JUMP PILOT MANUAL

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STAY SAFE

BRITISH SKYDIVING

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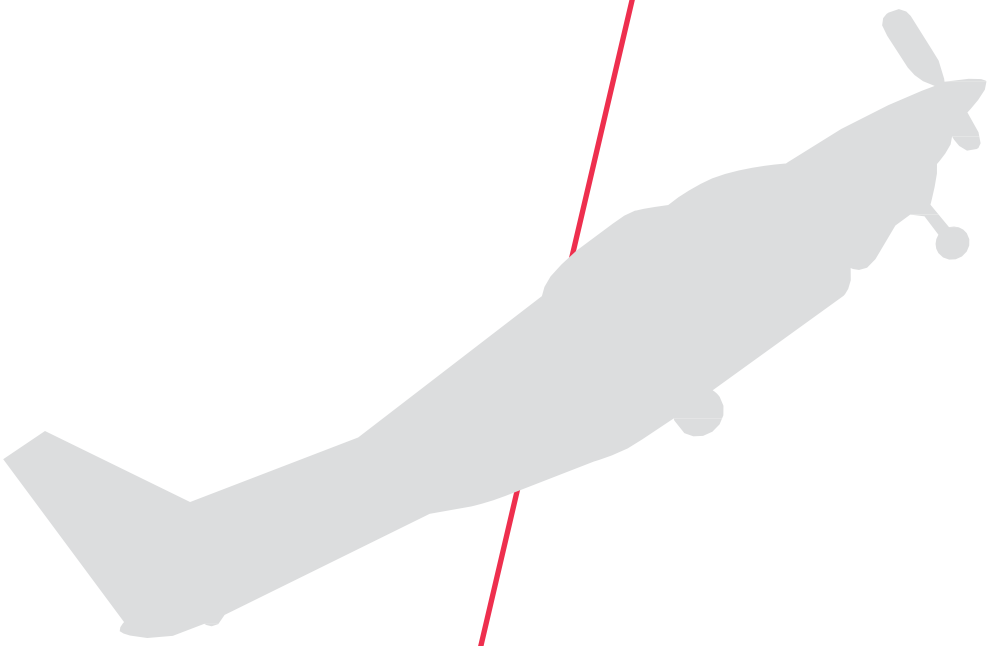

The British Skydiving Jump Pilot Manual is updated periodically. As British Skydiving rules are continually evolving, the primary operational document, the British Skydiving Operations Manual, is regularly updated at meetings of British Skydiving Safety & Training Committee which are held every two months.

Therefore, in the case of any conflict between rules or requirements set out in the British Skydiving Operations Manual and any other British Skydiving manual, the provisions in the British Skydiving Operations Manual shall always have primacy as the definitive statement of the current position.

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INTRODUCTION

This manual is intended as an introductory guide for new or aspiring jump pilots and as a reference guide for existing jump pilots. It does not set out to teach basic piloting skills. There is an assumption that anyone wishing to become a jump pilot will already know how to fly an aeroplane and perform the basic tasks, both in the air and on the ground, which reflect good airmanship. The main purpose of the manual is to outline the practical and legal requirements and responsibilities which are attached to this particular piloting task and to provide a framework for reference. Whereas it will be an authoritative source of information as far as British Skydiving regulations are concerned, it cannot supplant other statutory instruments within general law.

If, therefore, any material contained within this manual appears to contradict requirements which are contained within the Air Navigation Order or any other statutory document and also the British Skydiving Operations Manual (BSOM), then such requirements must be considered as taking precedence over the information contained in this manual.

This manual also only relates to the operation of skydiving aircraft in the UK or in overseas locations that come under British regulation. It must be recognised that procedures and regulations in other countries will vary.

It must also be recognised that as a generalised manual it cannot purport to provide information that is always applicable to every aircraft type or situation. It may well be that pilots encounter operational circumstances or requirements which are not covered by this manual

Terminology: The term skydiving now generally replaces 'sport parachuting' and is used to differentiate the activity from military or other technical forms of parachuting; thus 'skydiving' and 'skydiver' are used throughout this manual as they are the more popular modern terms for 'parachuting', 'parachute jumping' or 'parachutist'.

SECTION 1: THE REGULATION OF SKYDIVING (SPORT PARACHUTING)

1.1. Skydiving (Sport Parachuting) is regulated in the UK by the Civil Aviation Authority (CAA). The CAA has delegated much of its regulatory functions to British Skydiving under the terms of a Schedule of Approval. This means that British Skydiving, in effect, regulates skydiving within the UK, but does so under a system which is audited by the CAA to ensure that the regulatory functions are correctly carried out.

1.2. The Air Navigation Order (ANO) places a statutory duty on the CAA to regulate skydiving (parachuting). The general skydiving regulatory requirements of the CAA are outlined in CAP 660 (Parachuting). This document requires that all skydiving activity is carried out in accordance with an approved Operations Manual. The BSOM is currently the only approved manual in use for UK skydiving and is therefore the primary document which mandates how skydiving operations are to be conducted in the UK. The BSOM is, therefore, essential as a working reference document and all jump pilots should be familiar with it generally and have specific knowledge of the flying section (section 9). It is attached as Appendix A to this manual.

1.3. There are currently around 22 Parachute Training Organisations (PTOs) that operate within British Skydiving. There are none operating independently in the UK. The BSOM requires that each PTO produces its own local Standard Operating Procedures (SOPs) which are intended to detail any additional safety procedures which local conditions may necessitate.

1.4. Parachute dropping may only take place under the terms of a valid CAA parachuting permission which is issued individually to each PTO or display team. This permission can include an exemption for oxygen requirements and an exemption for IMC or IR(R) rated pilots to fly in CAS. A jump pilot should be familiar with any conditions in the permissions and exemptions at the PTO for which they are flying.

1.5. It should be stressed that British Skydiving only regulates skydiving and military skydiving. Other forms of parachuting, such as operational military parachuting, commercial parachute testing, base jumping, paragliding etc. are all aspects which come under different regulatory regimes.

1.6. Within the British Skydiving regulatory system, issues that relate specifically to pilots and jump flying are generally dealt with by its Safety & Training Committee (STC) which is advised by the Pilots' Specialised Interest Group (SIG) which meets formally once a year but is also convened when necessary to deal with specific issues as they arise.

1.7. When circumstances require changes to the flying section of the BSOM, the issues under consideration are usually presented to the STC, which is responsible for the structure and content of the BSOM and whose members vote on whether or not to amend or change its content.

1.8. Pilots who have any difficulty with regulatory issues, or questions relating to them, would usually be advised, in the first instance, to contact the Safety & Training Officer (STO) via the British Skydiving HQ.

1.9. It should be noted that passengers cannot be carried on any skydiving flight. Skydivers and jumpmasters are classified as task specialists.

GUY HINKS

SECTION 2: BECOMING A JUMP PILOT

2.1. The task

The task of a jump pilot is simple to explain. The job is to fly the aircraft efficiently to a predetermined point over the ground, arriving at a given height and a given speed, in order to permit skydivers to safely exit the aircraft and optimise their chances of flying their parachutes back to a designated parachute landing area (PLA). The pilot must then descend the aircraft and land as quickly as is safely possible, giving due regard to efficient engine management. The remainder of this manual is intended to explain the operational structure and procedures involved in achieving this task.

2.2. Qualifications

The qualifications needed to become a jump pilot are laid out in section 9.1.1 of the BSOM. It will be noted that the minimum starting requirement is a PPL and 100 hours as Pilot in Command (P1). Jump flying is actually classified as a Commercial Operation and as such would normally require a CPL. The terms of the CAA Permission, issued annually to PTOs, permits the work to be carried out by an appropriately qualified PPL provided they are not working for hire or reward and providing they have qualified as a British Skydiving Approved Pilot (AP).

It should be noted that the PPL minimum requirement assumes a UK Part-FCL PPL. Other nationality PPLs may not necessarily be recognised as equivalent and the privileges which are attached to these licences in the UK will need to be ascertained with the CAA prior to any involvement with jump flying. The licensing requirements are also different where foreign registered aircraft are concerned (see section 3.3).

2.3. Getting started

In order to gain British Skydiving AP status any aspiring pilot will need to approach an approved PTO, as the qualifying process can only be undertaken under the auspices of such an organisation. The addresses and contact details of these can be obtained from the British Skydiving website *(britishskydiving.org)*. Some PTOs may be prepared to train and qualify an applicant (in exchange for money) without necessarily providing a position at the end. Others may be in need of a pilot and may be prepared to train a pilot for free or on a conditional fee arrangement

2.4. Motives

There are several motives for wishing to become a jump pilot. Not least (and quite acceptably) is the need to build up hours in order to enhance a newly acquired CPL. Another is simply the need for a PPL holder to take their flying another step forward and engage in what is essentially a focussed task as opposed to flying around with no particular purpose.

Whatever the motive, jump flying is a skill that has to be learned and maintained. Many pilots are surprised, when they start, at the workload that can be involved in the job and often report that there is more to it than meets the eye. For these reasons it is a job which requires commitment and one which cannot be approached half-heartedly. It needs constant practice to become good and remain proficient.

Many pilots have approached PTOs on the basis that they might be able to 'help out' now and then and have been surprised to have their offer rejected. The fact is that most PTOs need pilots who can commit to regular flying because most will not want the trouble of training someone who then remains rusty at the job and never quite gets on top of it.

KEV COFFEY

SECTION 3: THE AIRCRAFT

3.1. Types

Many types of aircraft are suitable for skydiving. Some have been designed from the outset to encompass this role. Others have been modified in order to encompass it. The defining criterion is whether the aircraft flight manual approves the role and gives appropriate operational guidance. If an aircraft flight manual, or a flight manual supplement (FMS), does not specifically approve the aircraft for skydiving then such approval must be obtained and incorporated into an appropriate FMS before the aircraft may be used for skydiving/parachute dropping.

3.2. Aircraft documentation

The documentation required for skydiving aircraft is the same as for any other British registered aircraft, with the additional specific requirement for an FMS to cover skydiving operations if the normal flight manual does not already do so. Foreign registered aircraft also have additional documentary requirements (see 3.3 below).

The British Skydiving Aircraft Document Checklist (form 246) is attached as Appendix B. This also lists the additional documents that need to be in place prior to any skydiving operation. Some of these are dealt with as separate items in this manual. It is necessary to be aware, however, that when you board a skydiving aircraft as its commander you must have on board the following documentation.

a) Aircraft Flight Manual
b) Aeronautical Chart
c) Aircraft Checklist / MEL (if applicable)
d) Mass & Balance Schedule .
e) Technical Log / Flight Log (including fuel uplift and quantity records)

3.3. Foreign registered aircraft

Aircraft registered in foreign countries may be used for skydiving operations in the UK provided that the operator of each particular aircraft has a Department for Transport (DfT) permit to operate it for this purpose. In order for a pilot to fly a foreign registered aircraft they must be approved to drop skydivers under the pilot licensing requirements of the state in which the aircraft is registered and it must also be operated for skydiving in accordance with the requirements of the country of registration.

The DfT permit may also impose additional requirements to the state of registration as may the BSOM in terms of skydiving procedures. As a general guide, where there is a difference between the requirements of the DfT, the CAA, British Skydiving and the country of registration it must be assumed that the more stringent rules will apply.

3.4. Additional equipment and modifications

Most skydiving aircraft will require some additional equipment or modification in order to be able to fulfil the skydiving role. The types of equipment and modification will vary from aircraft to aircraft but the following list is a sample of what is likely to be encountered.

a) In-flight doors (used as replacements for normal doors with side hinges).
b) Door edge spoilers
c) Flap switch depressor plates
d) Static line strong points
e) Static line stowage bags
f) Floater steps and rails
g) Wheel steps
h) Floor panels
i) Jumper restraints
j) Jump exit lights

Some of this equipment will be optional and some will be mandatory. If the flight manual requires any additional equipment for the aircraft to be used for skydiving, then this must be regarded as mandatory. The BSOM also requires some additional equipment to be carried whenever an aircraft is engaged on skydiving operations (see section 3.14).

3.5. Preparation of aircraft for skydiving

The necessary procedures involved in preparing an aircraft for the skydiving role will depend, obviously, on the type of aircraft but also the PTO at which it is operated. Some larger PTOs will have their aircraft kept in permanent readiness for skydiving but others will be in a situation where they lease or hire different aircraft and will need to go through frequent sometimes complex procedures. The following are aspects which will routinely need to be attended to, but the list is not necessarily exhaustive.

3.6. Door removal

Most skydiving aircraft will require a cabin door to be removed in order to provide a means for the skydivers to exit the aircraft. This may sound obvious, but many aircraft, with the exception of tailgate varieties, do not have doors that are designed to be opened in flight. They must either be removed altogether, or have doors specifically modified. The BN2 Islander has a sliding door manufactured for this purpose and the Cessna 180/182/185 varieties can have an upward opening door modification which permit use in flight. For many aircraft, however, an appropriate door has to be removed and the flight conducted without it.

It is important to realise that door removal can only be undertaken if it is specifically approved in the flight manual. Some aircraft doors are designed to contribute to the structural integrity of the fuselage and their removal would be dangerous. On some aircraft door removal is prohibited because it would permit a build up of carbon monoxide in the cabin from engine exhaust fumes.

It is also common for flight manuals to specify airspeed limitations for door off operations which are often substantially lower the maximum normally permitted with the door on.

