirements do not represent a consistent routine.

But even 1000 tandem descents a year do not necessarily mean more professionalism, if the frequency does not lead to attentive conscientiousness, but rather to cutting corners.

Tandem descents must therefore never be based on reducing care on the part of the TP due to personal circumstances but must be implemented regularly with the highest quality standards.

Regardless, a TP must move with the times and follow technical changes and adjustments. They should seek regular information on relevant platforms and inquire whether there are updates on existing procedures, manuals (including this one here), or safety communications.

In the meantime, they should also avoid becoming "one-trick-ponies" with their jump routine only consisting of tandem descents, KPIs and financial reward. That's why a TP should conduct sports parachute jumps now and again for self-satisfaction. For example, practicing solo sidespin jumps can be beneficial.

In addition, frequent uneventful tandem descents can promote the fallacy that one is a highly experienced TP and thus can cope with any situation at any time with ease. But the only thing that is reinforced in this situation, is the normal descent. In extreme cases, the supposed experience is not applicable, and, in more and more accidents, it is becoming apparent that so-called professionals have failed.



Each TP is therefore required to deal with the entire scope of Behaviour in Special Circumstances every year and to complete a mental as well as physical training under realistic conditions, such as a tandem hanging harness. This is the only way to ensure that there is also currency for the rare, but possible non-routine case.

### 3.6.2 Continuous professional development

Although no training is necessary for the extension of a tandem approvals, the DFV e.V., as the Authorised Association, offers an "Information and Security Conference" (InSiTa) once a year. All information from conference can be found for later use on an event CD, which can be used by Chief Instructors and Tandemverantwortliche for end of season safety training. At the InSiTa regular training courses are held for TPs based on current developments. It is therefore worthwhile to inform yourself of the agenda of the upcoming event and come along.

The Tandem Examiner Conference, which was installed by the Bundeskommission Fallschirmsport (BKF), also meets in advance of the InSiTa and discusses TP training, procedural recommendations and future decisions for tandem events in Germany. The majority of this meeting is public and can therefore be attended or followed and, if necessary, even influenced by applications to the office in advance.

### 3.6.3 Publications

Additional publications on safety and equipment are available on the download sections of the websites of the authorised associations and/or ParaOrg.



# Chapter 4

## Forms and documents



## 4. Forms and documents

### 4.1 List of Forms & Documents

Most forms are downloadable (in German) from the Download page of the website of the Authorised Associations although some are only available on request.

**Note:** Some of the documents are examples only.

Description
Beförderungsvertrag = Contract for carriage (Example)
Contract for carriage in English (Example)
Fitness form (Example)
Fitness form for disabled people (Example)
Application form for third party liability insurance
Application form for passenger liability insurance
Application for a demo landing
Application to license extension/ re-issue
Text for the 90-day Rule as at 03-2019
List of maximum suspension weight for tandem systems and canopies (MSW / Maximum Suspension Weight - List) (on request)
Manufacturers authorisations for equipment compatibility (on request)
Safety Notices
Listing of reportable incidents in relation to Tandem descents
BKF Tandem incident reporting form
Accident reporting form
Insurance claim form - insured
Insurance claim form - injured/claimant
Validity matrix of air carrier third party liability insurance
DFV e.V. Membership application form
General annual parachuting statistics
Questionnaire for compilation of annual statistics
InSiTa Archive
Application for event third party insurance
Summary of relevant legislation (see AHB Part 1, chapter 12)



The following forms and publications are relevant for training and approvals:

Description
BKF Certificate for TP qualification (Form)
BKF Registration for TP training (Form)
BKF Training certificate for TPs (Form)
BKF Exam for TPs (Form)
BKF Application for issue of instructor approval
BKF Application for conversion of a foreign or military instructor approval
BKF Application for Recognition of a foreign instructor approval
Data sheet for recognition of foreign TP licences
„Tandempilot Certification" for foreign TPs without foreign TP license (only available on request)
List of current Tandem Examiners
BKF Tandem-Examiner Qualification (Form)
Table of legislative basis for approvals Published 12-2014 January
Legal regulations for German and foreign approvals
Overview list of Tandem Examiner conference minutes (on request)
Tandem Fatality statistics (on request)
Evaluation checklist by TE Frank Carreras (Aircrew)



Deutscher Fallschirmsportverband e.V.  
Deutscher Aero Club e.V.



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# Chapter 5

## Tandem glossary



## 5. Tandem glossary

### 5.1 Terminology relevant to the Tandem Handbook

<b>Tandem System</b>	<b>Manufacturer</b>
Advance Tandem	Basik Air Concept / Para Fun - France
Dual Hawk Tandem (Strong / TNT Tandem)	Strong Enterprises - USA
Wings Tandem	Wings Tandem System - USA
Elite Tandem	Jump Shack / Parachute Laboratories, Inc. - USA
Legend T - Tandem (Galaxy / Atom Tandem)	Zodiac Aerospace / Aerazur - France
Omega Tandem	Firebird GmbH - Germany
SIGMA Tandem	United Parachute Technologies, LLC - USA
Touch Tandem	X-SkySpirit Technologies - France
Ultra Tandem (Next Tandem)	Paratec GmbH - Germany
Vector Tandem	Previously Relative Workshop - USA, subsequently UPT; there remain some older models in use. VT is no longer manufactured as a pure tandem harness contain system

<b>Term</b>	<b>Description</b>
90-Day-Rule	Per § 45a of the Aviation Personnel Regulation (Verordnung über Luftfahrtpersonal - LuftPersV); legal minimum currency period to transport passengers in air sports equipment; relates to time elapsed and number of jumps
Evaluation Checklist	Checklist for training of TPs which lists individual stages of each jump to aid a TE in evaluating their candidate
MARD (e.g., Skyhook RSL)	Main-Assisted Reserve Deployment: System which through an RSL connects the main risers to the bridle of the reserve pilot chute.  This means that in the event of cutting away the main canopy, the RSL does not just open the reserve container, but pulls on the bridle and freebag of the reserve canopy. The idea is to speed up the activation and opening of the reserve canopy.



Term	Description
MSW	Maximum Suspension Weight: The MSW table provides information on maximum suspended weights for individual components by manufacturer (e.g., harness, main canopy, reserve canopy) and thereby the whole system
Tandem-Examiner (TE)	Person currently approved and appointed by the Authorised Association to train and examine TPs

Cross references	Description
AHB Part 1, chapter 12	<i>Ausbildungshandbuch Teil I, Sammlung der für den Fallschirmsport relevanten Gesetzestexte in Kurzform</i> Training handbook Part I Summary of legislation relevant to Sport Parachuting
AHB Part 1, chapter 5, Behaviour in special circumstances	<i>Ausbildungshandbuch Teil I, Erstausbildung, hier vor allem der Abschnitt „Verhalten in besonderen Fällen“</i> Training handbook Part I, Initial training, in particular Behaviour in Special Circumstances 2.

## 5.2 Translation of English Tandem terms (for completeness)

Term	Translation
1st Release	1st Release used most frequently
2nd Release	2nd Release, sometimes functions with cut-away pad
AAD	Automatic Activation Device
Collins Lanyard	Named after Mr Collins, connects RSL on one side to cut-away cable on the other side to ensure both risers release in the event only RSL side separates (e.g., if riser breaks) while RSL activates the reserve
Dummy	
Flipthrough (3-Ring-System)	Can occur on walking back from landing area, visual check should ensure it is corrected before the next jump



Term	Translation
Gainer	Sometimes used to exit from suitable jump aircraft
Handcam (HC)	Hand camera on the TP's left hand
MSL	Mean Sea Level
PIA	Parachute Industries Association
Quick-Ejectors	Used on the TG harness
RSL	Reserve-Static-Line
RW (FS)	Relative Work (formation skydiving)
Side-Spin Phenomenon	Side-spins can arise in tandem descents if the pairs tips on its side resulting in an unintentional spin which can only be stopped by active intervention by the TP
Tandem Instructor (TI)	Terminology used in the USA and UK for tandem pilots
Tandem Instructor Examiner (TIE)	Tandem-Examiner
Tandem Student (TS)	Terminology used in the USA and UK for Tandem guest as only students can be transported by others using air sports equipment

Speed terminology	Meaning
Normal-Speed	Normal drogue braked fall rate
Low-Speed	Acceleration phase on exit before reaching normal speed
High-Speed	Higher than normal fall rate arising from lack of or malfunctioning drogue 3.



# Chapter 6

## Tandempilot Training



## 6. Tandempilot Training

### 6.1 First issue of tandem approval (excerpt from chapter 1)

Any licensed German parachutist over 18 years of age can apply to gain a TP rating on meeting the following requirements:

- valid jumper license
- Valid instructor approval (if expired, check with the Authorised Association) or successfully completed a TP-QL and passed the related exam.
- Valid medical certificate recognised by the Authorised Associations (in either English or German)
- Minimum of 500 RAM-Air descents in total
- At least 12 jumps in the last 12 months
- At least 10 jumps in the last 90 days
- At least 5hrs freefall
- Evidence of German language skills
- Successful completion of a TP training course carried out by an authorised TE and passing the exam (theory and cross-check) with a second authorised TE
- Agreement to data protection policy
- Submission of the application form with relevant fee, assurance declaration and optionally a passport picture

For members of the Bundeswehr the following applies:

- For members of the Bundeswehr the instructor rating „Ausbildungsleiter mil. Freifall" is acceptable

A list of all authorised Tandem-Examiners can be found in the download area of the website of the Authorised Associations under the heading 'Personal' (Staffing).