3.7. In-flight doors

Some aircraft will have a secondary in-flight door which is designed to replace the original door when the aircraft is used for skydiving. These are often specifically designed by manufacturers for skydiving purposes. Commonly these will take the form of metal roller shutters which can be lowered from inside the aircraft over the door opening. Sometimes they are made of fabric or clear plastic composites or a combination of these. Other types take the form of single piece ‘door plugs’. These are doors designed to plug the door aperture from the inside and sometimes rely on the differential between internal and external air pressure to keep them in place. These doors require careful handling. They are removed on the jump run and usually stowed securely in the cabin by the jumpmaster or other skydivers. It is obviously important that they do not fall out of the aircraft; fortunately, they are now becoming a rarity.

3.8. Seat / seat belt removal

It is quite common for all or some of the passenger seats and seat belts in jump aircraft to be removed prior to skydiving use. Seat belts are usually either attached to the seats themselves or to the cabin floor. When removing seat belts from a cabin floor attention must be paid to the remaining floor fittings which may need to be covered in order to protect them from snagging on skydivers’ equipment.

3.9. Restraints

In smaller aircraft it is common for skydivers to be unrestrained because the presence of belts/ restraints on the floor would be hazardous to skydivers when exiting the aircraft because of their potential to snag skydiving equipment or cause hang ups.

In larger aircraft, or where the Flight Manual requires it, alternative restraints (usually single point) must be provided where seats have been removed. These are usually attached prior to take off and disconnected prior to jumping. It would normally be the responsibility of the jumpmaster to ensure that restraints were utilised correctly, but ultimately it would be the responsibility of the pilot to be satisfied that there were an adequate number of restraints for the skydivers on board.

Where skydivers are utilising aircraft seating it would be usual for them to use whatever restraint belts came with the seats.

3.10. Aircraft controls

In some circumstances it may be necessary to remove the co-pilot's control column or wheel from an aircraft in order to facilitate skydiving operations. Such a circumstance would only prevail where the Flight Manual or other formal modification approval permitted it. In any event such work would have to be carried out by a licensed aircraft engineer and should not be attempted by an unqualified person.

3.11. Floor coverings

Some aircraft will have floor coverings to be installed after the removal of seats. This will be for various reasons; either to protect floor fittings or level out uneven floor configurations, or simply to provide more comfort for skydivers who will be seated on the floor. Floor coverings will generally be of wood, carpet or dense foam material or a combination of these. A recommendation by British Skydiving has suggested that energy attenuating foam is the most suitable material for floor covering in circumstances where floor covering is desirable and permissible. The recommendation was made as a result of research that indicated that such foam would provide superior vertical impact protection for cabin occupants as opposed to the more commonly encountered materials.

3.12. Static Line strong point

If an aircraft is to be used for static line skydiving (see section 13.2 for detailed information) it will need to be equipped with an approved static line strong point.
This is the means whereby static line operated parachutes are attached to the aircraft so that their deployment is initiated immediately the skydivers exit the aircraft.

A strong point will normally be a webbing strop with metal D rings or hooks attached which will fix to seat belt or other suitable anchorage points in the cabin, or will be a steel cable incorporated into the cabin floor, roof or wall. It must be stressed that strong points for this purpose must be approved by the aircraft manufacturers or other formal aviation agencies.

3.13. Steps and rails

Some aircraft will incorporate external grab rails and steps which are designed to enable jumpers to climb outside the aircraft prior to jumping. This enables groups of skydivers to exit closely together rather than in single file. Normally grab rails and steps must be installed by engineers to approved designs and are not quickly detached.

3.14. Ancillary cabin equipment

Skydiving operations require various items of ancillary equipment to be carried in the cabin. Among these are carabiner strops, knives, aerial photographs, stowage bags, stopwatches, crash seating position placards etc. It would normally be the responsibility of the jumpmaster to ensure that the necessary items were on board, but it is advisable that the pilot satisfies themself that a knife and carabiner strop are always carried. The need for these items is explained in more detail in section 12.6.

SECTION 4: SKYDIVING FLIGHT PROCEDURES

4.1. General

The general procedures required for the execution of a flight to drop skydivers will be much the same at any UK PTO. Local variations and airspace requirements will always produce additional procedures which will be detailed in local SOPs (such as deconfliction procedures with other local activities like helicopter flying or gliding) but what follows here is an outline of what will generally be expected from a jump pilot.

4.2. Command of aircraft

Ultimately the pilot is in command of the aircraft and all persons on board. The jumpmaster, however, must be regarded as having a primary role within the command structure, as in some situations they will be in a better position to make judgements about some courses of action which may be necessary. Very often a pilot will wish to consult with the jumpmaster with regard to procedural choices (e.g. whether or not skydivers should jump out in low level emergencies). If, however, at any stage in a flight the pilot believes that safety is being compromised, they must not hesitate to conduct the flight in whatever manner they see fit to maximise flight safety, even if this means aborting a flight and landing regardless of what other pressures there may be to proceed.

4.3. Pre flight procedures

The procedures outlined here are those that are specific to skydiving. There is an assumption that all the normal requirements necessary to any aircraft flight (weather checks, pre- flight aircraft checks etc.) will have been carried out as a matter of routine.

4.3.1. ATSU notification

PTOs are required to notify an Air Traffic Service Unit (ATSU) as designated in the UK AIP ENR section 5.5 via telephone at least 20 minutes prior to the commencement of dropping and to notify when skydiving operations have ceased.

This is in order that the ATSU can give information on the activity status of a drop zone to the pilots of aircraft who are likely to transit through it.

It is a requirement that PTOs specify in their Standard Operating Procedures (SOPs) the person who is responsible for notifying the designated ATSU. Many PTOs specify that the duty pilot is the person responsible, so this is a task that may well also fall to you as an AP. It is usual to record the start and cease times on a British Skydiving standard form (form 193) which is attached as Appendix C to this manual. The form also provides more detailed information on how and why this procedure is to be applied.

4.3.2. Local arrangements

Many PTOs have local arrangements, which are often contained in letters of agreement (LoAs), where they must notify other ATSUs as well as their formally designated one. Some PTOs will also require this task to be performed by their duty pilots.

4.3.3. Manifesting

There is a requirement that all skydiving flights are correctly manifested prior to take off and that a copy of the manifest remains on the ground. The manifest will record the names of all skydivers on board and will normally record the heights they intend to jump from and the nature of the skydiving exercise they are going to perform. It will also generally indicate the name of the pilot and jumpmaster.

The pilot would not normally draw up the manifest. It is usual, however, though not mandatory, for the pilot to be given a copy of the manifest so that they have a record of the various heights and number of passes that they will be required to make over the drop zone.

4.3.4. Weight & Balance awareness

This subject (very important in skydiver dropping) is dealt with separately in section 5.

4.3.5. Pre flight briefing

The Jumpmaster is required to brief the pilot on all requirements pertinent to any flight. The brief would include an indication of the exit point or a request for a wind drift indicator (WDI – see glossary and section 4.5.3) to be thrown, the number of passes required, the size of the groups and the heights they are to jump from and any other special requirements such as particular run in speeds required or a change of run in direction.

4.4. Take off and climb

4.4.1. The take off

The take off and climb will be executed according to operator requirements and within the parameters specified in the Flight Manual. The pilot must also be satisfied that prior to take off the aircraft is loaded correctly and that skydivers are correctly restrained (when required), and that they are wearing head protection as required in the BSOM. The jumpmaster will normally attend to these matters, but it is wise for the pilot to check these items as well, if possible. It is also essential for the pilot to obtain confirmation from the jumpmaster that the load is ready for take off.

4.4.2. The climb

The climb phase of the flight will again be according to the operator's and Flight Manual parameters. During this phase it is not uncommon for skydivers to move around in the cabin and the pilot must expect to make the necessary trim changes that this will entail. There may be directional requirements under local orders which prohibit climbing over certain areas. These will usually be for the purposes of noise abatement or avoidance of controlled airspace. Regardless of local orders it anyway makes good sense for pilots to fly in such a way as to minimise, as far as possible, the noise impact on the local population.

4.4.3. Mixture leaning

Many PPLs may not have been taught the importance of correct mixture leaning for piston engine aircraft during their training. This is primarily because most PPL activity takes place below 5000 feet and many instructors do not believe that leaning is necessary for general flying below this height. As far as jump flying is concerned, it is very important. This is because skydiving aircraft frequently go to heights where poor engine performance and rough running are likely to result if the fuel mixture is not leaned. It is also fundamental to the efficiency of a flight that the mixture is leaned to ensure maximum power combined with best fuel economy.

Attention to the mixture control will be required throughout the flight. The progressively changing altitude will require a progressively changing mixture. How the leaning is performed will depend upon the aircraft and its instrumentation. An EGT gauge is the best instrument to govern the leaning procedure, but a fuel flow gauge can be used to equal effect. The precise methods will depend upon the specific operational procedures for any particular aircraft.

4.5. Calculation of exit and opening point

4.5.1. Spotting

When skydivers exit an aircraft they will wish to do so at a point above the ground which gives them the best possibility of landing on their target area. This point will be worked out in advance in order to make allowance for the effect of wind on the skydivers whilst in free fall and under canopy. There are two principal ways of calculating the exit point. The first is done prior to flight by using meteorological information and the second is done during flight by the use of a WDI. The process of working out the exit point and then directing the aircraft towards it is the jumpmaster's responsibility and is generally referred to as 'spotting'.

4.5.2. Pre-flight calculation

The most widely used wind forecast information source for skydiving operations is the Met. Office form 214. This is obtainable over the internet and lists the forecast wind speed and direction for various altitudes from 1000 to 24000 feet at various locations in the British Isles. This information is used when calculating the exit point prior to take off.

This calculation is normally the responsibility of the jumpmaster, but pilots may become involved or be consulted regarding it.

It is normally performed mentally by experienced practitioners rather than involving precise mathematical calculations. The calculation will take account of the exit height of the skydivers and the intended opening height of the parachutes. These factors will vary according to the nature of the skydiving being performed. The result will be an exit point usually given as a distance and bearing from the target.

4.5.3. In flight calculation

This is normally done using a WDI. The pilot will be asked to make a pass over the target area (usually flying into wind) at a given height (normally between 2000' and 2500'). The jumpmaster may give corrections to the pilot to change the aircraft heading (see 4.6 below) and will normally aim to throw the WDI over the target. Once the WDI has been thrown it will be the pilot's job to ensure that they fly the aircraft in a pattern that enables the jumpmaster to keep it in sight whilst it descends to the ground. With some aircraft this is quite easy if the pilot and jumpmaster are both able to keep the WDI in sight together. With some aircraft, however, (such as low wing types, or types where the exit door is on the opposite side of the aircraft to the pilot, the job is not quite so easy. The pilot may have to lose sight of the WDI for some of the time in order to ensure that the jumpmaster keeps a view of it from their position at the jump door. The pilot will then have to use their best guess as to where the WDI is as it descends. This aspect of the job will only be learned with practice and experience.

The WDI should descend at the same rate as an average parachute (approx. 1000 feet per minute). The jumpmaster will make a note of where the WDI lands on the ground and then work out the exit point according to the distance and direction that the WDI has moved from the point at which it was thrown.

The use of WDIs is mandatory on skydiving displays. It is not mandatory otherwise, provided relevant met office information is used instead.

4.5.4. Throwforward

Some spotting calculations may take account of throwforward. This is the distance that a parachutist tends to be projected forwards in the direction of flight once they exit. It is a function of the fact that at the point of exit they are still travelling forward at the same speed as the aircraft and will therefore tend to continue on a forward trajectory for a short time after exit. Many skydiving/parachuting textbooks (particularly older ones) make a meal of this and provide mathematical formulas for calculating throw-forward distance.

In fact, such calculations are virtually never used in practical skydiving, but throw-forward is a phenomenon which an experienced skydiver will take into account when necessary.

4.6. The run in

Sometimes referred to as the 'jump run'. This is the phase of a skydiving flight immediately prior to dropping. It is the point at which the pilot has assumed the required heading towards the exit point and has achieved, or is just about to achieve, the height and airspeed that will be required at exit. Adhering to specific airspeeds at exit can be particularly important (see sections 13.2.1 and 13.3).

Once established on the run in the pilot will obtain clearance to drop from the drop zone controller (see also section 8.2 Radio Procedures). When the pilot is satisfied that the aircraft will achieve the correct height and speed specified and is otherwise in the correct configuration for the drop, they will communicate the 'clear drop' status to the jumpmaster. The means whereby this will be done will vary according to the type of aircraft. In smaller aircraft it may be done by telling the jumpmaster directly. In larger aircraft it may involve a signalling system using sound or lights. Sometimes in larger aircraft, without signalling systems, such messages are relayed via other jumpers. In these circumstances both pilot and jumpmaster must beware of the potential for errors in messages relayed verbally along a chain. It is usually at this stage of the flight that the inflight door, if fitted, will be opened in preparation for the exit.

Once the run in has been commenced the pilot will need to maintain the correct track towards the exit point. This will either be done by reference to radio navigation instruments such as VOR or GPS (see section 11 Use of GPS) or by directions from the jumpmaster. Again these directions are given either verbally or by a system of light signals. The directions will be for heading changes (usually for changes

of 5 or 10 degrees left or right, though sometimes more). At this stage these heading changes should be made, as far as possible, using flat turns rather than banking the aircraft. This will involve using crossed controls (i.e. applying the heading change with the rudder pedals and using opposite aileron to prevent the secondary effect roll).

The reason for this is to make the jumpmaster's job a bit easier. They are responsible for ensuring that the aircraft is over the correct exit point. On the run in they must make assessments of the aircraft's vertical position in order to do this. If the aircraft is banked one way or the other during these heading changes, this vertical assessment is made much more difficult and is less likely to be accurate. The jumpmaster is, of course, in a much better position to make this vertical assessment than the pilot because they have access to an open door and is able to see vertically downwards, which in most aircraft is not possible for the pilot.

The run in is usually made into wind but could be along a line which simply represents the aggregate direction of the wind at differing heights. It does not necessarily have to be into wind and sometimes cross wind or downwind run ins may be ordered by the jumpmaster for various reasons; for instance it may be the only way that they are able to maintain visual contact with the ground.

4.7. The exit

It should be stressed at this point that the responsibility for exiting the aircraft at the correct exit point is entirely the jumpmaster's. It is not the pilot's responsibility. The pilot will be expected to set the aircraft up on its predetermined run in and maintain its correct track either visually or by using a GPS or other radio navigation instrument, or by executing heading corrections given by the jumpmaster. They may also be required to indicate the distance to run to the exit point.

JOHNNY KRUGER

The decision about when and where to jump rests solely with the jumpmaster. At the point of exit the jumpmaster will indicate to the pilot that they require a 'cut'. At this point the pilot will reduce engine power to a predetermined level. This is in order to ensure that the propwash and airspeed are minimised (usually to approximately 1.1Vs) which enables the jumpers to exit the aircraft cleanly and with minimum turbulence.

The 'cut' request is more normally associated with piston engine aircraft when it is common practice for the pilot to close the throttle to the minimum power setting. With turbine aircraft the power setting at exit is often unchanged from the settings selected earlier in the run in and it is not usual for a 'cut' command to be necessary.

At the same time an increased flap setting may be required. This can be for various reasons depending upon the type of aircraft. It may be in order to assist with flying at a slower airspeed or simply to decrease the possibility of jumpers striking the flap on exit from low wing aircraft (such as the PA32). In some skydiving operations a faster or 'no cut' exit may be requested. This is usually when immediate and quicker parachute deployments are required after exit. This is common in Canopy Formation jumps (see section 13.3 which deals with this and its associated dangers).

For many aircraft the exit is a particularly critical point in the flight. The aircraft is generally flying slowly at low power settings. For many aircraft, particularly those with low tail planes, the attitude is critical and nose up / tail low attitudes must be avoided in order to eliminate the possibility of jumpers striking the tail on exit. As jumpers exit the aircraft there is a considerable and rapid change in trim. On some jumps, groups of jumpers will want to climb out of the aircraft and hold on to the outside in order to exit together. This can prolong the exit process whilst they get into position. Initially their bodies will create weight and drag on one side of the aircraft which can initiate a tendency to roll. This will have to be corrected by opposite aileron which puts the aircraft in an out of balance situation and increases the stall speed. Sometimes the nose will have to be gently lowered to increase the airspeed in order to maintain aileron authority. Once a group has left the aircraft another group may then take up similar stations outside, only now there are no jumpers left in the cabin to counterbalance the rearwards leverage they are creating (see also section 5 Mass & Balance).

These circumstances must be anticipated and managed; often by radical trim adjustments combined with gentle increases in airspeed. The general point to make is that the exit can represent a point of high pilot workload and is a phase of the flight which has a great potential for handling error and the possibility of stalling and or spinning from a poorly handled exit phase.

4.8. The descent

4.8.1. Initial procedures

Prior to commencing a descent, although it may sound obvious, the pilot must first ascertain that the exit phase has been fully completed. The pilot must be sure that all skydivers have exited correctly. It has been known for pilots to commence descents whilst groups of skydivers are still preparing to launch from the aircraft. This can be dangerous or disconcerting for the skydivers involved who may lose their grips on the aircraft and leave it in an uncontrolled fashion, perhaps with the danger of striking external aircraft surfaces. There may still be skydivers remaining in the aircraft (perhaps a tandem pair whose exit position has been altered). A sudden steep descent could make their exit difficult or dangerous.

Prior to descent, it may also be a requirement that a particular ATSU is notified on the radio so that they can anticipate control directions to other aircraft.

4.8.2. Engine management

The method of execution of an efficient descent will obviously depend upon the type of aircraft involved and will be carried out within flight manual parameters. Good engine management is particularly important in the case of piston engined aircraft which can be subjected to rapid overcooling in descents. The engine will be hot, having worked the climb at a high-power setting. The air temperature at jump altitudes can often be very cold.

These conditions can induce shock cooling if descents are made at high speed and low power settings. This can result in cracked cylinder heads which are costly to replace. It is important that descent procedures are planned to allow for gradual engine cooling, and it is wise to have these procedures written down for any particular aircraft and incorporated into check lists.

4.8.3. Collision hazard awareness

Having dropped skydivers and commenced (particularly in the case of turbine aircraft) a high-speed descent, the most important thing a pilot needs to be aware of outside the aircraft is the location of the skydivers that they have just dropped.

If the pilot is not aware of the movement of skydivers in free fall and under canopy there is a danger that the aircraft could collide with them. Remember that some aircraft can descend faster than a free-falling skydiver.

The danger of collision with parachute canopies as an aircraft approaches to land is obvious. This is because in most circumstances the aircraft will be landing at, or very near, the same location as the skydivers. What is not so obvious is the fact that collision dangers can exist throughout a descent. Some skydiving exercises, such as Canopy Formation (see section 13.3) or wingsuit flying (see section 13.4) can mean that a rapidly descending aircraft can encounter skydivers at a fairly high level in areas of the sky where the pilot might not be expecting them. Unexpected high-speed encounters are much more dangerous than low speed encounters which are expected and being watched for, such as on the approach to land.

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It is important that pilots familiarise themselves with the various scenarios that skydiving operations can present and be aware of what they need to take into account on each flight.

4.8.4. Automatic activation devices (AADs)

It is important that pilots understand the hazards which are associated with AADs in aircraft descents. An AAD is a device which will activate a skydiver's reserve parachute when it detects a rate of descent which is above a safe pre-set limit for a particular height. The basic idea is that if a skydiver fails to operate their main or reserve parachute by a certain height then the AAD will do it for them.
The parameters which an AAD is calibrated for will differ according to the experience level and task of the skydiver wearing it.

In certain circumstances a jumpmaster, a drop zone controller, or the pilot in command, will abort a skydiving flight and order a return to base with some or all of the skydivers still on board. In this event the AADs can still activate if the aircraft descends at a speed above the AAD set limit.
The consequences of this are highly inconvenient at best and disastrous at worst. If a reserve parachute were to deploy out of an aircraft door the result can be fatal.

Some AADs can easily be switched off in the aircraft but others cannot. Activation heights and speeds vary but are unlikely to be higher than 3500 feet or less than a descent rate of 1500 feet/minute.
In the event that a lift is aborted, the simplest and safest procedure is to ensure that below 5000 feet the descent rate does not exceed 1000 feet/minute.

This will allow a sufficient margin to ensure that any AAD will not activate and will eliminate the possibility of mistakes being made in the effort to work out optimum descent rates for the AAD parameters believed to be on board.

4.8.5. High speed descents

Pilots will normally be expected to descend their aircraft as quickly as is safely possible. This is for the sake of economy and to facilitate quick turnarounds on busy days. With turbine aircraft, which do not have the cooling constraints associated with piston aircraft, descents can be particularly fast and restricted only by the particular aircraft's VMO (or VNE) which is often reduced when operating with open doors.

Descents at or near VMO are perfectly acceptable, but clearly not above it for structural reasons. There are however several dangerous scenarios here about which pilots should be fully aware.

The first is the temptation to try and concentrate on vertical descents in order to emulate the many photographs that show jump aircraft doing this. In many cases such photographs are only achieved by aircraft exceeding their VMO, because many aircraft cannot be put into a vertical descent for more than a few seconds without exceeding it.

The second is the very real danger of exceeding the design manoeuvring speed (VA) which is usually considerably lower than the VMO. This can occur if steep turns are executed at high speeds.

The worst consequence of this is for the inside wing of the turn to exceed its critical angle of attack (effectively stalling) with subsequent loss of control. This is a real danger and has resulted in skydiving aircraft fatally crashing.

4.9. The landing

There will be nothing unusual about landing an aircraft after a skydiving flight. One point to bear in mind, however, is the enormous difference to the stopping distance required between an empty and a fully laden aircraft. This is worth mentioning as pilots will often get into a routine of familiarity by getting used to the landing characteristics of an aircraft at very low load weights.

They may go for months of constant landings with empty cabins and become very proficient at handling in this format, only to be embarrassed by misjudging what is required when they need to land a fully laden aircraft after a flight has been aborted.

SECTION 5: MASS AND BALANCE

N.B. For the purposes of this document the terms 'Mass & Balance' and 'Weight & Balance' are considered interchangeable. At the time of writing the term 'weight' is probably more commonly used but is being formally changed to 'mass'.

5.1. Mass & Balance Schedule (MBS)

The MBS is a particularly important document as far as skydiving operations are concerned, and it is important that pilots understand its use. The MBS is based on the information contained in a Weighing Report which is prepared by aircraft manufacturers or companies approved to weigh aeroplanes.

5.2. Aircraft and fuel loading

Jump pilots must be acutely aware of the load limitations applicable to any aircraft they are flying in skydiving operations. This is because aircraft used in parachuting are routinely flown at, or very close to, their maximum all up weight (MAUW).
This means that particular attention must be paid to the loading limitations outlined in the MBS. In some aircraft, for instance, if the cabin occupancy is at a maximum then the aircraft cannot accept a full fuel load or would exceed its MAUW if it did. In some aircraft a light load means that limitations might exist for the load distribution and in some aircraft cabins loading is restricted to certain areas of cabin space when only partially loaded.

5.3. Mass and balance calculations

Some textbooks indicate that mass and balance calculations should be performed prior to every flight. In some areas of commercial aviation, it is, indeed, necessary. Where general skydiving operations are concerned, however, it is unrealistic to expect a pilot to do one on every flight, particularly in circumstances where they are required to conduct a series of back to back flights without even shutting the engines down.

It is advisable though, that pilots perform mass and balance calculations which cover all the loading scenarios that they are likely to be faced with so that they gain an ability to recognise abnormal or potentially dangerous loading situations.

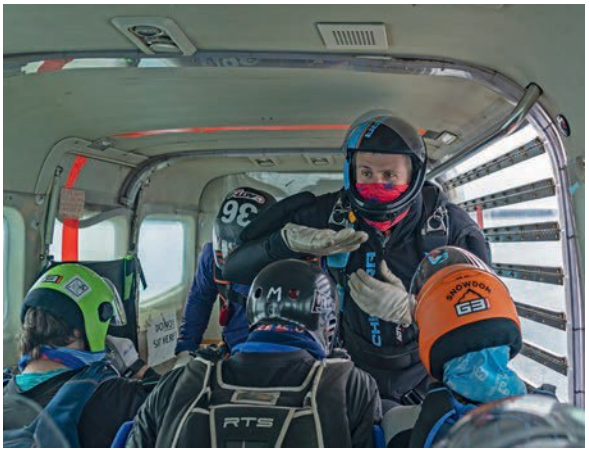
5.4. Potential hazards

Pilots must also learn to recognise situations which can present loading hazards in ways which are not always immediately obvious.

Loading difficulties can inadvertently develop even when the aircraft is well below its MAUW.
When a certain number of skydivers have to climb outside an aircraft it can tend to shift its C of G rearwards. This may be acceptable if there are other skydivers on board at stations which will tend to counterbalance the tendency towards tail down leverage. If there are no other skydivers on board, despite the fact that the aircraft may be relatively lightly loaded, the aft C of G could become sufficiently rearward to be outside the permissible envelope and place the aircraft out of control.

Some flight manuals do permit transitory out of balance situations where the rearward weight shift on exit can briefly place the aircraft out of balance but not out of control.

As already mentioned some aircraft have cabins areas which should not be loaded until other cabin areas have been loaded first. Such areas are often delineated with red lines or placarded with warnings. Pilots should not rely on skydivers necessarily adhering to these requirements and should be prepared to check on the loading and redistribute the load if necessary. In these situations, a lot will depend upon the confidence which the pilot has in the jumpmaster's abilities.



ALEX

When C of G calculations are performed it is usual to allocate an average weight for a skydiver and their equipment (usually around 90kg) which is a reasonable compromise between the extremes likely to be encountered. In some situations, particularly with smaller aircraft, it may be possible to inadvertently overload by relying on averages. A military display team of five large skydivers, for example, with an average equipped weight of 110kg, could easily overload a small six seater aircraft which is otherwise within its limits with 'average' skydivers.

The pilot therefore needs to accumulate the necessary knowledge to ensure that such situations don't develop. It is important to recognise also that skydivers are not necessarily experts on aircraft mass and balance and cannot be relied upon to anticipate the situations they may be unwittingly creating.

GARY WAINWRIGHT

SECTION 6: FUEL MANAGEMENT

6.1. Introduction

As has already been mentioned, fuel management is particularly important with jump flying. Pilots coming from some flying school environments will be used to starting flying at the beginning of the day with full fuel tanks, doing an hour's flying and then filling the aircraft up again for the next sortie and so on. In some instances, pilots have never flown below half tanks and because of this are perhaps patterned into an overconfident assumption that fuel is always on board an aircraft in abundance. This is not the case with skydiving, and it could even be said that skydiving encourages the deliberate use of low fuel levels.

The reasons behind this are simple. The principal demands made on an aircraft and pilot by most skydiving operations are that the aircraft takes as many people as possible to jump height as quickly as is safely possible. To do this often means that fuel loads are limited by the fact that cabin occupancy is at a maximum and there is a need to gain altitude quickly. This latter requirement meaning that it is not economical in terms of time and money to haul unnecessary quantities of fuel up to altitude and only to fly them down again. Skydiving operations will therefore calculate fuel requirements more precisely than will say, training operations, where abundant on board fuel is the norm.