### 6.2 Papers needed to attend a training course

- License, approval to teach, TPQ permission (see module 1) and logbook
- Valid medical certificate recognised by the Authorised Association
- For the TP-Qualifikation: First Aid certificate, less than 24 months old
- Signature of training contract
- Registration of all candidates on version 03-2018 of the registration form with the Authorised Association by fax or e-mail
  - On the notes of the form please indicate:
    - Tandem system type being used on the course (e.g., Vector, Dual Hawk, Sigma, etc.)
    - Aircraft type being used on the course
    - Co-trainers and any trainee TEs
- Check all participants and co-trainers in at the drop zone/manifest



- Complete example contracts for carriage between
  - o Tandem Examiners and TP candidates
  - o TP candidates and Tandem-Examiners
- If relevant, complete equipment hire contract
  - o If candidate brings their own system, complete gear, document and insurance check on it
- Start the entitlement to teach form (Version 03-2018)
- Prepare the examination certificate (Version 03-2018)
- Hand out written test (see THB Part II Module 8)
- Prepare application for TP licences

In addition, possibly:

- 9x evaluation checklist for the training descents
- 9x contract for carriage for the training descents

### 6.3 Guidelines for the TP-training (TP-Ausbildung - TA)

This is the implementation of the instructions of the Authorised Associations for the training for gaining the passenger flight approval for air sports equipment operators (Tandem pilot approval) in accordance with Sections 42 & 84a LuftPersV. A tandem pilot training (TA) can be hosted by any training permit holder and must be registered with the authorised associations.

A TA must be led by a tandem examiner (see chapter 7).

## Training

### 1. Elements on the training

The training for the acquisition of the passenger flight approval for air sports equipment (tandem approval) consists of theoretical training, practical ground and practical jumping training.

The training objectives listed are binding and must be completed, sometime before level 0 or 2 of the practical jump training. The entire training can only be carried out on a tandem system type in which the Tandem Examiner has proficiency.

Before starting the training, the training tandem examiner (TE) reports the TP candidate to the Authorised Association.

On completion of the training, the TE confirms the suitability of the candidate, that they passed the first written exam and the practical examination by signing the training record card. The training record card is handed to the candidate.

Training that has not been successfully completed must be reported to the Authorised Associations!



## **2. Theory training**

The appropriate knowledge must be imparted in theoretical training.

## **3. Practical Ground and jump training**

In practical ground and jump training, the appropriate skills must be taught and developed by the TP candidate.

## **Examination**

### **4. Components of the Examination**

The theory exam supervision and practical evaluation is carried out by a TE who was not or only minimally involved in the practical jump training.

### **5. Theory exam**

5.1. The candidate takes two written exams in longhand.

5.1.1. The first written examination takes place before the first training jump in which the candidate acts as a tandem pilot. It is examined by the training TE.

5.1.2. The second written examination is taken before the final evaluation jump (Level 10/X-Check) by the examining TE.

### **6. Practical Exam (X-Check or "Cross-Check")**

6.1. The practical test consists of two parts: the jump preparation and the descent itself.

6.1.1. The preparation consists of:

- Greeting
- Beförderungsvertrag = Contract for carriage
- Briefing the TG with body position practice
- Checking and putting on harnesses

6.1.2. The descent itself consists of:

- Behaviour during the emplaning and climb to altitude
- Exit
- Freefall/ Drogue fall
- Canopy flight and landing
- Aftercare following the jump
- Packing

6.2. The signed examination certificate is not a valid tandem approval.

The examination certificate is given to the trainee.





Exams and X-Checks need to be reported to the Authorised Associations.

6.3. On passing the exam, the candidate/TP (now a qualified TP on receipt and signature of the updated airman's licence) should seek the earliest opportunity to obtain their approval and take their first real TG.

### **Content of the theory training**

See training record card

### **Content of the practical ground training**

See training record card

**These training elements MUST be completed before Level 0 or 2 respectively!**

### **Content of the practical jump training**

The training consists of at least **9 tandem jumps and 2 solo side-spin training jumps**, all of which are to be carried out under the supervision of a tandem examiner of the candidate's choice.

During the training or examination (X-Check) at least **one video** of the TP candidate must be made (incl. ground briefing, hooking up, jump and landing). The training jumps from level 6 onwards are particularly suitable for this purpose.

The video person must have demonstrated their appropriate proficiency in advance. In addition, a detailed briefing of the video person by the TP candidate is required.

### **Sequence of events during the training tandem descents**

#### **All Levels:**

- In all cases only TE's can act as the passengers
- TE-Safety handles for cut-way pads and reserve handles must be installed ("Chicken-Handles").
- All TGs (including during the training) must have completed and signed a contract for carriage

**Level 0:** Level 1: (1 jump/**optional**) solo jump with the tandem system (and optional dummy load).



**Level 1:** (1 jump) candidate as a TG with TE or experienced TP (at least 100 tandems). Normal tandem descent (in terms of ground, climb, canopy flight and landing) as a demonstration of the ideal scenario.

Freefall program: Depending on the briefing, candidates can try to influence the drogue fall. Candidates hold their hands on the toggles without input on landing. If the candidate already has relevant experience as a tandem passenger (e.g., participation in other TP training courses), they can also complete his level 1 as a TP, but without a high-speed scenario (similar to level 2).

For this jump the TG must be a Tandem-Examiner.

**Level 2:** (at least 1 jump) candidate is the TP.

No passenger briefing, stable exit, straight and controlled freefall/drogue fall (drogue only set after approx. 10-15 seconds stable fall), touch exercises on all handles, possibly 360° rotations. Passenger is cooperative and holds their hands in the control toggles when landing.

**Level 3:** (at least 1 jump) good passenger.

Ground briefing, if desired a further qualified TP or TE can be present in the aircraft to provide additional oversight.

Stable exit, drogue setting after 10 - 13 seconds stable fall, handle check for all handles, 360° turns with the drogue.

**Level 4 - 9:** (at least 1 jump per level) - middling to bad TG

Ground briefing as before, during the descent preparation for the examination descent by:

- Include High Speed scenarios/ freefall speeds without drogue with front loops or turns (set drogue by 2,500m GND (8,200ft AGL)
- Where possible conduct touch checks on handles
- 1x unstable exit
- 1x Second Drogue Release Pull
- Increasingly uncooperative TGs
- 1x simulated emergency exit (in accordance with the Tandem Behaviour in Special Circumstances descriptions) from altitude with touch of reserve handle within 3 seconds of exit TG to be fully hooked up with tightened laterals and full gear check!
- 1x simulated unconscious TG under canopy and on landing
- At least 1x determine stall point of the canopy

If possible

- 1x TG weighing less than 60 Kg
- 1x TG weighing more than 80 Kg
- 1x TG over 180 cm tall
- 1x female TG

**All landings** during the training course must be safe!



## **Gaps between training events /refreshers**

If the training is interrupted for more than 30 days, the TP candidate must perform a refresher jump with a TE as a passenger before the training can continue or the exam can be completed.

## **Training on two Tandem System Types**

If the training is to be carried out on two different types of tandem system, 2 instruction jumps must be made on the second system. These jumps may not be made until level 4 at the earliest.

The induction jump for the second type must be carried out with a TE as TG.

## **Exam for the passenger flight approval (X-Check)**

The examining TE must not have trained the TP candidate or only conducted a small number of training descents!

After completing their training, the candidate has 3 months to pass the passenger flight permit examination.

The examination consists of a theoretical part, a practical part "preparation" and a practical part "implementation".

The theoretical exam consists of the 2nd written exam.

Use the detailed examination (see THB Part II module 8).

### **Examination criteria**

- Pass mark is 75%.
- If an incorrect answer indicates a risk of danger or safety breaches the exam is failed (regardless of the percentage actually achieved).

The practical part "Preparation" consists of greeting, contract of carriage, instruction/briefing of the passenger with practical exercises of body position, as well as checking and putting on the harnesses.

Here, the candidate is being tested for confidence, expertise, organization of the jump, and completeness and clarity of the briefing by preparing a passenger (TE or other person, does not have to be a jumper) for a tandem descent.

Significant defects, incompleteness of the briefing or forgetting the contract of carriage or the absence of signature(s) can already lead to failing the examination.



The practical part "Execution" consists of a descent that the candidate performs as a TP with the examining TE as the TG

### **Examination programme**

- Jump with stable exit from at least 3000m/GND (10,000ft AGL). (Must be under control after 10 seconds at the latest.)
- Stable, controlled freefall with movement across at least 2 axes.
- Drogue set by in 2500m/GND (8,200ft AGL) at the latest.
- Initiate main canopy release by 1700m/GND (5,500ft AGL) at the latest.
- Good landing within 50m of the target.

It is at TE's discretion to present further problems to the TP candidate in the areas of briefing, putting on harness, climb, hooking up, freefall/drogue fall, canopy flight and landing.

The evaluation here is done during the climb, exit, jump, freefall/drogue fall, canopy flight and landing, post jump after care and packing.

Despite implying a relatively stable TG exit, the TP-candidate should be presented with a scenario which will require some stabilisation effort

As soon as a stable position has been achieved, the TG should initiate a poor body position which the candidate needs to counteract. Act with care to ensure the descent remains within the necessary safety parameters.

### **Examination criteria**

- If the TP-candidate does not demonstrate a good enough performance during any of the briefing, climb-out, exit, free fall/drogue fall, canopy flight and landing the exam has been failed.
- Every safety breach, braking of any safety rules (e.g., uncontrolled setting of the drogue, failing to be under canopy at the correct altitude etc.) results in failing the exam
- More than three obvious shortcomings in terms of confidence building, comfort, jump also lead to failure of the exam

### **Failing the exam**

- In the event the examination is failed solely because of the evaluation descent, the examination may be repeated immediately at the TE's discretion.
- If the examination is not passed in total, the candidate may apply to the Authorised Associations for a re-examination with another tandem examiner for a maximum of 3 times. This must be completed within 6 months.



- Exams must always be reported to the Authorised Associations with results, whether positive or negative.

The examiner confirms the examination with his signature in the examination certificate. A passed examination certificate is not considered an approval. The tandem approval is only valid once it is entered in the jumper's license which is then in their possession and signed.

### **Personal data of the candidate**

The following data relating to the candidate must be included in the training record card as well as the examination certificate:

- Family Name
- First name
- Date of birth
- Place of birth
- Licence number
- Start date of training
- End date of training

The training record card acts as a record of the training activities carried out during the period of training.

### **Handing the training and examination documents**

The training tandem examiner hands over the completed and signed training record card to the candidate (and keeps a copy himself).

The examining tandem examiner confirms the training record card by countersignature and hands over the completed and signed examination certificate to the candidate (and keeps a copy himself). The result of the audit shall be reported to the Authorised Association.

The candidate sends the original written exam, training record card and examination certificate and, if applicable, his completed tandem pilot qualification incl. first aid certificate, together with his airman's license, the medical valid fitness certificate, the Application for the issue of a new tandem authorization (including passport picture) and the fees for examination and license issuance to the Authorised Association of his choice.

The copies of the training and examination documents must be destroyed after 5 years by the trainer and/or examiner (see Section 128 LuftPersV).

### **Guidelines for newly licensed tandem pilots**



If you want to jump out of a small aircraft with a strut and front exit (e.g., Cessna 182-type) without this aircraft type having been used in training, a briefing must be completed by an experienced tandem pilot and endorsed in the logbook.

For the first 5 tandem jumps with "real" passengers, the following applies:

- no formation jumping,
- no accompanying freefall camera person.

After that, the approval can be exercised without restriction.

**Generally, the following are not permitted:**

- Hookturns on landing (defined as: greater than 90° turn under 150m/GND (450 ft AGL)
- Hand-held camera jumps with tandems with less than 200 tandem jumps
- Demo landings with tandems with less than 50 tandem jumps
- Intentional water landings with a tandem
- Canopy formation or night jumps
- Jumps into covered stadiums with tandems
- Jumps with "Pole-Stick" (e.g., for film purposes)
- Tandem "Fly-bys" by wingsuit jumpers (e.g., on the open canopy)

#### 6.4 Intended flow of a TP training course

The aim of this module is to meet the requirement of the Tandem Examiner Conference (TEK) for uniform tandem pilot training (TA) at national level. The background to this is:

#### **Tandemhandbuch (chapters 1 - 5 )**

##### 6.4.1 Introduction

- Introductions TEs and candidates
  - Getting to know each other, possible individual motivation for learning to be a TP
  - Registration of all candidates with the Authorising Associations
- Cover paperwork including training aids and hand-outs, name the tandem systems being used for the training course
- Awareness building
  - Philosophy of tandems
  - Basic idea: safety and professionalism, earnings and fun
  - Tandems require organisation, looking ahead - how do I reduce stress, planning, division of effort, confidence
- Introduce the course of events on the training course



- Summary of course, jump levels 1 to the cross-check X-Check (as a suggestion), in addition to the two solo side-spin jumps.
  - poss. Level 0: Solo descent with dummy
  - Level 1: Candidates as the TG, demonstration of the ideal jump by the TE
  - Solo: 2 solo Sidespin jumps before the candidate can act as TP
  - Level 2: TE as trainer in front.  
Stable exit, drogue after 10 - 15 seconds  
stable freefall (to reduce fear of falling without drogue, implications of the growing airspeed on stability)
  - Level 3: Cooperative TE as TG, stable fall for 10 - 15 seconds without drogue, turns
  - Level 4: Cooperative TG, different climb-out/exit, stable fall for 10 - 15s without drogue, turns
  - Level 5: TG only does as told, unstable exit, drogue setting at discretion of candidate, pull with 2nd release handle
  - Level 6: TG doesn't do everything they are told, unstable exit, drogue setting at the discretion of the candidate
  - Level 7: TG doesn't do as they are told, long fall without drogue including rotations over 2 axes
  - Level 8: cooperative emergency exit practice, cooperative high-speed descent with rotation over two axes
  - Level 9: TG is uncooperative, candidate needs to demonstrate they remain in control throughout.
  - Level 10/X: Evaluation jump („Cross-Check") and written exam
- Specific regulations
  - whenever possible, perform touch exercises during the drogue fall
  - at least 1x Outside video accompaniment
  - Train high-speed frequently to improve freefall skills
  - the two solo side-spin jumps, as well as the instruction "Behaviour in Special Circumstances" must be completed theoretically and practically (hanging harness training), and the first safety test must be passed before the candidate jumps for the first time as TP "in command".
  - If a suitably qualified video jumper is on site for the cross-check, the cross-check should take place with video accompaniment (attention: additional costs may arise!)

#### Proposed lesson planning

- Present the schedule of the entire training course
- special safety regulations (will be taught separately)
- unacceptable errors that lead to level repetition or failing the course
- Briefing aids (make cheat sheets during the course)



- Address the type of tandem system on which the training takes place (mention: Type training required when changing the tandem system type)
- Overview of experience:
  - rough steps in accordance with TE's preferred teaching approach
  - If necessary, view tandem videos for the task overview, if the candidates are unfamiliar with the whole tandem journey
- Scheduling
  - What time are briefings
  - When who jumps with whom
  - Contract for carriage must be prepared and signed for each jump
  - Short instruction Tandem malfunction tree (for illustrative purposes only)
  - Trainers' behaviour (TE will present more poor behaviour cases to familiarise candidates, not because this represents actual TGs, possibly with a hand-held camera)
  - possibly 9x evaluation checklists for candidates (explain purpose)
- Hand over the contract for carriage as a copy template
- Address any innovations in THB Part I, in the forms or in the tandem fatality report

#### 6.4.2 Basic introduction to tandem equipment

- History of tandems
  - Development in the USA
  - Introduction into Germany (when, who, how)
  - Development in Germany
    - Statistics from the safety conference (InSiTa)
    - Fatalities
    - Overview of what is on the market (see MSW table)
    - Aide-memoir of reportable events (hand out copies)
- Drop zone introduction from the perspective of a TP
- Equipment introduction relevant to the equipment being used on the course
  - Harness introduction (based here on Vector II/ Next-/ Atom-Types)<sup>10</sup>
    - Main differences to sport rig (e.g., TG harness and connection points etc)
    - Size adjustments on the harness
    - Drogue-induction (no Drogue = no Main)
    - Release 1. + 2. Release => how to pull, in which direction
    - Emergency procedure (handle position => sequence)

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<sup>10</sup>If SIGM type systems are used in the training, the equipment briefing needs to be adjusted accordingly. See "SIGMA Specials" written by TE Jürgen „Mahle“ Mühling.





- Cutaway sequence One handed method
- RSL right-handed reserve handle active / deactivated
- Release packing errors; possibilities of hard pull
- AAD (e.g., CYPRES: blue = 580m (1,902ft) firing altitude, only sets at 900m (2,950ft), other AADs such as Vigil, etc. are similar)
- Collins Lanyard: Explain purpose, hang-up on 3-ring circus
  - SIGMA Specials Update 05/09
- Interrelations:
  - RSL - Reserve handle (right hand)
  - Emergency exit minimum attachment
  - RSL - Deactivation rather than removal
  - RSL - Wind
  - RSL - Wear and tear and related danger
  - Atom-Tandem - Reserve Override Device (because of double RSL)
  - Cutting away - cable lengths on cut-away pad (pull order: first 2nd release then left riser then right riser with RSL)
  - If RSL deactivated - use reserve handle (not reserve pad)
  - Vector III/UPT-TG harness - do not use with Atom tandem system (Reserve Override Device likely to be blocked)
- Skyhook/RSL-Discussion:
  - Handling during the training course
  - Personal view comparing the two
- Possibly introduction of the harness container systems used at the hosting drop zone
  - Differences, special features, construction features
- Safety – Check:
  - Always in the same sequence
  - When to do Safety – Check: 1. Before kitting up
  - 2. handle check on putting equipment on
  - 3. after tightening all straps incl. TG straps
  - 4. before exit: Drogue- und Release check
  - 5. Freefall: on setting drogue, handle check in the correct order
  - Always do handle check in the same order
  - 6. 2000m/GND 6,500ft AGL: Check Release
  - 7. under canopy ⇔ during the training course, always verbalise the safety checks out loud
- Special features of the tandem main canopy:



- Aerodynamics of the tandem main canopy (elements relevant to tandems)
  - Steering and braking toggles (Primary and Secondary toggles)
  - Stalls
  - Avoidance in emergencies
  - Flare behaviours on the canopies used in training, possibly compare and contrast with other canopies on the market
  - Flight plans
  - Landing tricks (e.g., shorter TPs use of leg straps)
  - What to do if steering line breaks
- Possibly 6-grommet Slider on the main canopy
- Special features of the tandem reserve:
  - Settled reserve pack = pilot chute can move = loop needs shortening
  - Reserve is packed similar to the main, opening can be long
  - Reserve flight characteristics:
    - E.g., PD 360 Rock'n'roll on opening
    - Flight behaviour
    - Flare point
  - Reserve equipment
    - Single toggles, without loops for TG
    - PD 360 uncascaded lines, stabilisers not fully stitched
    - E.g., risers with the double L-Links (risk of steering lines becoming entangled)
- TG Harness(es):
  - Introduction of the features of the harnesses used during the training course
    - Putting on: Order
    - Connection with the main harness, hooking up
    - Handling of laterals, Quick Ejectors  
(Assisting tabs are acceptable but they must not have loops)
    - Where to keep accessible hook knife
  - Demonstration:
    - Putting on TG harness (address different TG-shapes and sizes and weight)
    - Possible adjustments to improve comfort and movement
    - Handling on landing
- Drogue-introduction:
  - Diameter up to 60''
  - Construction features
    - 3-ring circus: large 10:1, small 5:1
  - Kevlar bridle, Centre line, Pin bridle, Soft-pin bridle