A busy skydiving operation will perhaps take on board the maximum permissible fuel for its cabin loading if it is anticipating doing a series of 'back to back' lifts. It will, however, then fly as many lifts as possible before approaching its emergency fuel reserve levels (see section 6.3 below). If, at this stage, there only remains a requirement to perform one more flight, it would be quite normal only to fill to the level of fuel required to do that flight and no more.

Obviously requirements and practices will vary between different organisations, but it is sufficient to prepare new pilots for regimes where low fuel loadings will be commonplace rather than rare. There is nothing wrong with this approach, it simply means that pilots must become more focussed on fuel management and pay more attention to fuel monitoring than they may have been used to doing in the past.

6.2. Fuel gauging

Given the unreliability of fuel gauges in many aircraft, it is prudent for pilots to rely on other methods of gauging the fuel they have on board at any one time. It is a requirement of the BSOM that "The pilot must have available to them in the aircraft, a record of fuel and oil uplifts made and the quantity of fuel on board prior to each flight or series of flights, to enable remaining endurance and fuel reserves to be readily calculated."

Dip sticks are often used in skydiving and are a reliable visual indication of fuel levels. If an aircraft is not equipped with a dip stick it is often prudent to make one. These must be used properly, however, and must be marked with an ID for the aircraft and the particular fuel tanks they are intended for (e.g. 'G-ABCD – 'inboard mains').

Errors can also occur when dipping some fuel tanks which contain flexible liners. Liners are known to sometimes ripple and form pockets of fuel in otherwise empty tanks. If a pocket is dipped it can give a misleading reading on the dip stick.

Whatever means are used to determine the amount of fuel on board the aircraft at any time, an important backup is the pilot's own knowledge of the expected fuel burn of the aircraft when performing in the role. By knowing what the aircraft should have burned on each sortie the pilot will have a mental gauging system which will act as a backup and enable them to make good estimates of current fuel load. This will help them to complete the mandatory record of fuel quantities which sometimes have to be estimated for flights taking place between refuelling stops. When estimating fuel levels in this manner it is important to take account of additional fuel burned on holds and go arounds and pilots must never hesitate to shut down and recheck fuel levels if they are unsure.

6.3. Fuel reserves

Every PTO should have a policy with regard to the amount of fuel it considers necessary to be kept on board an aircraft as an emergency fuel reserve. It is prudent to write this policy into the centre SOPs and essential that pilots then adhere to it.

Because jump flying tends to keep an aircraft fairly close to its base, there is a tendency to disregard the need to strictly observe fuel reserves and to eat into them simply to complete a normal operational function. This is a mistake; fuel reserve levels should always be calculated and maintained on the assumption that a situation may arise that prevents the aircraft from returning to base (incident on the runway, poor weather etc.) and enables it to be flown with a full load to a predesignated airfield that has appropriate poor weather approach facilities.

6.4. Fuel station management

Some PTOs are based at licensed airfields and draw their fuel from professionally managed fuel stations which are the responsibility of the airfield authorities. Others, however, have responsibility for the management of their own fuel stations. These can take the form of small hand pumped trailer tanks, large powered bowsers, or full underground tank and pump installations.

In the latter case, where the installations are the responsibility of the PTO operator, they must be managed in accordance with legal requirements and in the case of petroleum, under the terms of a Local Authority petroleum storage licence.

It is important that pilots understand that they may have a close involvement with this process at some PTOs and that very often the routine quality testing and storage management processes are their responsibility. It is equally important that if they are not involved with this process, then they satisfy themselves that someone else is adequately fulfilling it. The PTO SoPs should detail responsibilities and procedures.

GARY WAINWRIGHT

SECTION 7: HEIGHT LIMITS & ALTIMETRY

7.1. Height, altitude and flight levels

As is common within aviation and for the purposes of this manual, 'height' is the distance above ground level, 'altitude' is the distance above mean sea level and 'flight level' is an aircraft's altitude at a standard pressure setting of 1013 hPa. (sometimes referred to as 'pressure altitude').

In general, skydivers will think and operate in terms of 'height'. If a skydiver requests a drop height of 10,000 feet, they will be expecting to have 10,000 feet of air between the point at which they exit the aircraft and their intended parachute landing area (PLA).
Most skydivers will wear altimeters which will be set to zero feet at take off, assuming the intention is to jump at the same location, which in most cases it will be (otherwise refer to section 7.5).

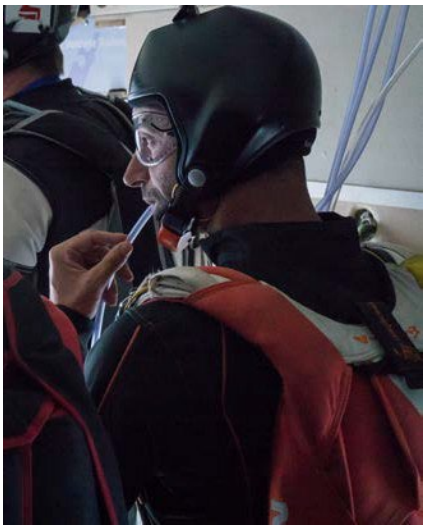
When operating in controlled airspace care must obviously be taken to differentiate between height and flight levels. When the QFE set on the altimeter is lower than the standard pressure it is possible to initiate a level bust if attention is not paid to this.

7.2. Height limits

Except in emergency situations, or specially exempted circumstances, all skydiving drops will take place from a minimum of 1500 feet and a maximum of 15,000 feet. The heights at which skydiving jumps take place between these upper and lower limits will depend upon the nature of the skydiving exercise being undertaken, airspace restrictions in the area the jumps are being made, and the performance limitations of the aircraft being used.

7.3. Use of oxygen

The requirements regarding height limits and the use of oxygen are slightly different for skydivers than for pilots. Skydivers may fly to FL150 without oxygen provided that they do not remain above FL100 for more than 30 minutes and above FL120 for more than six minutes. Skydivers wishing to jump above FL150 must apply for special permission and must include provision for supplementary oxygen tailored to the requirements of the jump.



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Pilots are required to adhere to the requirements of the ANO, which as far as skydiving is concerned means that they must use supplementary oxygen if they remain above FL 100 for more than 30 minutes (rare in the case of skydiving operations) and at all times above FL 130.

Pilots should keep a track of the time limits and flight levels that are applicable to the skydivers. If the time limits or flight levels are exceeded then the pilot must bring the skydivers down and land the aircraft. It is not permissible simply to resume operations at a lower flight level.

7.4. Jump height precision

In some skydiving exercises the precise exit height is not of great consequence. Sometimes if a pilot arrives at a designated jump height earlier than intended (before they have reached the exit point) the jumpmaster may well tell them to keep climbing and achieve whatever extra height they can. Alternatively, a lower than anticipated cloudbase may cause a jumpmaster to order a run in at a lower height than previously requested. A pilot may also arrive at an exit point before achieving the height requested and the jumpmaster may elect to initiate the jump anyway (if it is not too far from the intended height). Most jump pilots will eventually encounter all of these situations but will hopefully aim to avoid them.

In other circumstances, however, the precise jump height is critical. This applies particularly to student static line jumping (see section 13.2.2) and early student free fall jumps, where free fall time is counted down verbally, rather than being checked on an altimeter.

It is important in these circumstances that pilots pay particular attention to achieving and maintaining the precise height specified by the jumpmaster. For instance, if a pilot allows an aircraft to lose height on the run in and exit phase of a low free fall jump, it is possible that the jumpmaster, who has already observed that the correct height has been reached, may turn their attention to other matters and fail to notice that the aircraft has inadvertently descended. The result of this may be that a skydiver exits and opens too low for safety in the event of a parachute failure or does not have enough height to make it to a safe target area and is faced with a hazardous landing. In these circumstances the onus would be on the pilot to abort their run in and inform the jumpmaster of their error. Clearly the benefit of experience will help most pilots to avoid repeating such errors.

7.5. Field elevation differentials

When pilots fly aircraft from one location to drop skydivers at another (as they often do on skydiving displays) they will have to take into account the likelihood of different field elevations. Failure to do this can cause a potential danger. A pilot taking off at an airfield with a field elevation of 100 feet amsl and dropping skydivers at a target area with a field elevation of 1100 feet amsl needs to ensure that they take account of this when they run in at the requested drop height. If they are unable to obtain an accurate QFE at the display location (which is often the case) then they need to add 1000 feet to the run-in height based on their take off point QFE (assuming no pressure differentials). Alternatively, they need to add 1100 feet to the run-in height based on the display location QNH. Failure to do this could result in skydivers inadvertently exiting at dangerously low heights.

There is, of course, also an onus upon jumpmasters to ensure that this kind of mistake does not happen. They should ensure that the jumpers' altimeters are set at take-off to provide a correct height reading at the target area. It is nevertheless prudent that pilots and jumpmasters both ensure that field elevations are taken into account and agree upon how this is to be done. The rule for skydivers is to set altimeters lower at take-off for target elevations which are higher than take off elevations and to set them higher for target elevations which are lower than take off elevations.

7.6. Uneven terrain

An important consideration, apart from differential elevations between take off airfields and PLAs is the differential ground elevation that can be encountered once a target area is reached. In hilly or mountainous terrain, it is possible to have an exit point which is much closer to the ground than the landing area. If, for instance the jump height requested by the jumpmaster is 3000 feet (meaning that they require 3000 feet height above the target area) the subsequently calculated exit point, which can be over a mile away from the target, may be over the top of a mountain which is 2000 feet higher than the landing area. If this fact is not taken into account it now means that the skydivers are exiting at a height of 1000 feet above the ground. If they then perform even a short free fall delay, the result could be fatal.

In these circumstances it is incumbent upon the pilot to ensure that the jumpmaster is alert to the dangers inherent in the situation and to take the necessary steps to avoid them. In this particular situation the danger is avoided by jumping at a higher altitude if circumstances permit; or shifting the exit point if the wind strength and direction permit; or aborting the jump if neither of these solutions is available.

7.7. Jumpers' altimeter variations

Occasionally jumpers or pilots may wish to cross reference jumpers' and aircraft altimeter readings in order to establish accuracy or for resetting purposes. An anomaly which is often encountered in jump flying is the fact that skydivers' personal altimeters will often read a few hundred feet higher than the aircraft altimeter whilst in flight, despite the fact that all altimeters have been zeroed on the ground.

This variation is due to the cabin air pressure in an unpressurised aircraft being slightly lower than the external air pressure. This occurs because the external airflow over the aircraft creates a pressure differential inside the cabin which is always lower than the outside. The aircraft altimeter static air source being outside the cabin will therefore register a different reading to a skydiver's personal altimeter inside the cabin. In effect a skydiver's altimeter starts to over read once the aircraft is flying but will become 'correct' once they jump out.

The extent of the error will depend upon the type of aircraft and the speed at which it is flying, but will rarely exceed a few hundred feet. It is necessary to be aware of this phenomenon, however, in order to avoid creating altimeter errors by attempting to synchronise them when it is not necessary.

SECTION 8: COMMUNICATION PROCEDURES

8.1. Radio requirements

The basic requirement as far as the BSOM is concerned is simply that radio communication with the drop zone control is available when student skydiving is in progress. On all other occasions it is only mandatory that visual communications are available (see section 8.6 below). Thus, it is possible for some skydiving operations to be conducted by non-radio aircraft. This would be highly unusual these days and would not be permissible in circumstances where other mandates (such as local air traffic agreements or controlled airspace requirements) overlay the basic requirements.

Under normal circumstances skydiving aircraft will maintain radio communication with their drop zone control at all times and with any other radio station that is necessary, such as local airfield or ATSU.

8.2. Radio procedures

Radio procedures will vary between different PTOs and will normally be the subject of requirements laid down in local SOPs. It is virtually universal within the UK that these requirements will include the need for the pilot to notify the Drop Zone Control (DZC) that the aircraft is commencing its run in or is a stated number of minutes prior to jumping and to receive a clearance to drop from the DZC and to notify the DZC when the jumpers have exited the aircraft.

8.3. Mandatory ATSU notification

The ATSU notification requirements have been outlined at section 4.3.1.

8.4. Transponder use

Pilots should squawk 0033 with Mode C throughout each skydiving flight, unless instructed by a controlling ATSU to use a different squawk.

8.5. Mode S transponders

Although some circumstances would exempt aircraft operating in VFR from the requirement to carry a mode S transponder, they are anyway compulsory above FL100 and this therefore includes just about all parachute aircraft.

8.6. Visual communications

The BSOM permits skydiving in certain non-radio situations providing that a system of ground signal panels is used. The use of ground signal panels is anyway mandatory for all skydiving operations (unless specifically exempted) in order that some ground to air communications can be quickly established in the event of radio failure.

8.7. Radio failure

If radio failure occurs during student skydiving the aircraft must anyway land without further drops taking place. It is well to remember here that the BSOM defines tandem passengers as students (even though they are harnessed to an instructor) and this rule therefore applies to tandem pairs as well as solo students. In the case of experienced (licenced) skydiver jumping then the ground signal system will be used. The signal panels will be laid out in one of four shapes (an X, I, T or L) which are intended to convey different messages as follows.

X - **It is clear to continue with skydiver jumping.**

I - **Skydiving is temporarily suspended**
(This is intended to signal the aircraft to remain aloft until further signals are made but is not a mandate as other factors, such as limited fuel, may mean that the aircraft cannot remain airborne for longer than would normally be necessary to complete the drop – in which case the pilot should land the aircraft).