- Pull force at 200km/h
  - Open: up to 180kg (see pull force test - collapsed approx. 50% according to tests by the DFV)
- How it works = releasing etc.
- Release cable/-line = Routing and und normal state
- Special cases:
  - Opening with fully inflated drogue
  - Drogue collapses after setting
- Wear and tear on centre line:
  - Possible marker thread
  - Burn marks
  - Wear and tear problems lead to loss of drogue
- Maintenance/inspection intervals for drogues
  - Practical example: inspection cost compared loss of work during the season
- Drogue malfunctions (extra lesson)
- Inspection intervals for tandem harnesses in general
  - Check condition of the following before each jump: handles, drogue, AAD
  - Check Drogue centre line every 10 -15 jumps
  - Visual inspection of key areas at risk of wear and tear every 25 jumps
  - Complete Drogue- and Release check every 50 jumps
  - Replacement of Drogue centre line as needed depending on condition
  - Drogue replacement advised every 600 jumps
  - Full inspection of main and TG harnesses every 200 jumps, take manufacturers guidance on lifing into account
  - Replace main risers every 600 jumps
  - Advisable to retire main canopies made of ZP after 1500 jumps
  - Advisable to replace main canopy line set after approximately 300
  - Life of reserve canopy as per manufacturers guidelines
  - Life of RSL/Skyhook/MARD as per manufacturers guidelines.
- Brainstorming additional equipment for tandem descents:
  - Jumpsuits, goggles, frap hats/helmets, wrist or other visual altimeter, audible altimeter, suitable shoes, possibly gloves, hairbands, sick bags, spare parts (e.g., goggles, tape etc)
  - General views on: Jewellery, watches, Piercings - anything attached to the body, false teeth, gasses, chewing gum, sweets, keys, lighters etc.
  - Weight limits, height size implication s
  - Other knowledge transfer



#### 6.4.3 Theory training for tandem descents

- Train/learn supported by videos
  - o Tandem descents (conditions, prerequisites)
  - o Induction to the aircraft being used during the training course (climb-out, exit, seat belts etc.)
  - o Handling the drogue (how, when what)
    - Case studies
  - o Address freefall issues (lack of stability, Sidespin, flat spin, 'chipping')
  - o Opening, canopy flight and landing (Handling including TG)
- Greeting the TG / course of events for tandem descent
  - o Overview of experience:
    - Go through point by point
      - Develop standard briefing
    - Highlight key points
      - All the things which are different to jumping alone
    - Address legal matters and responsibilities
      - Highlight contract for carriage
      - Handling-errors which could be deemed negligence
      - Behaviour and expressions as passenger transporter
    - Talk through safety-checks
      - "Verbalise" during the training course
- Different approaches to aircraft emergencies
  - o Seat belts / securing the TG / head protection
  - o Emergency landing with departure from the aircraft - hooking-up
  - o Up to 500m/GND (1,600ft AGL)/ above 500m/GND (1,600ft AGL) Handling with the TG
- Freefall theory (including slides on mass and centre of gravity, see annexes 1 and 2)
  - o Centre of gravity with the TG: If the TG is smaller, bigger or the same size as the TP
    - In conjunction with attachment points - upper hooks dominate
    - Changes in the centre of gravity through weight (up/down), size (forwards/backwards)
  - o Weight implications: TG is lighter, same weight or heavier
  - o Aerodynamic implications: Balance point is stable, wobbly or indifferent
  - o Air resistance implications:
    - Resistance - Baggy jumpsuit
    - Chipping - counter movements
    - Stabilisation through flight skills - controlled freefall
  - o Underlying thoughts on freefall behaviour:
    - Turning techniques
    - Approaches to improve flight position:
      - How to move TG
    - TG seeking experience or likely future skydiver - TP possibly instructing in free fall?!
    - TG positioning priorities during freefall
    - Psychological care during freefall: use of voice



- Drogue fall theory
  - o Movement of the centre of gravity
  - o "Chipping"
  - o Tightness of laterals: problems if tightened up too much in relation to hip position
- Videos on freefall (own or teaching videos)
  - o Setting the drogue:
    - Opening time and speeds - Normal Speed / Low Speed / High Speed
    - Consider emergency exits between 500-1500m/GND (1,600- 5,000ft AGL) experience shows only pull reserve!
  - o Drogue problems
    - See THB Part I Module 3 section 3.5.
    - Possibly images and/or videos
    - Summarise (Standard - Exceptions)
    - (If relevant) SIGMA Specials
- Side-Spin phenomenon
  - o Videos (including Bill Morrissey PIA 1995)
  - o Balance of forces:
    - Consider maple seeds which rotate while falling = compare to tandem
    - How to alter or stop the relevant forces
  - o Aerodynamic process
    - Centre of gravity is not key - measure must be aerodynamic - possibly solution techniques?!
    - Characteristics: sense of airlessness / zero gravity / falling off a beach ball
    - Actions: de-arch, pull TG close, force turn onto the back, straighten legs, initiate a head down position through a back layout, stabilise by front loop, then arch hard
  - o Go directly to the reserve only as a last resort
  - o Address the „solo Side-Spin" practice jumps
- TG-Emergencies
  - o Stress curve
  - o Physiological movement limitation due to harness
    - breathing
    - Circulation
    - Nausea, vomiting
    - Losing consciousness
    - Care of an unconscious TG under canopy
      - o Address by name (know their name!)
      - o Hold their head
      - o If possible, loosen chest and/or belly strap
      - o Open jump suite
      - o Loosen helmet, chin strap, goggles
  - o Constitutional preconditions
    - General health (e.g., no cold or runny nose etc.)



- People at risk of injury (cardiology patients, bone weaknesses/osteoporosis, other handicaps)
- Prescription medication
- Smoking, alcohol
- Hunger, tiredness, thirst, de-hydration on hot days in the sun
- Other factors: scuba diving, pregnancy, blood donation possible hypoxia at 4000m (13,000ft AGL)
- Landing with an impaired TG
  - Spread legs wide to surf
  - Roll sideways
  - Possibly loosen or remove lateral straps: after landing fully extend leg straps to ease removal of laterals
  - First Aid (possibly recovery position) if needed: start emergency cascade
- Water landings
  - Intended order of events in case of water landings
  - Possible TG behaviour
  - Possible non-swimmers
- Jumping with handicapped TGs
  - Seek advice and induction from a TP with suitable experience if possible
    - Indicate basic skills and experience needed to take on unusual TGs
  - Reminder of existing knowledge
  - Evaluating different handicaps
  - Sensitise judgement
  - Consider the special fitness form available on the DFV website
- Induction on exits (demonstration only, no practice)
  - Seated
  - On knees
  - Standing
  - Floating vs. Diving
  - Falling out backwards vs. exits with loops or barrel rolls
- Body position of the TGs
  - Legs: parallel / crossed
  - Arms: parallel / crossed
- Go through malfunction tree
  - Relate to the equipment being used on the course:
    - Point out purpose (not just training the logic, but also permit confident fast decision making and action, highlight exceptions)
    - If needed, update
- Safety briefing (see point 5: Safety matters)
- Model briefing



- The TE(s) and assisting training conduct a full TG briefing for all candidates to pass on information and demonstrate good briefing (at least 2 different demos)
- Level 1 Descent (Demonstration of the descent by the TE)
  - TP candidate as TG (without TE-Handles)
  - Teaching of the descent to all candidates
  - Candidate experiences tandem from the TG perspective
  - Special features:
    - "Talk Through", learning while doing
    - Stall canopy (above 1000m/GND 3,300ft AGL) for max 3 sec.
    - Avoidance curve (fight curve)
    - Possible Front riser turn
    - Attempt to flare with the rear risers during the canopy flight

#### 6.4.4 Practical training of tandem descents

- Throwing the drogue
  - Adjust harness
  - Throwing techniques
  - How to pack drogues (consider different methods so candidates can identify the best method for them)
  - Allow bent or wrongly packed drogue to be tried for comparison
- Coordinate handles
  - Touch handles in sequence to enable handles to be found quickly
  - Go through handle touching over and over again (slowly, speeding up to too fast<sup>11</sup>)
  - Find fastest sensible speed at which the handles are still being correctly and properly touched
  - Highlight emergency procedures
  - Handles on actual rigs (only peel pads and handles from the Velcro rather than actually pulling them)
- Questions & Answers: Behaviour in special circumstances
  - TEs to including all possibilities in the questions (see annex 3)
  - Demonstration of steering toggles
  - Highly emergency procedures (decision altitude: 1000m/GND 3,300ft AGL)
  - Two-out scenario
  - Hook knife use opportunities
  - Water landings
  - Enhanced canopy control check
  - Landing on/by obstacles

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<sup>11</sup>Too fast = there is a point where the speed of movement leads to a lack of coordination which should be recognised as the point at which speeding up is no longer of value.



- High wind landings/ tandem catchers/ collapsing main and reserve canopies without assistance/ when to de-tach RSL, cutting away as last resort
- Training in hanging harnesses
  - Putting on TG harness
  - Go through normal descent:
    - Laterals and safety strap
    - 500m/GND (1,600ft AGL)
    - 1500m/GND
    - 1500m (4,500ft) before exit altitude
    - 1000m (3,300ft) before exit altitude
    - 500m (1,600ft) before exit altitude
    - Safety Check
    - Open door
    - Exit (build up, Drogue- + Release check)
    - Free fall / Drogue fall (TP activities)
    - Canopy opening and flight
    - Landing
    - TG-Handling
  - Unusual Situations
    - See hanging harness checklist
    - Male/female training TGs
    - Case studies, training on how to react to different situations
    - Emergency procedures
    - Pulling all handles without simulation
- 1. Written exam
  - Small Test with 10 questions (selection at the discretion of the TE)
  - Or excerpts of the written test per THB Part II Module 8
- Theory of the solo Side-Spin practice jumps (according to Bill Morrissey)
  - Under instruction
  - Practical exercised on body position for the practice jumps
- If possible: first solo Side-Spin practice jump
- Muscle memory of emergency procedures
  - Go through movements
  - Role play: Mime going through all stages of the emergency procedures in the correct sequence





- Further solo Side-Spin jumps (until the candidate has completed at least 2 satisfactorily)
- Level 2 descent<sup>12</sup>
  - TPA is in the TP role
  - TE is trainer on the front with TE handles
  - Talk through all steps of the jump
  - Swap roles
  - Sensitise the candidate by demonstrating tandem descent as if it was with live "cargo"
- Packing tandem main canopies
- Continued work on aide-memoire for TG briefings
- Level 3 descent
  - Possibly first "actual" briefing by the candidate
  - Simulate neutral TG: do everything you are told, do it right
  - Possibly small free fall problems such as de-arch or asymmetry
- Repeat at the discretion of the TE
  - Briefing & putting on TG harness
  - Behaviour in special circumstances
  - Packing
- Practical jump training
  - Level 4 / 5 / 6
  - Complete briefing
  - Special situation for practical training as per training record card
  - Video evidence (Level 5 or 6)
- Repeats in conjunction with
  - Briefings under time pressure (e.g., max. 15 min.)
  - Briefing a small group
  - Very fearful TG (psychological aspects)
  - Undecided TG (psychological aspects)
- Special subjects to be addressed during the course
  - Different exit altitudes
  - Different Exits
  - Turns and how to stop them in free fall
  - If possible, jump different tandem main canopies

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<sup>12</sup>By this time (also applicable at level 0), the small written test and the hanging harness test must have been passed.



- If possible, for educational purposes, open one reserve canopy on the ground to demonstrate opening sequence and technical details of tandem reserve canopies
- If possible, demonstration of packing of tandem reserve
- Practical jump training
  - Level 7
  - Level 8
    - High Speed until 2500m/GND (8,200ft AGL)
    - Emergency exit simulation with touching of reserve handle
    - Intentional back loop or barrel roll
    - Drogue by 2500m/GND (8,200ft AGL)
- If needed, repeats
  - Whatever necessary
  - Analyse tandem descent videos
  - Consider activities in bad weather conditions (round-robin Q&As, hanging harness etc)
- Level 9
  - Complete any missing training content
  - Stress test and create maximum workload
  - No more assistance
  - Ensure 100% safety
- Ready for final exam
  - Paperwork
    - Complete Training record card
    - Instruction on what to do with exam certificate
  - Administration
    - Signatures and rubber stamps
    - Discuss remaining course
    - Archive all training aids and checklists
    - Archive all videos taken during the course
  - Examination
    - Location, time, Examiner (must be well communicated)
    - Handling of written exam
    - Evaluation descent (Level 10/X Cross-Check)
- Written exam for the X-Check
  - Examination in accordance with Chapter 8
  - The written exam can be invigilated by the training TE. Any gaps in knowledge can be identified and should be closed



- A completely unsatisfactory exam counts as a failure and must be repeated
- The marked (including pass/fail recommendations) written exam should be presented at the Cross-check. The examination TE can therefore concentrate on the practical skills of the candidate without doubting their theoretical knowledge.  
The examining TE can always double check knowledge by asking sample questions during the practical exam. At the end, the examining TE endorses the result of their examination on the Examination Certificate.

## 6.5 Safety matters

### 6.5.1 Safety briefing for the Tandem trainees (summary for the course)

- Contract for carriage must be in place (discuss content)
- Minimum exit height during training is 3000m/GND (10,000ft AGL)
- Release altitude for training and X-Check = 1700m/GND (5,500ft AGL)
- Hard Deck at 1400m/GND (4,500ft AGL)
- Normal main canopy open by 1200m/GND (4,000 AGL).
- Der TPA conducts a touch test of all handles in free fall in the sequence and says it out loud
- Never set drogue while unstable (Exception: in an emergency)
- If exit is unstable, TPA should be stable within 10 seconds. After that, TE should assist with stabilisation
- The TE will only remain uncooperative until 2500m/GND (8,200ft AGL)
- The TE will also be immediately cooperative if the TP shouts "STOP" during the descent. This will result in a repeat of the decent for levels 6 and above
- The TE will jointly pre-determine the safety behaviour for any instability or side-spin drills. In particular this relates to the timing of setting the drogue or reserve handle as the last resort. The TE and TPA should not take opposing measures
- If the tandem pair remains in unbraked freefall below 1000m/GND (3,300ftAGL) without a drogue, the only action by either tandem member is to pull the reserve.
- Agreement on hand signals during training:
  - e.g., For setting the drogue, altimeter check, touch handles, release etc.
- If accompanied by videographer, the candidate should brief the videographer
- Video briefing: at least 300 jumpers, of which 50 within the last 12 months. Video proficiency in accordance with AHB Modul 8 and 100 video jumps in total, authorisation from the TP and induction:
  - Exit: climb out, exit count, when drogue is set
  - Position: not above or below
  - Approach sector, only from in front
  - Agree hand signals in freefall
  - Where to face in freefall (sun glare)
  - Grips: when and only on TG
  - Separation: from 2000m/GND (6,500ft AGL)/ possibly signal



- Opening: trap-door effect
- TG: Where they are looking
- Separation and deployment altitude of videographer
- Accompaniment by formation skydiver
  - Must be a TP or AFF instructor or
  - Jumper with at least 300 jumps, FS proficiency in accordance with AHB Modul 8 + 50 jumps in the last 12 months, authorisation and induction from the TP (as above)
- No videographer accompaniment in the first 5 descents after the course
- Note key stats of TGs: height, weight, fitness
- Safety-Check: Safety-Check: conduct practice pull sequence in one go
  - 1. Before kitting up
  - 2. On kitting up
  - 3. Before the exit including the TG
  - 4. Check drogue and release in the door
  - 5. In freefall (touch handles in sequence)
  - 6. Check drogue release at 2000m/GND (8,200ft AGL)
  - 7. Under the open canopy (visual and touch check of remaining sequence, check attachment hooks)
- Verbal confirmation
  - On hooking up, e.g., bottom right, left top right left secured
  - At the Safety-Checks: drogue, release, second release, cut-away pad, reserve handle, RSL (Atom = ROD = Reserve Override Device)
  - After pulling: Canopy check right/left, Connector links front right/left back right/left, 3-ring circus, RSL (Info attached or not), cut-away pad, reserve handle, release toggled and full canopy check before the TG harness is loosened.
- One handed: Emergency procedures
- Know Your Limits
  - Weight categories = 3 - 5kg more or less than usual
  - Height = 3 - 5cm more or less than usual
  - Wind and weather
  - Exit altitude
  - Skills and capabilities: limits on what can be done
  - Responsibility / Professionalism
  - Limits of the equipment
- During the descents, the TE can at any time reach into the TG toggles and assist in steering and if needed flaring
  - The evaluation of the canopy flight and landing will of course depend on the opinion of the evaluating TE
- Overall



- In the event of exits at any lower altitudes, the TG MUST be attached by all 4 attachment points!

#### 6.5.2 Rules of the game (summary for the course)

- Change of system (Next, Vector II, Atom, Ultra, Omega) only after level 4 in the training programme following type-rating lesson(s)
- Always train types in the event of changing equipment types (e.g., Vector II or Next to SIGMA)
- 30 days gap in training refresher jump = re-jump
- Minimum exit altitude for tandems from a motorised aircraft is = 2000m/GND (6,5000ft AGL)
- Minimum exit altitude for tandems from a balloon is = 2500m/GND (8,200ft AGL)
- Un hook RSL when wind is more than 5m/s under 300m/GND (1,000AGL)
- Minimum briefing: contract for carriage, TG body position for exit, freefall and landing, TG briefing for emergencies
- Insurance cover which must be present:
  - Owner/equipment third party liability
  - Air cargo transport third party liability
- X-Check should be done by a TE who was either not or only minimally involved in the training
- X-Check within 90 days of completed course (if no video present yet, X-Check must be videoed)
- X-Check: at least 3000m/GND (10,000ft AGL), Release by 1700m/GND (5,500ft AGL), movement around 2 axes, landing 50m radius of known target
- „Real" tandems only after registered approval
- TP-refreshing in general / 90-Day rule
- Gap of more than 24 months = competence check
- Exit/ aircraft type introduction (e.g., C182 / DO27 / balloon)
- Hook laterals back in after loosening
- Test 1 + hanging harness must be passed before first jump as TP
- Second-Release Info:
  - Pull direction - cut-away pad
  - Disadvantageous functions in the event of cutting away with drogue entanglement
  - Hard pull of cut-away pad
- General equipment check each morning:
  - Handles, condition of TG harness, loops, bungees, any damage? (untwist steering line and/or Centreline)
  - Size adjustment of the TP harness
- RSL - Info:
  - Activated / deactivated
  - Reserve handle - RSL



- Main canopy - RSL
- If static line students on the load: Static lines cannot exit below 1500m/GND (5,000ft AGL)
- Carrying weight of hooks:
  - Upper hooks 2250kg
  - Quick-Ejectors on the side 1130kg
  - Hip rings on TP harness 1150kg
  - Type VII webbing 2700kg
  - Type VIII webbing 1800kg
  - Seat belts in the aircraft:
    - Strength of anchors depends on aircraft type
    - Webbing to be of same strength as anchors
- Extension of TP proficiency to TP-trainer
  - Tandem-Examiner-appointment (see THB chapter 7)
- Type-rating for tandem type change<sup>13</sup>, as the passenger approval is not endorsable for tandem types, (see FF-Xpress 1/2010 after removal of the old § 97a)
- Type ratings: if change is merely within the classic types no need for a jump, confirmation of briefing in logbook is sufficient
- Exam certificate no longer counts as an alternative to the additional approval. "Live" tandem descents are therefore only permitted on receipt of the new license with the relevant endorsements.
- Minimum exit height of 3000m/GND (10,000ft AGL and the release altitude of 1700m/GND (5,500ft AGL) also applies to re-currency jumps, re-training jumps and type proficiency jumps
- Foreign TP certificates
  - Complete tandem training of a foreign jumper to permit them to carry out tandem descents in their own country with an official DFV TP Certification can only be carried out by an authorised TE.
  - Note: for recognition to jump in Germany, the candidate will also require a X-Check with a second Tandem-Examiner!