T - **Only those with specifically notified experience levels may jump.**

L - **The aircraft is to land and make no further drops.**

SECTION 9: DISPLAY SKYDIVING

9.1. General

Skydiving displays simply demonstrate aspects of skydiving activity to members of the general public. The actual skydiving procedures are much the same as they would be at a regular drop zone. Displays normally take place at locations other than notified drop zones, such as major airshows at large airfields, county shows or village fetes. If display drops take place outside notified drop zones then there are special procedures which have to be followed before they can be legally undertaken.

The required procedures are detailed in section 13 of the BSOM. Display drops may only be undertaken by registered display teams. Pilots require no additional qualifications other than their British Skydiving Authorised Pilot rating (plus an IR if the display is in controlled airspace – see section 16.3). There are, however, additional considerations to note as follows.

KARIM

9.2. Display flight preparation

The pre display administrative procedures required by the BSOM will normally be undertaken by display team members and pilots are not necessarily required to perform these functions, though they may be asked to.

It is important, however, that pilots realise that they are responsible for all aspects of the actual flight planning and that they must obtain NOTAM, weather and en route information that would be normal practice on any cross country flight. In addition they must be sure that they are acquainted with special display co-ordination requirements such as display control frequencies, holding areas, and entry and exit routes. These will normally apply to larger air displays but even small village fetes can have co-ordination requirements which the pilot will need to ascertain prior to take off.

9.3. Smoke canisters

One aspect of display skydiving that pilots do not normally encounter on regular drop zones is the use of pyrotechnic smoke generators. These are smoke canisters similar to those used in marine distress applications.

They are used on displays to highlight jumpers in free fall and under canopy, so that they can be more easily seen from the ground and to add a more colourful and spectacular effect to a display.

They are normally worn on the jumpers' feet and detonated immediately prior to jumping. Although there is normally a delay of a few seconds between the canister being activated and the commencement of smoke discharge, it does mean that on some occasions pilots may experience some smoke in the aircraft cabin. It is not normal for this to be anything other than a tiny amount which quickly dissipates and is detectable only by its odour. It is as well for new pilots to be prepared for the experience, however, as it can otherwise cause alarm.

Pilots should also be aware that display teams may plan to produce a smoke trail from the aeroplane by using a jumper to trail his foot and detonated smoke canister out of the aircraft door prior to jumping. In some circumstances the smoke can badly stain aircraft paintwork. A pilot could, therefore, unwittingly find themself responsible for damage to the aircraft by permitting the use of smoke in this way. It is, therefore, important that pilots are clear about what display jumpers are planning to do with smoke canisters and that this accords with the aircraft operator's wishes. If in doubt, the pilot, as commander of the aircraft, should not permit this use.

9.4. Display regulations

Pilots should be aware that air displays are subject to particular regulations under the ANOs and that some aspects of display flying require a pilot to hold a display authorisation.

To simply take off and perform a normal skydiving drop at an air display, or anywhere else, does not, of itself, require this authorisation. This is because the normal pattern of a skydiving drop would not bring the aircraft within the proximity limits to large crowds that are the subject of the regulations. It would, however, not be permitted to perform additional manoeuvres, such as a low pass, which could be classed as displaying the aircraft itself without the necessary authorisation.

A pilot should, therefore, be careful about the way in which they fly an aircraft at a display and would be advised to consult CAP 403 (Flying Displays and Special Events) if in doubt about the legality of a display format.

ANDREW SWAFFIELD

SECTION 10: NIGHT JUMPING

10.1. Night jumping regulations

As well as a night rating, in addition to a jump pilot authorisation, there are other regulations relating to night jumps which are covered in section 8 of the BSOM. These rules relate principally to skydivers and include qualification requirements. Pilots should be aware, however, that details of any night jumps must be notified to the CAA and NATS via the appropriate on-line portals and to the British Skydiving office (BS Form 185 can be used for this purpose).

Pilots must be satisfied that this requirement has been complied with before undertaking such flights. If the notification has not been made, then the appropriate NOTAM will not have been issued. This means that drop zone infringement by aircraft is more likely as drop zones are normally considered to be inactive at night.

10.2. Night vision

The effectiveness of night vision depends upon several factors (such as altitude, age, fitness, smoking) but in particular it depends upon restricted exposure to light. Night vision improves the longer a person remains in the dark, but this accumulated effectiveness is immediately destroyed if vision is then exposed to bright light.

Pilots must be aware, therefore, that it is easy to 'waste' jumpers' night vision by shining a torch at them, such as one might be tempted to do when being spoken to from the rear of a dark aircraft cabin.

10.3. Collision avoidance

The principal danger, as far as jump flying at night is concerned, is the potential for collision with a skydiver. Although skydivers are required to carry lights, they are not particularly bright or readily seen at any distance. When descending from altitude it is, therefore, important to do so well upwind of the exit point so that the potential to run into skydivers (who may have inadvertently opened high) is minimised.

It is also important to remain away from the drop zone prior to landing until the DZC can confirm on the radio that all jumpers have landed and that it is safe to make an approach. In the event that communication is lost with DZC it may be necessary to allow a sufficient margin of time to elapse to be certain that the skydivers are on the ground before making an approach.

SECTION 11: USE OF GPS

11.1. General

Prior to the introduction of GPS most jump flying was conducted as an entirely visual exercise requiring the co-operative skills of both the pilot and jumpmaster.
Over recent years, however, GPS has probably become the primary tool for establishing an aircraft on a jump run and indicating when the exit point has been reached.

11.2. Technique

The ways in which GPS can be used to establish a run in are various and will depend upon the actual equipment available. Most pilots with the experience necessary to become jump pilots should have no difficulty in using a GPS for this purpose. In the early stages of jump flying probably the most common mistake is to keep overcorrecting in an attempt to keep the aircraft flying along an indicated line. This results in the aircraft weaving left and right along the line rather than flying steadily along it. Practice will overcome this tendency and guidance on the best techniques appropriate to the equipment available should also be sought from pilots with more experience in its use.

11.3. Responsibilities

The use of GPS enables a jump pilot to position aircraft accurately on a run in and to indicate an exit point with great precision.

This means that a pilot will often be left to position the aircraft without interference from the jumpmaster and only to indicate to the jumpmaster when the aircraft is close to the exit point. In pre GPS days the jumpmaster would generally have the task of visually positioning the aircraft by physically 'spotting' through the open door. This was sometimes a prolonged, and extremely cold, process.

Pilots must remember, however, that the responsibility for exiting an aircraft in the correct place still rests with the jumpmaster.

The advent of GPS has tended to shift the focus of this responsibility towards the pilot. The current regulations still require that a jumpmaster is able to see the ground between the opening point and the target prior to exiting the aircraft. All a pilot can do, therefore, is to indicate when an aircraft is on the run in and when it is over the exit point. If the aircraft subsequently proves to have been in the wrong place, or if the skydivers do not land on target, this is not the pilot's fault or responsibility.

GUY HINKS

SECTION 12: EMERGENCIES

12.1. General

Pilots should be familiar with the emergency procedures which relate to the specific aircraft they are flying and anyway be able to deal with general emergencies, such as engine failure, which are an ever present risk in any form of powered flying. If the drills for these emergencies are practised regularly then the outcome is likely to be less dramatic when the real thing occurs.

There are, however, additional considerations which come into play when dealing with emergencies during the course of dropping skydivers and there are additional emergency situations which are specific to skydiving and are only likely to be encountered during the course of dropping skydivers.

12.2. Engine failures

Engine failures in skydiving aircraft present differently than other flights insofar as most of the persons on board have the option of jumping out. An engine failure at sufficient jump altitude will normally mean that the skydivers can exit the aircraft if they wish. It is a reasonable expectation that they would wish to unless they are over water or other inhospitable terrain.

In the event, the decision to jump still rests with the jumpmaster. It would not be expected that a pilot would order the skydivers to jump under these circumstances. The decision may be the result of a discussion between the pilot and jumpmaster but it is likely that the discussion will be brief. In some circumstances the pilot may well find that the decision to jump has been taken and executed before they actually get the chance to enquire about it.

Height is obviously a critical factor in the decision to jump or not. Experienced solo skydivers may opt to jump from as little as 500 feet but student skydivers and tandem pairs would require more height. In some circumstances some skydivers may jump and others remain on board.

Pilots should be aware that although the payload is decreased if skydivers jump, this will not necessarily increase the glide capabilities of the aircraft. A lighter payload may, however, mean that aircraft manoeuvring during a forced landing in confined areas would be easier because of slower flight capabilities.

The fact that glide capabilities are not necessarily altered by payload differences is part of traditional aviation wisdom. This accounts for the fact that many aircraft flight manuals will only give one maximum glide speed for an aircraft without any reference to its weight. It is significant to note, however, that some aircraft manuals do, in fact, give differing glide speeds according to payload. It is particularly important, therefore, that jump pilots are conversant with differing glide speeds, if they apply to varying payloads, because jump pilots are always usually flying their aircraft at the two extremes of an aircraft's load envelope; usually near MAUW on the way up and virtually empty on the way down.

12.3. Preparation for emergency landing

An emergency or forced landing will make great demands on any pilot. There is a lot to think about and concentrate on under any circumstances. If skydivers are on board there are additional considerations. These are

a) Weight distribution	(see also section 5.4)
b) Use of restraints	(see also section 15.3)
c) Adoption of brace positions	(see also section 15.4)
d) AADs	(see also section 4.8.4)

These aspects are normally the responsibility of the jumpmaster, but if there is time it is important that the pilot reminds those on board to a) ensure safe weight distribution of remaining skydivers; b) ensure use of restraints if available; c) remind skydivers to adopt appropriate brace positions, d) ensure that AADs are turned off (if possible) if skydivers are remaining with the aircraft, or that the jumpmaster is ready to take safeguarding measures in the event of AAD firings.

12.4. Evacuation of aircraft on the ground

Once the aircraft comes to rest following an emergency it is important to evacuate the aircraft as quickly as possible. Again, this will be the primary responsibility of the jumpmaster, but circumstances may prevail where the pilot has to take charge of this. Evacuation of the aircraft may be a straightforward process, but it is important to ensure that occupants are warned to be wary of propellers that may still be turning (particularly with turbine aircraft which may still be winding down). Normally occupants would be instructed to evacuate towards the tail end of the aircraft.

An additional problem with evacuation comes when static line skydivers are on board. The BSOM requires that static lines are hooked up before take-off and are only unhooked on the ground if the static line skydivers have been unable to jump for whatever reason. The jumpmaster should only consider unhooking the static lines if the student skydivers are definitely going to land with the aircraft in an emergency rather than jump out.

In the emergency circumstances prior to landing both the pilot and jumpmaster will be extremely busy people and the unhooking of static lines may not be a priority. If the static lines have not been unhooked and speedy evacuation of the aircraft is necessary, then the static lines will deploy the parachutes as the evacuees leave it. They will then have to drag the deployed parachutes away with them or pull their canopy release handles (if they have the presence of mind).

12.5. Premature parachute deployment

This situation occurs when a parachute deploys inside the aircraft or whilst a skydiver is still connected with the aircraft prior to jumping (such as being positioned on a jump rail on the outside). If the parachute deploys inside the aircraft then every effort must be made to prevent it from going out of the door. If it does deploy outside the aircraft then there is serious risk of damage to the airframe and injury to the skydiver. Such incidents have happened, and when they have there has not been much that the pilot has been able to do to influence events. A pilot may, however, be in a position to help prevent the likelihood of such incidents by intervening whenever they may be involved with skydivers planning or practising exits or apparently adopting practises within the aircraft that they believe are potentially dangerous and could perhaps result in a premature deployment. A jump pilot can play a worthwhile role on the ground in helping to educate skydivers about safe behaviour in aircraft.

12.6. Skydiver hang up

This occurs when a skydiver becomes unintentionally attached to the outside of the aircraft (hung up) either by a deployed parachute, a static line or another part of their equipment or clothing.

This is a situation which has occurred several times throughout the history of skydiving/parachuting and is clearly one that pilots will not welcome. Skydivers have been hung underneath aircraft by static lines which have failed to operate correctly. They have been suspended by partially deployed parachutes from aircraft tail wheels or other parts of the airframe. Sometimes the outcome of the scenario has been an aircraft crash with fatal results; sometimes the situation has been resolved successfully.

Under some circumstances the jumpmaster is able to resolve the situation by cutting the skydiver away with a knife, which is kept on board for the purpose. In some situations the jumpmaster has climbed down the static line and has cut themself and the suspended skydiver away. A carabiner strop is required to be carried on board to facilitate this exercise should it be necessary.

Whatever the nature of the hang up the pilot's first job is to keep the aircraft flying and, if possible, gain height. This will give the jumpmaster a better chance of resolving the situation themself. The pilot should also attempt to keep the aircraft in the vicinity of the drop zone but in particular should keep away from built up areas. They will, of course, inform drop zone control of the incident.

If the situation cannot be resolved, then the pilot will have no choice but to land the aircraft with the skydiver still hung up on the outside. The conceivable variations to this scenario are too numerous to be able to set down a coherent set of drills for a pilot to follow. It would, however, make sense, where possible, to arrange a landing on grass with medical assistance ready on hand.

Land as slowly as is safely possible and hope for the best. If it is any consolation, this situation has actually occurred with a successful outcome, resulting in only minor injuries.

12.7. Airframe strikes

Sometimes a skydiver or a parachute can strike the airframe on exit causing damage to the aircraft which can result in control problems. Again, the only drill a pilot can follow is to do their best with whatever this particular circumstance throws at them. What jump pilots should be aware of, however, is that such events can often be of their own making and can therefore be avoided in the first place.