## 6.6 Tandem pilot proficiency check

### The TP proficiency check needs to be done whenever

- The necessary number of jumps in the last 36 months is below the minimum to meet currency rules
- A TP approval needs to be renewed
- A foreign Tandem rating is to be recognised in Germany for the first time
- The Authorised Associations requires it of a TP
- A TP voluntarily chooses to take it

<sup>13</sup>The following types are considered separate classes: CLASSIC (such as Vector 2, Ultra/Next, Galaxy/Atom, Omega und Advance), SIGMA, DUAL HAWK (such as TNT or Wings/Plexus), ELITE and TOUCH .



## Content

A proficiency check may vary from case to case and should only take place in consultation with the Authorised Association. The Authorised Associations may require only specific segments to be tested however it remains at the TE's discretion to cover more.

In principle, all refresher parameters which are included in the tandem pilot qualification should be taken into account, insofar as they are considered relevant by the TE for the review.

- Equipment induction for the relevant tandem system (Function and packing)
- Operation in normal cases. Including local operating procedures in relation to flight planning
- Briefing a tandem descent
- Behaviour in Special Circumstances in relation to the harness container system being used
- Hanging harness training
- Performance review (theory Test, hanging harness test)
- Possibly 1 solo Side-Spin descent accompanied by a videographer
- 2 or 3 tandem evaluation jumps with the TE depending on the situation
  - Alteration from the above only with agreement from Authorised Associations

## Result

The result of a proficiency check is the responsibility of the performing TE. If there is any doubt, a second opinion can be obtained from another TE via X-Check.

The result of a proficiency check must be communicated to the Authorised Association in writing, e.g., by e-mail.

## Administration

An application for eligibility extension or renewal must be completed and validated by TE signature. The application must be submitted to the Authorised Association for a fee (including a current passport picture).

Required accompanying documents are:

- Summary of tasks of the TP Qualification carried out
- Completed and marked theory exam
- Fitness certificate
- Original of previous license (if appropriate)
- Tandem exam card and Examination Certificate (if appropriate)
- Written evaluation (if appropriate)

### 6.7 Drogue lesson content

A detailed review of drogue issues is in THB chapter 3 in section "3.5. Drogue problems". The following list uses those descriptions and chronology.

- General Drogue matters
  - Drogue is to slow down, not stabilise
  - Stay in sequence
  - no Drogue = no Main



- Avoid High Speed
- With Drogue = 180-200km/h
- Without Drogue = 250-300km/h
- Second Drogue Release can be at the cut-away pad
- Drogue specials:
  - Drogue cannot be found
  - Drogue jams on pulling
  - Drogue entanglement with the tandem paid
  - Drogue entanglement with another jumper
  - Drogue knotted and collapsed (250-300km/h)
  - Drogue knotted but open (180-200km/h)
  - Drogue set and then collapses
  - 1. Drogue Release cannot be found/hard pull
  - 1. Drogue Release pulled and no reaction
  - 2. Drogue Release pulled and still no canopy
  - Drogue tears off before the release
  - Drogue tears off after the release
  - Drogue entangled with main + 1.
  - 1. Drogue Release accidentally pulled with the drogue (classic harness container)
    - Set drogue = opening can take up to 700m (2,300ft)
    - Complications with emergency exits until 1500m/GND (5,000ft AGL) in relation to opening distance of the HP main canopy stay seated or go directly to the reserve (decisions altitude)
  - Container open but drogue not released yet = horseshoe Container flapping,
    - 1. Release possibly not locatable
  - Normally set drogue 3-5 sec after exit
  - Drogue requires about 10sec = approx. 700m (2,300ft) from setting at high speed until it slows the tandem pair to normal speed
  - Drogue doesn't collapse on opening possible hard opening with damage to main canopy or risk of injury
    - Twisted kill lines can prevent collapsing
    - Drogues which twist up during drogue fall also jam more frequently
  - Drogue packing errors lead to
    - Jamming
    - Entanglements/knots
    - Possibly no opening and drogue-in-tow malfunction
  - Drogue cannot be released if one of the release cables is routed through both loops
  - Drogue cannot be release if a drogue release cable is bent or damaged
    - Prevents the second Release, which means cutting away the main can be limited => lots of strength needed
  - If the drogue is held on to on pulling and not thrown, the bridle can wrap itself around the tandem pair





- Detailed Drogue check every 50 jumps
  - Generally, life of 600 jumps
  - Centre line change at 300 jumps
  - Release cable must not be bent
  - Untwist kill line at least every 10-15 jumps

## 6.8 Suggestions for practical training

- Practical training matters
  - See training record card
  - Pull 1. and 2. release
  - Stable fall and touch all handles
  - On one occasion do not loosen laterals
  - Dive- and floater exit
  - Simulate an emergency exit and touch reserve handle within 3sec of exit
    - E.g., on the high-speed jump
  - If possible, female practice TG
  - FS and video briefing (at least one video briefing)
  - Stall main canopy above 1000m/GND (3,300ft AGL) on level 1
  - Use rear risers on the main canopy, e.g., to turn
  - Back loop or barrel roll on a high-speed jump
  - Turns during Drogue fall
  - Fall out backwards
  - Unconscious TG
  - Side-Spin practice jumps (2x)
  - Wind over 10Kts (possibly only simulated)
    - Riser stall as a measure to collapse the canopy after seated landing in high wind
  - Moving to the door seated, on knees, standing
  - Exit variations
  - Keep TG's arms under control - note during the briefing
  - Conscious "High-speed" descent (only set drogue at a particular altitude => practice sparring candidate vs Examiner)
- Canopy flight and accuracy landing for tandems
  - Make performance differences between tandem canopies and sport canopies clear during the lesson
  - Establish tandem flight and landing plans and how to put them into practice in accordance with local operating practices including exit order
  - Observe the candidate's accuracy landing proficiency and develop this over the course
  - Adapt landing style and identify differences between landing yourself and landing a TG (high performance fun vs guaranteed TG safety)
  - Evaluate landing and flare behaviour of the candidate and develop if necessary



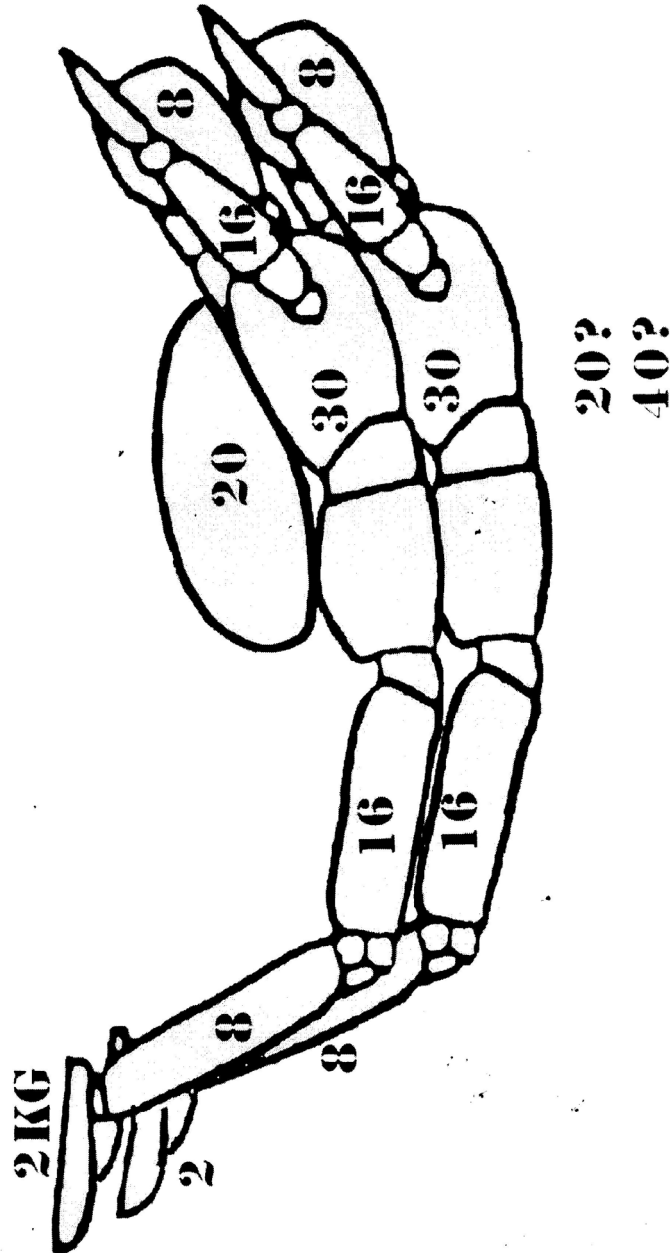
- Ensure candidates understand that altered wing loading and additional responsibility means their judgement in relation to weather and location is a core working condition of a TP
  - Discuss correct behaviour in dynamic weather conditions such as thermals and turbulence in detail
  - Prevention strategies for canopy collisions and landing on/by obstacles
  - Review analyses of past incidents to ensure legal implications of behaviours to reinforce the candidate's responsibility for quality and safety management
  - Clear evaluation and feedback on canopy flights during the course, including requirement to repeat levels (re-jumps) if canopy handling is not good enough to progress to the next level.
- Recommended additional equipment for the TE
- TE-safety handles ("Chicken-Handles") on the TG harness
  - Hook knife on the front of the TG harness, accessible to the TE
  - Mirror on wrist to check behind them
  - Possibly hand camera

## 6.9 Annexes to THB Part II

Over page

## 6.9.1 Weight distribution and centre of gravity for tandem pairs generally

### Gewichtsverteilung bei Tandem



Alle Angaben in Kilogramm

Image 2 Usual weight distribution on tandem descents

## 6.9.2 Weight distribution and centre of gravity movement specifically for tandem pairs

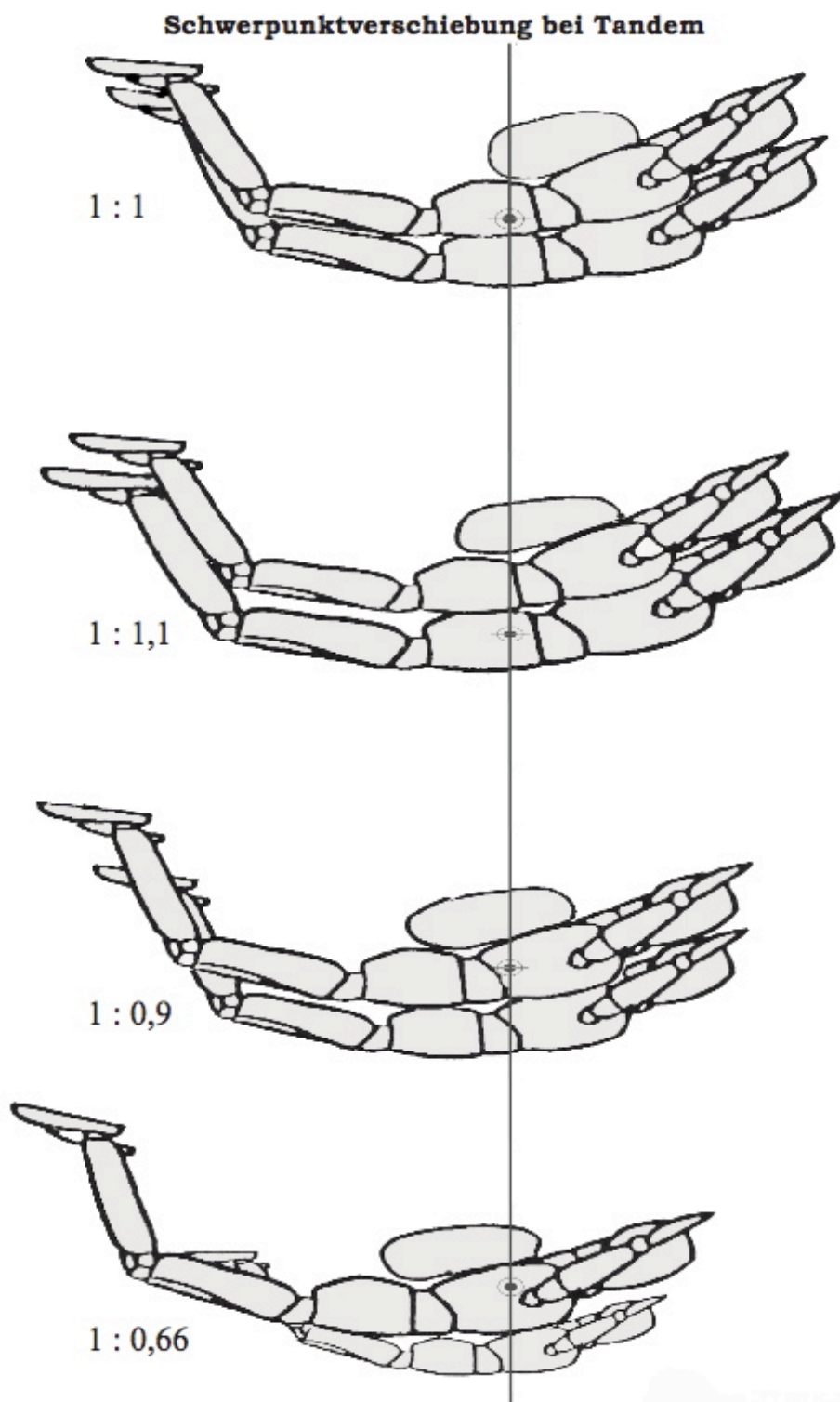


Image 3 Movement of centre of gravity for tandem pairs



#### 6.9.3 Hanging harness check list (suggested example)

- Normal case, assist TG to loosen laterals
- Tighten normal straps / loosen to improve comfort
- Drogue entanglement on main canopy
- Lowering into leg straps
- Unconscious TG + Landing (including after care after landing / unhooking etc)
- Lots of wind RSL
- 1. Release nothing 1st Release cannot be located
- 2. Release nothing
- Entanglement with drogue
- Malfunction (add a few times to encourage muscle memory)
- Drogue in tow collapsed
- TG holds onto left arm
- TG holds on to right arm
- Steering line breaks
- Water landings
- TG vomits
- Connector link open after canopy is open
- Use of Hook knife (e.g., Line over on Reserve, etc.)
- Dangling handles
- Emergency exit minimum attachment
- Time pressure (no run-in warning unexpected exit)
- Being towed by reserve
- TG has hands on cut-away handle and/or reserve handle
- Two-out scenario
- Canopy collision
- Drogue torn off
- Hard pull on cut-away pad (possibly unpeel. 2nd Release, use much strength)
- Laterals jammed, cannot be unhooked
- Static line students in the aircraft
- Hand signals during training (set drogue / SG / HM / Release / etc.) \* Adjustment techniques
- Anything else the TE considers relevant/necessary
- ...



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# Chapter 7

## Operating guidelines for Tandem-Examiner



## 7. Operating instructions for Tandem Examiners

### 7.1 Tandem-Examiner

Tandem Examiners (TE) are specially appointed and recognised to train and test TPs (strictly "air sports equipment operators with passenger approval") and form a specialist body to advise the Authorised Associations on tandem descents.

The appointment (and nomination) of a TE depends on their qualifications and general or local needs.

All current TE meet once a year for a Tandem Examiner Conference (TE Konferenz - "TEK"). This forum identifies innovations or makes submissions on tandem descents to BKF following approval of proposals. The role of the TEK also includes maintaining regulations and updating this tandem handbook (THB), safety or procedure recommendations for tandem descents in general, as well as internal personnel matters.

The appointment of each TE is subject to the following individual criteria:

- Possession of a parachutist license with valid approval for the practical training of parachutists (instructor rating)
- Possession of a valid approval to perform passenger jumps (tandem pilot approval)
- Minimum 500 tandem descents as a TP (of which at least 50 in the last 12 months)
- Qualification by successful assistance at 2 different TP courses with 2 different TEs in the last 12 months prior to appointment
  - o written confirmation and assessment by the respective TEs
  - o Working through the qualification tasks in accordance with TEK
- Application for appointment to one of the Authorised Associations
  - o Confirmation of appointment by following a meeting of an approvals committee of the TEK, consisting of 3 TE, or as a last resort the Authorised Association until the next meeting of the TEK

The appointment of a TE is granted for a maximum of 3 years and is bound by the validity of their instructor rating. The appointment must be validated and justified by ongoing tandem training. The continuation of a TE appointment is therefore only as needed and is dependent on the activity in the previous period of validity. It shall be subject to the following minimum criteria for a total period of 36 months<sup>14</sup>:

- Conduct or participate in TA
- At least 18 training jumps with tandem pilot candidates (TPA)

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<sup>14</sup>For shorter periods from the outset, the criteria are adjusted accordingly.





- these include, among others, X-Checks ("Cross-Checks"), proficiency check jumps, 90-day "Currency" rule jumps, type training jumps, TEQ jumps, Handcam instruction jumps.
- Participation in a training course for parachute instructors recognised by the Authorised Associations in the 36 months before renewal/renewal of instructor approval
- Fulfilment of the criteria for renewal/renewal of the tandem approval
- Participation in the TEK
- Continued interest in working as TE

If a TE does not meet the above minimum criteria or only partially meets them, this shall be reported to the Authorised Association in the renewal year in which case the approval will also not be renewed. Alternatively, an appointment review may be carried out under supervision of the Approved Association for an individual TE.

TE appointments may also be revoked at any time if facts justifying this become apparent. These include, but are not limited to, breaches of the instructions of the Authorised Associations, improper training and examinations of tandem pilots or abuse of office in the broadest sense. In the event of a withdrawal of appointments, the latter shall be notified to TEK without delay.

#### 7.1.1 Tandem Examiner Qualification (summary list)

Content of the Tandem-Examiner Qualification training record card:

- Prior confirmation by the TE candidate to the examining TE
  - Meets all prerequisites
  - Read current THB!
- Training tasks
  - Assist 2 qualified TE in all aspects of the TP training
    - Specifically involved in the hanging harness training of TP candidates
      - Encourage opinion forming on topics with multiple approaches
  - Additional TE hanging harness training for being on the front during a tandem descent
    - Emergency procedures from the TG position
  - Possibly assist with the TP training descents under supervision
    - Clear guidelines
    - Clear briefing on emergency procedures
- Training descents with TE and TE candidate
  - At least 2 descents with TE tasks
    - Could also take place separately from (ideally before) assisting on a TP training course



- Tasks TE candidate should carry out as the TG with a TE
  - Setting drogue from the front
  - Touch check of all TP handles (including TE handles) from the front
  - 1st Release from the front
  - Practice hand signals
  - If possible, simulate emergency procedures from the front (e.g., using chicken handles)
- Mentoring by a TE during the training period as appropriate for the candidate concerned
  - Focussing on difficulty levels
  - Extent of increasing difficulty
  - Limits to goal setting when risk of endangering self or others in dangerous situations
  - Judgement and decision-making ability in relation to TP candidates
    - Evaluating jumps and re-jump decisions
    - Development and ultimate suitability of a TP candidate
  - Relation of how to be a TE
    - Ethics and responsibilities of a TE, including image of the sport to outsiders, including lax approval processes for new TPs
  - parallel TP candidate training, induction to the paperwork, Dos and Don'ts, etc.
- Decision on TE-Qualification
  - Result to be communicated to the Authorised Associations /TEK using the qualification certificate

## 7.2 Operating instructions for Tandem Examiners

### 7.2.1 General

An appointed TE is both the TP trainer and the examiner for the testing and evaluation of TPs.