Airframe strikes have been caused by pilots stalling aircraft whilst skydivers are exiting. They have also been caused by pilots flying an aircraft at too high an airspeed for the particular exercise being undertaken. It is possible to cause strikes from a deploying parachute if a static line exit speed is too high (see section 13.2) or if the speed is too high for a Canopy Formation exercise (see section 13.3)

SECTION 13: SPECIAL PROCEDURES

13.1. Special procedures

There are many different disciplines and types of skydiving which each make special demands on skydivers and instructors. Some of these also require a jump pilot to have extra awareness of the demands they make in the way a jump aircraft is flown. The following are skydiving procedures which require additional pilot attention.

13.2. Static line jumping


PAUL DEWEY

Static line skydiving/parachuting is a means of deploying a parachute canopy quickly and automatically when a skydiver exits an aircraft. The static line is a length of tubular webbing, one end of which is attached to a strong point in the aircraft whilst the other is attached to the parachute container carried by the skydiver. The static line is configured to open the parachute container and extract the parachute in order to initiate its immediate deployment. Most static line systems are designed so that the static line and a parachute deployment bag (which initially contains the parachute) remain with the aircraft after the skydiver has jumped. It is the job of the jumpmaster to retrieve the line and bag by hauling it back into the aircraft.

Static line jumping is not as widely practised in UK skydiving as it used to be and some PTOs no longer utilise it. Nevertheless, many jump pilots will still be required to fly static line jumpers, so there are a few issues which need to be considered.

13.2.1. Airspeed

The airspeed at exit is a critical factor for static line jumping. In general the speed requested will be around 1.1 Vs (stall speed plus 10%), in other words quite low. High airspeeds can adversely affect static line parachute deployments, which is particularly undesirable as static line jumpers are generally novices. Pilots who are new to parachute flying and who may be initially apprehensive about flying at low speeds must nevertheless get to grips with this. Whilst emphasising the importance of slow flight the one overriding rule is 'above all, don't stall'.

13.2.2. Height loss

It is equally important that the precise height requested when static line skydiving/parachuting is adhered to. At slow speeds and low power settings there is a tendency to 'sink out' if attention is not paid to this. If there is more than one skydiver on a pass the tendency to sink out is prolonged. It is particularly important that height is not lost. When the last skydiver exits they do not want to be lower than the expected height for their calculated opening point. If they are, then they may not be able to make it back to their target area.

When circling for multiple passes it is also prudent to keep an eye out for students who are remaining high because of thermal activity. Although relatively rare this is nevertheless a regularly observed phenomenon.

Pilots must also realise that whilst the height at which a static line skydiver/parachutist is dispatched is critical and is, in the first instance, the responsibility of the jumpmaster, they may have a more immediate knowledge of height errors. A jumpmaster, once satisfied that an aircraft is at the correct height, may be focussing their attention on other aspects of the dispatching process and may not notice critical height loss. In these circumstances it is incumbent upon the pilot to recognise their own error and alert the jumpmaster accordingly.

13.2.3. Static line length

Pilots should also be aware that the length of static line and deployment bag assemblies can be critical to aircraft safety. An assembly whose overall length is too long for the particular aircraft being used, particularly when flown with excessive airspeed, may be liable to strike the tailplane or elevator and cause structural damage. A correctly configured assembly will be a few inches short of the tailplane when fully extended. Be aware, however, that a few inches short is sufficient and that the physics of static line deployment also means that static lines which are too short can also cause deploying parachutes themselves to strike the tail.

13.2.4. Static line spotting

When setting up for a run in during static line dropping, pilots must expect the procedure to be a visual process for which the use of GPS might not be appropriate. It may involve the use of WDIs (see section 4.5.3) and is more likely to involve verbal heading corrections from the jumpmaster. Also be aware that multiple passes may be involved (often one separate pass for each skydiver) and that the jumpmaster may request a time delay between passes in order to allow good vertical separation between the jumpers in the air. This is normally to facilitate the talk down procedure and prevent confusion over instructions issued to students from the ground.

13.3. Canopy Formation

Canopy Formation (CF) is a particular type of skydiving in which jumpers will deploy their parachutes immediately, or very shortly after exit. They will then engage in linking the deployed parachutes together in various formations and in competitive CF will be doing this against the clock.

Jumpers engaging in CF will often request high run in and exit speeds because a high exit speed will assist with a rapid deployment of their canopy, which is what they require.

Pilots should be aware that high exit speeds increase the chance of airframe strikes by jumpers or their canopies. An accident has occurred in the past when a pilot gave a high run in speed which had been specified by the jumpers but which proved to be too high and resulted in a canopy strike. Pilots should become familiar with the maximum safe exit speed on the type of aircraft they will be flying and not allow jumpers to persuade them to exceed it.

It should also be noted that CF exercises often involve high altitude exits and deployments. This means that in the descent the pilot may encounter parachute canopies at a much greater height than they would expect normally. Pilots must, therefore, take care to organise their descents so as to ensure that they descend in areas that are likely to be clear of descending canopies. It is important that the pilot understands what the jumper's intentions are and has planned accordingly. Finally if the pilot is receiving an ATS he should advise the ATC that parachute canopies are opening high.

SPENCER

13.4. Wingsuits

Some jumpers will wear wingsuits. These are specially designed jump suits which have wing areas (often with good aerofoil design) between the jumper's hands and feet and between their legs. They enable a jumper to 'fly' more efficiently during the free fall phase of their jump. The chief advantages are that they will prolong the time they are in free fall and will greatly extend the range of area that they are able to fly across whilst in free fall. Jumpers will often fly wingsuits as a group, which is usually referred to as a flock.

ALEX

As with Canopy Formation (where open canopies may be encountered), the pilot now needs to be aware that they may now encounter wingsuit jumpers during the course of their descent. These are not so easy to see and will be faster moving than a parachute canopy. Pre-planning is important, and the usual procedure is for the jumpers to brief the pilot on the areas where they expect to be flying so that the pilot can avoid them in the descent. If the pilot becomes aware that wingsuits are on board and they haven't received any briefing, then they should take steps to ensure that they do.

13.5. Water jumps / Flights over water

Some jumps are organised specifically as jumps into water. From a pilot's perspective there is very little difference to this from flying any display jump away from base. The jumpers are dressed for water entry and do not usually require (or want) great altitude. They are required to wear flotation gear and there are requirements for boat provision in the water. This may mean that that the numbers who jump on each pass are limited and the time taken between passes is extended according to the extent of boat provision. The aim is not to have jumpers in the water who cannot immediately be attended by a powered craft.

When flying over open water the normal requirements for the provision of flotation equipment must be met. It is well to bear in mind that in the past one of the greatest causes of skydiving fatalities was drowning. This is why skydivers do not always welcome flying over open water.

Pilots are, therefore, advised not to fly over open areas of water whilst engaged in skydiving operations unless this is unavoidable. Some drop zones near the sea may be far enough in land for skydivers not to be required to wear flotation gear. It is up to the pilot, therefore, not to put them in a position where they might inadvertently need it.

EWAN COWIE

13.6. Formation flying

When attempts are made to get large numbers of skydivers joined in large freefall formations it is often necessary to use several aircraft at once, flying in formation to achieve this. In doing so there are several considerations to take into account.

a) Take offs may need to be staggered to take account of the varying climb performance of different aircraft.

b) This will require rendezvous arrangements for the various aircraft at a predetermined height and location. To join formations in this manner will often require all the pilots to be familiar with the principles of lead pursuit curves as a means of interception.

c) Account will have to be taken of which side of the various aircraft the exit doors are, as this will affect the ease with which the jumpmasters on each aircraft can see what the other is doing at exit but may be outweighed by a pilot's need to clearly view the lead aircraft they are formating on.

d) The run in speeds and exit procedures for the formation will have to be carefully planned. It will not be possible to have an engine 'cut' on exit because of the difference in aircraft responses. The speed will have to be constant as will the height. For obvious reasons it is inconceivable that a situation should arise where aircraft start to run ahead of the lead or risk dropping behind and low of other aircraft whilst skydivers are exiting. There has been an accident in the UK where an aircraft has run into free fallers who were exiting above and ahead of the aircraft concerned.

e) For all these reasons and more, thorough ground planning and briefing needs to be undertaken, including the nomination of a lead pilot and aircraft and a clear understanding of the communication signals and the words of command and phraseology to be used on the radio.

f) Whilst there are no qualifications required to fly in such formations, it would be wise for pilots who are likely to be engaged in such work to obtain instruction on formation techniques and, initially, only to engage in parachute formations with pilots who have previous experience of this particularly demanding aspect of parachute flying.

SECTION 14: HUMAN FACTORS

14.1. General

All pilots should be familiar with the general issues regarding human factors which have a bearing on flight safety. It is well known that physiological and psychological problems are often significant issues in the causation of accidents.

These issues are just as relevant to parachute flying as to any other. There are also two issues which skydiving regulations focus on in particular, these are fatigue and ageing.

14.2. Fatigue

Parachute flying can place demands on pilots' stamina which they will not necessarily have encountered in their previous flying career. On a busy day at many parachute centres pilots may find themselves having to fly in excess of twenty flights spread over a twelve hour day. This can be very tiring given the demands on performance and concentration already required by this kind of flying. It is, therefore essential that pilots come to the job each day in a fit state to carry it out. Hangovers and lack of sleep the previous night are factors which can prove particularly dangerous in these work situations.

The BSOM requires pilots to have a break from the aircraft of at least 30 minutes after four hours of flying and restricts pilots to a maximum of eight hours flying in any one day. Each Club should have a system in place which enables pilots to easily monitor these limits during the course of their flying. If a pilot is flying under the terms of an AOC then they must adhere to the AOC requirements if these are stricter. Pilots must also adhere to the maximum limits anyway imposed by the ANO (maximum of 100 hours in 28 days and 900 hours in one year).

In the general turmoil of a busy skydiving programme it is easy to inadvertently overshoot these daily limitations and pilots must take care not to. Club SOPs should contain procedures for monitoring pilot flight times to ensure that the limits are not exceeded. The pilot will also be expected to keep the relevant drop zone organising staff appraised in advance of when a break will be required, so that other tasks (like refueling) can be organised around it. Remember, if average lift turnaround times are thirty minutes, then a break is going to be required immediately after 3 hours and 35 minutes of flying because it will be impossible to fly another lift without exceeding the limitations.

A pilot will not be popular, however, if they suddenly announce without warning that the jump programme must stop for thirty minutes. It is important, therefore, to anticipate breaks well in advance. At PTOs where two pilots are on hand to fly, none of this is a problem, but for the single duty pilot it often can be.

The same problems also apply to the eight-hour limit, of course, but here the problems can be compounded by the pressures on the pilot to keep things moving and not close the day's activities down. This can be a difficult situation for the pilot to cope with when persuasive influences encourage pilots to break the rules. Pilots must remember, however, that they are placing themselves and other people in danger when they continue to fly in a fatigued state, however capable they think they feel.

They must also remember that after the accident, it will be themselves personally who are called upon to explain why they broke the rules and not anyone else who simply persuaded them to.

The trick is to give plenty of advanced warning so that those who are responsible for organising the jump programme can plan their manifesting well in advance of a shutdown and also to resist pressure to break the rules.

With regard to breaks it is also wise to organise in advance how they will be taken. If a pilot is only to get a thirty minute break in eight hours of flying (as sometimes can be the case) they are better advised to use the time to eat a meal or sit and drink tea rather than refuel the aircraft.

14.3. Age of pilots

Despite the age limits imposed on CPLs, there is no age limit placed upon PPL holders provided they can pass the appropriate medical exam. Thus, pilots flying skydivers under PPL privileges (which is only allowable under (Part-NCO) can, theoretically, do so until a great age. Part-SPO operations may only use CPLs who would be limited to age 65.

There is overwhelming evidence that cognitive ability starts to deteriorate, on average, from the age of 55 and can be a rapidly accelerating process from the age of 65. The probability of sudden incapacitation due to illness also increases with age. This explains why the age restrictions are placed on CPLs and why accident rates among older PPLs appear to be higher.

Given that the PPL medical exam does not always detect these problems, it is up to CIs, Chief Pilots and, above all, pilots themselves, to recognise the fact that as they get older they may be losing their general ability to perform their flying tasks as well as they may have done in the past.

It is difficult to admit this decline in ability to oneself, particularly when it means giving up something you have enjoyed for many years and deliberately relinquishing a skill which has taken a long time to acquire. The moral, however, is quit before you have the incident that forces you to; that way there is no shadow over your retirement.

PAUL RIMMINGTON

SECTION 15: SAFETY IN THE AIRCRAFT

15.1. General

As well as flying the aircraft safely, there are a few points which the pilot needs to pay additional attention to with regard to the general protection of the skydivers on board.

15.2. Headgear

Skydivers are required by the BSOM to wear their protective headgear during the take-off phase of flight. They are permitted to remove it during the climb phase but must, obviously, wear it when they jump. There are exceptions for cameraflyers (BSOM section 10.1.6) and tandem students, but the rule applies in all other cases.

The jumpmaster should be responsible for ensuring that the rule is adhered to but the pilot should also encourage adherence to the rule if they see it being broken.

15.3. Restraints

Where restraints are required to be used, the jumpmaster should, again, enforce the rule. The pilot can also assist with this, however, and should require jumpers to use them if they observe that they have omitted to (See also section 3.9).

15.4. Crash brace positions

British Skydiving has issued advice to skydivers with regard to crash brace positions. These are detailed in British Skydiving Form 261 which is attached as Appendix D to this manual. Pilots should be familiar with this document. Each Club should display diagrams or instructions which relate to the crash brace positions to be used in any aircraft they are operating.