A TE conducts all the necessary tasks for training and testing, retraining and verification, recognition and conversion of a TP approval.

A TE can operate alone in across all these activities, except for the practical initial examination of a TPA candidate. In the training and testing process of tandem pilots, the dual control or "four-eye principle" applies.

This means that one TE trains, another TE checks. This principle is also called Level X or X-Check ("Cross-Check") after 9 previous levels of training.

The fixed guidelines for the training of TPs can be found in THB chapter 6.

The examination of TPs is conducted according to THB chapters 6 to 8.

In addition, the following approach should be used for the TP written exams:



- the examination questions will be handed to the Tandem Pilot Candidate (TPA) at the beginning of their training course
- A TPA can answer the questions during their TP training as soon as they have received the appropriate instruction
- at the end of the training, the training TE will be given sight of the examination to identify any deficits and to re-train them
- The TPA then submits their "corrected" version of the written exam with an evaluation recommendation for the X-Check, so that during the practical examination appropriate focus can be applied. The "X-Checker" is free to test the evaluation recommendation of the training TE by sample question.

**Note:** The sample solution for the written exam is classified as confidential and is intended for TE's eyes only. The basic version is held by the Authorised Associations and will only be provided to currently appointed TEs. An abuse of trust is punishable by the withdrawal of TE appointment. On leaving TEK, all exam documents held by a departing TE must be destroyed.

#### 7.2.2 Tandem Pilot Certification (TPC)

TEs are also responsible for the instruction of foreign TP candidates who come from a country without their own tandem regulations and who cannot acquire tandem approval there.

The opportunity was created to qualify this TP candidate under the German TP training, without the final X-Check or a German TP approval. This TPC instruction can be performed by a single TE.

After successful participation, the foreign TPA will only receive a "Tandem Pilot Certification" document from the Authorised Associations to demonstrate their qualification to their own country. The TPA is responsible for the recognition in their home country.

If a TP later wants to work with this "Tandem Pilot Certification" in Germany, they must complete the necessary X-Check or make up for it and acquire a TP approval for Germany with all the necessary entry requirements. For the avoidance of doubt, a TPC is NOT a valid TP approval for Germany.

#### 7.2.3 Documentation

All tandem pilot qualification, training, and exam must be documented by the TE. Both by processing the training and examination certificate for TPs and in their personal jump "Master log" or checklists to evidence all jumps as instructors or examiners.

Copies of the tandem qualification and examination certificates must be kept for 5 years and then destroyed. The annual master log year must be provided to the Authorised Association as part of the activity summary at the TEK.



#### 7.2.4 Agreements and notifications

For almost all TE activities, the THB requires agreement from the Authorised Associations. A TE should always conduct an individual assessment of the situation of the TP candidates, regardless of whether it relates to an approval renewal, conversion or recognition. After which, the TE contacts the office of an authorised association, to notify them of the candidate by name and the intended approach, for example by email.

In the event of a non-standard training course or examination, the TE should describe their approach on key points according to THB or make suitable suggestions on how they intend to deal with the situation. Usually, the Authorised Associations agree the proposals and are thereby aware of the situation.

At the same time, this process allows the Authorised Associations to evaluate the respective requirements for the subsequent granting of approval and thus to authorise the relevant TE procedure or, if necessary, require additional points and tasks to those proposed by the TE.

Subsequently, the outcomes of all TE activities shall be reported directly to the Authorised Associations. Each notification must be made in writing, be traceable and contain all reference data, although it can be informal, e.g., by e-mail, rather than a bureaucratic hurdle.

The aim of each result report is to ensure that the TP licensing system is transparent and comprehensible for the Authorised Association, TEs and all candidates. Positive results usually result in an official application for approval.

At the same time, it is very important to report negative results of all kinds! This is the only way that the Authorised Association can prevent individual failing applicants from exploiting the ignorance of different TEs. It is precisely for this reason that it is important to report results to the Authorised Associations in a timely manner.

#### 7.2.5 Fees for failed exams

The examination fee for written exams is due, even if failed, regardless of extenuating circumstances.

The fee is invoiced to the candidate by the Authorised Association based on the result report by the examining TE.

#### 7.2.6 Procedures for foreign approvals

To convert or recognise valid foreign or military TP approvals, the TE needs to follow the current guidance from the Authorised Association. The evaluation needs to conform with the usual guidelines of the TEK and in accordance with THB. The result of the evaluation shall be documented by the TE in an appropriate form and in accordance with THB chapter 1.



#### 7.2.7 Insurance

For the practical training, examining, verification, refreshing, recognition and instruction of tandem pilots, a TE or its assistants are sometimes not insured through passenger liability or accident insurance.

In order to avoid financial consequences in the event of a claim, a TE could therefore insure themselves privately or take out appropriate disability insurance.

#### 7.2.8 Supervision responsibility

The appointment of a TE obliges them to act as a supervisor of tandem descents on behalf of the Authorised Associations. If they notice errors or standard deviations during tandem descents in the course of any of their activities, they must inform the Tandemverantwortlichen and, if necessary, arrange for a notification to the Authorised Association.

#### 7.2.9 Continuous professional development

A TE has a duty to participate in the TEK. Failure to attend can be excused on occasion as long as it does not become a regular occurrence.

There are no specific content guidelines for TE continuing training. The analysis of tandem incidents and safety bulletins are the only regular items. In addition, there are always indications from the annual reporting statistics that can give rise to discussions and consideration.

Conversely, all TEs are invited to organize up-to-date training for all eligible TPs at the beginning of the year or season. The content of this measure(s) is always the THB in general and the last TEK in particular.

### 7.3 Tandem-Examiner-Konferenz (TEK)

The TEK is convened at least once a year by invitation from the BKF. All current TE will receive an agenda for which they can submit content and topic input at any time.

During the TEK, the activity report, the tandem statistics and other current content are discussed. Training issues, incidents and applications are discussed, usually with the aim of making resolutions which inform and improve the practice of tandem descents.

At the same time, TEK seeks lively exchange of professional experience and developments with the aim of optimizing procedures based on empirical evidence and accumulating of knowledge of tandem descents. Every single TE and TP should ultimately benefit from this.

In relation to personnel, the Authorised Association, in consultation with the TEK, shall, if necessary, appoint an examination committee consisting of 3 TE to confirm the appointment of a new TE candidate. The results of the examination shall be communicated in writing to all delegates. If the assessment is positive, the TE will be reappointed by the Authorised Associations.

The TEK can also use specialist committees and specialist working groups (Arbeitsgruppe = AG) to address specific tasks. This includes the preparation of manuals, training guidelines and examination documents. Each working group submits the intended work for review and by planning deadline.



The content of each TEK session is recorded by TE minutes. A recorder shall be appointed at the time of each meeting. Each set of minutes should be available to each TE for viewing and archiving within 2 months of the meeting.

Parallel to the individual minutes, an update to the TE summary minutes is regularly created. This summary is intended to reflect current decision-making statuses and their history.

All resolutions of TEK must be confirmed by the authorised associations as relevant. In parallel, the authorised associations shall ensure the publication of all important details from any TEK work.

#### TEK's internal archives

- Current personnel list of all tandem examiners
- TEK Minutes
- Tandem jump statistics
- Tandem fatality statistics
- InSiTa Archive depending on the topic
- Agendas of TEK with moderation concepts
- Training sections and lectures within TEK & InSiTa
- Working documents of TEK
  - o Download documents on the websites of the authorised Associations
  - o Tabular overviews of approvals
  - o Maximum Suspended Weight table for Tandem systems and tandem canopies
  - o Pilot chute and drogue pull-force tests in the wind tunnel

#### 7.4 Tandem fees

The list should only give a rough overview of possible fee types. It currently only specifies definitive provisions of the TEK and the Authorised Associations. No guarantee is given that these remain the same in the long term or there may be any difference in costs between the branches or providers at any time.

- TP qualification (set prices as desired)
  - o Fixed fee without jump tickets
- Tandem training (set prices as desired)
  - o Total costs without own tandem rig
  - o Total costs with own tandem rig
  - o Re-jump costs
- Tandem exam/X-Check (Pricing dependent of effort)
  - o Jump tickets, possibly including video
  - o Gear rental costs
  - o Examination costs
    - Per jump
    - Per candidate



- Per day
- Rate for TEs
  - Day rate according to TEK 150,- Euro (excl. VAT/MwSt)
  - Per jump will depend on number of people and duration, day rate may be more appropriate
- Tandem examination (Pricing dependent on effort)
  - Proficiency and competence check
  - Conversion of foreign approval
  - Recognition of foreign approval
- Tandem induction for "Tandem pilot Certification"
- Fees due to the Authorised Associations (as at 01.07.2019)
  - Tandem-Approval
    - Fee for exam, if failed 75,- Euro
    - Initial approval 125,- Euro
    - Extension 60,- Euro
    - Renewal 60,- Euro
    - Authorisation 125,- bis 245,- Euro, depending on validity of instructor rating
    - Recognition 125,- bis 175,- Euro, depending on whether including AFF or not
    - Confirmation of TP Certification 125,- Euro
- TE travel costs (to be negotiated with course organiser/attendees)
  - Mileage rates
  - Accommodation rates



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# Chapter 8

## Written exam



## 8. Written test to gain Tandem Pilot Approval

The written test to gain Tandem Pilot Approval is not published. Copies can be requested from the authorised associations for appropriate purposes.