15.5. Pilot emergency parachutes

The question as to whether a jump pilot should wear a parachute or not is a matter of personal choice in the UK. In some countries it is compulsory for jump pilots to wear parachutes. In the UK common practice seems to indicate that some types of aircraft attract the wearing of parachutes more than others. The majority of jump pilots don't wear parachutes; probably because in many aircraft they are actually difficult to wear in conjunction with the type of pilot's seat available and also because most pilots don't wear them in civil flying generally and are quite used to the idea.

If a jump pilot does choose to wear a parachute, then the most important thing they can do is to learn how to use it. Given the environment in which they are flying, this should not be difficult. There will be plenty of expert advice and training ready to hand.

SECTION 16: CONTROLLED AIRSPACE

16.1. Pilot qualifications in controlled airspace

Notwithstanding the fact that the CAA permissions issued to British Skydiving Clubs permit PPLs (who are British Skydiving APs) to fly an Aerial Work task which would otherwise require a CPL, there are slightly different requirements when it comes to dropping skydivers in controlled airspace.

16.2. Skydiving at notified drop zones

Where skydiving flights penetrate class A airspace there is a requirement for the pilot to hold an Instrument Rating, as there is for all other types of flight in the same category of airspace. In the case of notified drop zones, however, it is not necessary for the pilot to hold an IR provided that they hold at least an IMC / IR(R) rating and that the skydiving flight arrangements are the subject of a letter of agreement between the drop zone operators and the relevant ATSU.

Pilots who fly at such drop zones will need anyway to be thoroughly familiar with (and abide by) the terms of such agreements in order to maintain the privileges they accord.

16.3. Display skydiving in controlled airspace

If a display drop is taking place from within class A airspace at a location which is only notified for the purpose of the display (i.e. other than at a notified drop zone) then the pilot will require an IR regardless of the type of licence they hold. This is because the temporary nature of display zones means that they are unlikely to be the subject of letters of agreement with ATSUs.

BRUNO

SECTION 17: WEATHER CONSIDERATIONS

17.1. Limitations

Skydiving is a very weather constrained operation. The detailed limitations are listed in Section 8 of the BSOM but, broadly speaking, skydiving is only be able to take place in a maximum ground wind speed of 20 knots and with a flight visibility of at least 5km. Thus normal skydiving weather conditions are not, on the face of it, likely to be very demanding of pilots.

This does not mean, however, that jump pilots will not encounter difficult weather conditions. Whatever weather conditions are forecast, skydiving is generally conducted on the suitability of actual weather conditions prevailing at the time within the drop zone. This means that pilots will often be faced with flying in acceptable conditions but with the expectation of deteriorating weather.

17.2. TAWS exemption requirements

At the present time turbine aircraft with a MCTOM of more than 5700 kg or a MOPSC of more than nine are required to be fitted with a TAWS. Below those limits turbine aircraft must also have TAWS if their MOPSC is between six and nine, regardless of the MCTOM.

Turbine aircraft below 5700 kg which are used solely for parachute dropping do not need to comply with the TAWS requirement however, provided they do not carry passengers (skydivers are defined as task specialists) and fly only in VFR conditions. If they do carry passengers, then they must comply with the TAWS requirements.

17.3. Weather judgement

When faced with an expectation of deteriorating weather the pilot and the skydiving drop zone control are faced with differing types of decision. The drop zone control is faced with deciding when conditions are safe to skydive and when they are not. This is not a decision which is the pilot's responsibility. They will, to a point, keep flying until someone tells them to stop.

What the pilot is responsible for, however, is judging whether the conditions are safe for the aircraft they are flying and the limitations of their skill, experience and licence. It is possible, for instance, for a pilot to be flying in safe skydiving conditions but with an imminent approaching snowstorm.

For the time being the skydivers may be happy with this situation if they feel they are going to be on the ground before it strikes. The pilot may not be in the same happy position.

Under these circumstances it is incumbent upon the pilot to make their own decision about whether or not they should continue flying. Their decision should be made solely with regard to the safety of the aircraft and anybody on board (including themselves). This decision most definitely overrides that of the skydivers who may wish to jump. The pilot must realise that whatever pressure is put on them by skydivers on board to continue, they may not have the experience or knowledge to make an informed decision. They must also remember that if the aircraft is involved in some difficult weather incident, it will be the pilot who carries any blame for it and not the skydivers.

PAUL GARWOOD

SECTION 18: SAFETY MANAGEMENT

18.1. General

As well as the practical issues dealt with in this manual it is important for pilots to be aware of the safety framework within which they perform the job of jump flying and as far as possible take a proactive role within that framework. If a pilot ever feels that particular safety issues are neglected, or need addressing in some way, then they must not hesitate to involve the CI and the PTO management and voice their concerns. In addition to the BSOM there are several other safety management vehicles which may involve pilots and place further responsibilities upon them. They are outlined briefly below.

18.2. Standard Operating Procedures

PTOs are required to have Standard Operating Procedures (SOPs). These are rules or procedures which are specific to each individual Club and are determined by local requirements. British Skydiving has published guidelines for producing SOPs. These are contained within British Skydiving Form 172 and are attached as Appendix F to this manual.

It must be noted that SOPs contain instructions to pilots which cover all local flying procedures and safety requirements, including fuelling and deconfliction procedures. They are, therefore, essential reading for any pilot who is new to a particular PTO.

18.3. Club Risk Assessments

PTOs are also expected to produce formal risk assessments to cover all aspects of their operation including flying. British Skydiving publishes Risk Assessment Guidelines as British Skydiving Form 244a. This is attached as Appendix G to this manual.

Pilots will need to be familiar with the risk assessments that apply to the PTO they fly for and the measures it takes to manage risks. Pilots will often be involved in reviewing risk assessments and should be prepared to initiate a risk assessment review if they feel that circumstances have arisen that warrant it.

18.4. Pilots' Voluntary Reporting Scheme

The British Skydiving also runs a Pilot Reporting Scheme which is similar to the CHIRP system sponsored by the CAA. This enables pilots to report incidents or occurrences to British Skydiving so that the lessons learned from them can be passed on to other PTOs and pilots. The system is designed to respect confidentiality and contributors' identities are not revealed if this is requested. The British Skydiving Pilot Voluntary Reporting form is published as British Skydiving Form 176 and is attached as Appendix H to this manual.

PAUL FLOYD

SECTION 19: FURTHER QUALIFICATIONS

19.1. What next

After the Approved Pilot Certificate there are two further pilot qualifications within the British Skydiving system of approval. These are the Chief Pilot and Pilot Examiner certificates. These are both qualifications which jump pilots may wish to aspire to once they have gained experience as Approved Pilots. These qualifications are important within the British Skydiving system and the posts that they represent are vital in maintaining good safety standards among the existing pool of Approved Pilots and in preserving the body of knowledge and expertise within jump flying and passing this on to new pilots as they enter the system.

19.2. Club Chief Pilot

The BSOM requires that every PTO Chief Instructor (CI) appoints a Chief Pilot who is responsible to them for the PTO's flying operations. The qualifications to become a Chief Pilot are listed in the BSOM. They are relatively simple and depend largely upon a degree of additional experience of dropping skydivers as well as a further written examination.

The BSOM does not, however, specify the duties of a Chief Pilot as it recognises that the responsibilities of the job will vary greatly depending upon the size and location of the particular PTO. There are, however, published guidelines which suggest the various areas of responsibility that a Chief Pilot might be called upon to fulfil. These are published as British Skydiving form 236 and are attached as Appendix E to this manual.

This list is very comprehensive but is not intended to necessarily represent the mandatory duties of every Chief Pilot. Each PTO will require their Chief Pilot to perform some of these tasks and it is usual for the nominated tasks to be included in the PTO's Standard SOPs and for the Chief Pilot to have signed that they accept responsibility for them. The acceptance of responsibility for certain tasks in this manner does then attach certain legal and mandatory obligations by virtue of the chain of requirements which extend back via the BSOM and into the Air Navigation Order. For this reason the job must be taken seriously.

19.3. Pilot Examiner

Pilot Examiners play the principal role in ensuring the continuity of the British Skydiving pilot qualification system. The requirements for becoming a Pilot Examiner are listed in the BSOM and include further skydiver dropping experience and the completion of a written exam.

The duties of a Pilot Examiner will extend to supervising and conducting the training and testing requirements for Approved Pilots as laid out in section 9 of the BSOM. It should be noted, with regard to the conduct of tests, that Pilot Examiners do not necessarily need to hold type or class ratings for the aircraft that they are conducting the tests on. The candidates they are testing are already properly licensed to fly the aircraft concerned and examiners are only, in effect, testing to ensure that the candidate handles the aircraft and conducts the skydiver dropping aspects of the flight to an acceptable standard.

When a Pilot Examiner is not familiar with the type of aircraft that they are conducting a test on, it is incumbent upon them to at least familiarise themself with the relevant aspects of its performance (critical speeds, flap settings etc.) and the correct configuration that is required when dropping actually takes place. Some Pilot Examiners who have qualified on small relatively simple aircraft, on which they may have vast experience, may nevertheless feel daunted at the prospect of examining on much larger, complex aircraft of which they have little knowledge or experience. When these circumstances present themselves it would be prudent for the Pilot Examiner to decline to conduct such a test unless they are able to access and familiarise themself with the necessary information.

Examiners must also realise that they carry a great responsibility when they clear a pilot as being proficient to conduct skydiver dropping flights. The fact remains that not all pilots can handle the demands of flying skydivers and examiners must not hesitate to reject those pilots that they feel are not up to the job. To pass someone out because of a misplaced kindness aimed at sparing them expense or disappointment, or simply to avoid being unpopular, is a grave weakness and anyone who feels that are likely to be overridden by these feelings should not advance themselves towards this position.

SECTION 20: GLOSSARY OF TERMS

AAD: This stands for Automatic Activation Device. It is a device that is now worn by most skydivers and is intended to activate the reserve parachute in circumstances where the skydiver has failed or has been unable to activate it themself. It is usually triggered by sensing when the rate of descent is too fast at a low height.

AFF: Accelerated Free Fall. This is a method of training and progression for student skydivers which enables them to free fall from high altitude on their first jump. Early jumps are performed with two instructors helping to stabilise the fall and ensure that the free fall phase is performed safely. It is seen as a way of enabling student skydivers to quickly progress their skills and experience.

Canopy Formation: Is a particular aspect of skydiving/parachuting which involves manoeuvring parachute canopies so that they join together to make linked formations. In its competitive format the speed with which formations are achieved is the determining factor.

Drop Zone: Free Fall Drop Zone; often referred to as the DZ. This is the airspace above a parachute landing area (PLA – see below). It is designated on 1:500,000 charts as a 1.5nm radius circle with a parachute symbol contained within it. There is no designated upper limit though skydiving is not permitted to take place above 15,000 feet AGL unless special arrangements have been made via the CAA. It is a requirement that all skydiving takes place within a designated drop zone. This requirement does not, however, prevent a skydiving aircraft from flying outside of the zone whilst gaining altitude for the drop. The establishment of a drop zone does not confer any rights of exclusivity to a pilot or drop zone operator. Other aircraft therefore have the right to fly into a drop zone, though this may not always be very wise.

The term DZ has also historically been used to refer to the parachute landing area and general ground facilities for skydiving. A parachute training organisation will often be referred to as a DZ, though this is not a strictly accurate use of the term.

Exit Point: The point above the ground which has been calculated as the optimum location for skydivers to exit the aircraft and achieve a landing on their target. It will take account of wind speed and direction, free fall time, free fall drift, and where necessary, the effects of throw-forward.

Hang Up: An emergency situation where a skydiver is unintentionally suspended outside an aircraft, but still attached to it.

Jumpmaster: A skydiver who is qualified to take charge of skydivers on board an aircraft and who is responsible for the safe exit of skydivers from the aircraft. They are normally the most experienced skydiver on board and where student skydivers are on board they will always be a qualified skydiving instructor.

Opening Point: The point above the ground which has been calculated as the optimum point at which a skydiver should deploy their canopy in order to achieve a landing on their target. It will take account of wind speed and direction, opening height and parachute canopy performance.

PLA: Parachute Landing Area. This is an area of ground that has been specifically designated for skydivers to land on. PLA dimensions are subject to regulations (see BSOM).

Run In: Sometimes referred to as the 'jump run'. This is the final phase of a skydiving flight prior to actually dropping. It is the point at which the pilot has assumed the required heading towards the exit point and has achieved, or is just about to achieve, the height and airspeed that will be required at exit.

Spotting: This is the process of calculating the exit point and guiding the aircraft towards it and then giving the exit command at the correct point. The task is normally performed by the jumpmaster.

Tandem Jumping: Tandem jumping is the process of utilising one large parachute to carry two people. It is very popular as a means of performing a first jump. The parachute is worn and controlled by a Tandem Instructor. The student wears their own harness which is then attached to the instructor's harness so that they both face the same direction with the instructor behind the student.

Wind Drift Indicator: WDI – Wind Drift Indicator often referred to as a 'widdy'. This is a brightly coloured strip of paper (crepe paper is usually favoured) which is weighted at one end in order that it descends at approx. 1000 feet per minute which is the average descent rate of most sport parachutes. It is thrown from an aircraft and its descent observed in order to assess wind drift.

Wind Line: Is an imaginary line which represents the mean wind direction from the opening point to the skydivers' target.

SECTION 21: LIST OF APPENDICES

A British Skydiving OPERATIONS MANUAL – SECTION 9 (FLYING)

B British Skydiving FORM 246 - AIRCRAFT DOCUMENT CHECKLIST

C British Skydiving FORM 193 - ATSU NOTIFICATION MONITORING SHEET

D British Skydiving FORM 261 - AIRCRAFT CRASH LANDING PROCEDURES

E British Skydiving FORM 236 - SUGGESTED GUIDELINES FOR THE RESPONSIBILITIES OF A CLUB CHIEF PILOT

F British Skydiving FORM 172 - GUIDELINES FOR PRODUCING STANDARD OPERATING PROCEDURES (SOPs)

G British Skydiving FORM 244a - CLUB RISK ASSESSMENT GUIDELINES

H British Skydiving FORM 176 - PILOTS VOLUNTARY REPORTING

APPENDIX A

SECTION 9

FLYING

1. PILOTS

1.1. Pilot Qualifications.

A pilot shall not act as pilot in command of an aircraft for a flight during which skydivers are to be dropped unless they meet the following minimum requirements:

1.1.1. **Licence.** They hold a valid pilot's licence for the type or class of aircraft to be flown, including any differences training appropriate to the type (**N.B.1, below*) and any ratings necessary for the type of flight to be undertaken, i.e. IR, Night, IMC; RT licence. The minimum standard of acceptable licence is a UK or EU PPL or equivalent third country licence used in an approved manner for skydiving operations.

1.1.2. **Experience.** They have at least 100 hours as Pilot in Command (PIC) of aeroplanes if aeroplanes are to be flown by the applicant, or 100 hours as PIC of helicopters if helicopters are to be flown, (except in the case of British Skydiving 'C' Licence skydivers where the requirement is 75 hours PIC in each case). In addition, they must have at least 5 hours on type (**N.B.1, below*).

1.1.3. In the course of training any hours flown as P1 under supervision of a Chief Pilot (CP) or Pilot Examiner (see 1.1.5. (a) below) may be counted towards the five hours on type (**N.B.1, below*).

1.1.4. **Training.**

a. Has flown at least four lifts accompanied and supervised by a British Skydiving Pilot Examiner (PE) or Chief Pilot (CP) as PIC (under supervision) on the type (**N.B.1, below*) of aircraft to be used. The lifts are to be live drops of one or more Licenced Skydivers under the supervision of at least a Category System Instructor or Team Leader.

b. CPs must hold a British Skydiving Pilot Authorisation on the type (**N.B.1, below*) of aircraft being used.

c. In the case of service pilots or commercial pilots (operating under the terms of an AOC) flying in the course of their service duty or commercial duty, the training requirement of 'a' above may be supplanted by the training requirements specified in their military role training or by the training requirements specified in the AOC.

d. They have received at least one hour of ground instruction on skydiving dropping techniques, standard procedures and emergency procedures given by at least a British Skydiving Advanced Instructor or British Skydiving Pilot Examiner and has studied the British Skydiving Pilot's Manual and relevant sections of the British Skydiving Operations Manual.

e. In the case of service pilots or commercial pilots (operating under the terms of an AOC) flying in the course of their service duty or commercial duty, this briefing may be given by a British Skydiving CSI or Team Leader.

1.1.5. **Tests.**

a. Has flown a flight test conducted by a British Skydiving Pilot Examiner as PIC on the type (**N.B.1, below*) of aircraft to be used. The test will be conducted according to the Flight Test Proforma (Form 108C) and will be a live drop of one or more Licenced Skydivers under the supervision of at least a Category System Instructor or Team Leader. Any flight test on multi engine aircraft may only be conducted by a CP or PE who holds a current multi engine rating.

or

In the case of aircraft whose seating capacity or configuration only permits the use of one pilot's seat for skydiving to be safely conducted, have flown at least three flights with a British Skydiving Pilot Examiner and performed at least two lifts involving a live drop with a Category System Instructor or Team Leader and under the ground supervision of a British Skydiving Pilot Examiner.

b. Have successfully completed a written examination (Form108D) administered by a CP or Pilot Examiner.

c. The recommendation of a Chief Instructor and a British Skydiving Pilot Examiner (to be signed on a British Skydiving Pilot Application Form).

*N.B.(1) * Type in 1.1.1, 1.1.2, 1.1.3. & 1.1.5(a) above, means a type where a type rating is appropriate, or else a type within a class.*

N.B.(2) The five hours on type and two lifts requirement at 1.1.2. and 1.1.5 (above) apply only to the initial application. Subsequent types are applied for on Form 108F.

1.1.6. Documentation. Having satisfied all the above requirements, Forms 108A (Initial Application), 108C (Flight Test Proforma), and 108D (Written Examination) are to be completed and sent with the appropriate fee to the British Skydiving HQ who will then issue an Authorised Pilot Certificate. This certificate will be valid for a maximum of 1 year and will be renewable on the 31st March each year. (British Skydiving Authorised Pilot Renewal Form 108G).

1.1.7. Proficiency checks. All Pilots must complete a proficiency check at least every twelve months. This must be conducted by a CP or PE and signed off on Form 108E. This form is to be retained in a Pilot's personal file, which is to be kept and maintained by the CP.

1.1.8. A British Skydiving Authorised Pilot may conduct proficiency checks on CPs and Pilot Examiners.

1.1.9. Any proficiency checks on multi engine aircraft may only be conducted by APs, CPs or PEs who hold a current multi engine rating.

1.1.10. Recency.

a. A pilot shall not act as PIC of an aircraft carrying passengers, including skydivers, unless within the preceding 90 days they have made three take offs and three landings as the sole manipulator of the controls in an aircraft of the same type or class.

b. A pilot who has not flown skydivers for a period exceeding six months must undergo a proficiency check.

1.1.11. **Renewal.** In order to renew a Pilot Authorisation the applicant must have had a proficiency check (Form 108E) within the previous twelve months. The application for renewal must be signed by a Chief Instructor (CI) who must be satisfied that the applicant is current with Skydiving dropping techniques, emergency procedures and relevant British Skydiving Operations Manual requirements. If a renewal is not effected within two years of expiry, then a pilot must fulfil all the initial requirements.

1.1.12. Paragraphs 1.1.5 - 1.1.10 above, do not apply to service pilots, or commercial pilots (operating under the terms of an AOC) who in the course of their service duty or commercial duty fly parachuting lifts. Those pilots will be deemed as British Skydiving Authorised Pilots for the duration of the flight provided the skydivers on board are British Skydiving members.

1.1.13. **Additional Types.** British Skydiving Authorised Pilots may add additional types of aircraft to their British Skydiving Pilot Authorisation. This will require conformity with the licence requirements at 1.1.1. (above) and completion of a Proficiency Check (on the type of aircraft applied for) with a Pilot Examiner. Upon satisfactory completion of a proficiency check Form 108F must be signed and returned to the British Skydiving HQ who will then issue an additional authorisation.

1.2. Balloon Pilots.

A balloon pilot shall not act as PIC of a Balloon for a flight during which skydivers are to be dropped unless they meet the following minimum requirements:

1.2.1. **Licence.** They hold a valid Pilot's Licence for the balloon to be flown on the intended flight.

1.2.2. **Experience.** They have at least 60 hours PIC of Balloons.

1.2.3. **Training.** They have received ground instruction on skydiving dropping techniques and procedures given by at least a Category System Instructor or Team Leader who has made a minimum of one skydive from a balloon or by a Balloon Pilot who has already dropped two or more skydivers. This must include the procedures to be followed in the event of emergencies. They must also have read the British Skydiving guidelines for skydiving from Hot Air Balloons (Form 109B).

1.2.4. **Recency.** For any skydiving dropping flight, logbook evidence is required of flight within the 90 days preceding the date of the intended flight, as PIC of the Class of balloon to be used. For the privileges of a professional licence to be exercised on a skydiver dropping flight, a Certificate of Test is also required – valid for 13 months.

1.2.5. **Documentation.** Having satisfied 1.2.1 - 1.2.4 above, Form 109A is to be completed and sent to the British Skydiving HQ who will then issue an Authorisation to Drop Skydives Certificate. This certificate will be valid for a maximum of one year and will be renewable on the 31st March each year (Form 109A).

1.2.6. **Renewal.** The renewal procedure is the same as the initial application and is made on the same form. (Form 109A).

1.2.7. The minimum qualification for a skydiver to jump from a balloon is British Skydiving 'B' Licence.

1.3. Chief Pilot (CP).

1.1.1 CIs will appoint a Chief Pilot who will be responsible to them for the PTO's flying operations. The name of the CP should be notified to British Skydiving in writing at least seven days in advance of the appointment (Form 108H – British Skydiving Chief Pilot Application).

1.1.2 To become a British Skydiving Chief Pilot (CP) the applicant must meet the following minimum requirements:

a. Be a current British Skydiving Authorised Pilot.

b. Have a recommendation of a CI and a Pilot Examiner (Form 108H).

c. Have been a British Skydiving Authorised Pilot for at least 1 year.

d. Have a minimum of 100 hours' skydiver flying.

e. Have successfully completed CP written examination, administered by an STO or the HoSTC.

N.B.(3) Suggested guidelines for the responsibilities of a CP can be found on Form 236.

1.4. Pilot Examiner (PE).

To become a British Skydiving Pilot Examiner the applicant must meet the following minimum requirements:

1.4.1. Be a current British Skydiving Authorised Pilot.

1.1.1. Have the recommendation of a CI and a Pilot Examiner.

1.1.2. Have been a British Skydiving Authorised Pilot for at least 1 year.

1.1.3. Have 500 hours' skydiver flying, or, 250 hours' skydiver flying and a CSI rating.

1.1.4. Have an IR or IMC rating.

1.1.5. Have successfully completed the Pilot Examiner written examination, administered by an STO or the HoSTC.

1.1.6. **Documents.** Having satisfied 1.4.1. -1.4.6. above, Form 108J is to be completed and sent to the British Skydiving HQ who will then issue the applicant with a British Skydiving Pilot Examiner Certificate. This certificate will be valid for up to 12 months and will be renewable at the same time as the Pilot Authorisation to Drop Skydivers is renewed.

N.B.(4) British Skydiving Pilot's Manuals are obtainable from the British Skydiving HQ.

2. AIRCRAFT

2.1. Weight

2.1.1. Other than in accordance with the additional requirements listed in 3.2. below, the Maximum Total Weight Authorised (MTWA) of aircraft used for skydiver dropping shall not exceed 5,700 kg.

2.1.2. Aircraft with MTWA in excess of 5,700 kg may be used subject to the following conditions:

a. The aircraft is flown only by pilots holding valid professional pilots' licences, which include a valid Type Rating for that aircraft.

b. The aircraft is operated for skydiving from a Licensed or Government Aerodrome or an EASA certificated aerodrome.

3. AIRCRAFT CLEARANCE AND DOCUMENTATION

An aircraft shall not be used for the purpose of dropping persons unless the Certificate of Airworthiness issued or rendered valid in respect of the aircraft under the law of the country in which the aircraft is registered includes an express provision that it may be used for that purpose and the aircraft is operated in accordance with a written Permission granted by the CAA.

3.1. British and EU Registered Aircraft

Aircraft must have a valid Certificate of Airworthiness (C of A) in the category appropriate to the type of operation and must be appropriately approved for the purpose of skydiver dropping. Any aircraft modifications required for skydiver dropping, for example the installation of skydiver restraints (if necessary) or static line modifications, must be appropriately approved. Any structural or performance limitations applicable to skydiving operations must be stated in the aircraft Flight Manual or in an approved supplement, which must be included in the Flight Manual for that particular aircraft. The aircraft must be operated in accordance with the aircraft Flight Manual and applicable Flight Manual Supplements.

3.2 Foreign Registered Aircraft

An operating permit must be obtained from the CAA before a foreign registered aircraft (other than an EU registered aircraft) is used for any aerial work. The aircraft must have a valid C of A from the country of registration in the category appropriate to the type of operation and must be operated in accordance with the aircraft Flight Manual with respect to flight with the door removed or for skydiving operations.

Application for use of foreign registered aircraft should be made to:

Operations & Authorisations
Civil Aviation Authority
Aviation House
Gatwick Airport South
RH6 0YR

3.3. Pilots qualifications to fly foreign registered aircraft

3.3.1. Pilots wishing to fly foreign registered aircraft in the skydiver-dropping role must comply with current EASA FCL requirements and should have had some form of formally certified training carried out, either in the country of registration or in the UK, by a type rating examiner or equivalent, which culminates in a type rating, or similar qualification, which applies specifically to the type of aircraft being flown. Evidence of this training must be contained in the pilot's folder at any PTO where he or she acts as pilot in command of a skydiver-dropping aircraft. British Skydiving will be the final arbiters of the suitability of the qualification.

3.3.2. The pilot of a foreign registered aircraft who is not qualified and experienced in skydiver dropping will, in addition, be required to complete the training programme outlined in 1.1.3. (above) and the tests outlined in 1.1.4 (above).

3.3.3. The pilot of a foreign registered aircraft who is qualified and experienced in skydiver dropping in the country of registration will, in addition, have to complete a test in accordance with 1.1.4 above.

3.3.4. Where the requirements of a state of registration differ or are in conflict with the regulatory requirements of British Skydiving the more stringent shall apply.

3.4. Documents

The following aircraft documents must be available to the pilot and Chief Instructor/Team Leader before a flight for the purpose of skydiver dropping is made:

1.1.1. The approved flight manual/owner's manual/pilot's operating handbook and MELs as applicable to the aircraft.

3.4.2. The Certificate of Airworthiness.

3.4.3. A Weight and Centre of Gravity schedule.

3.4.4. Documents recording the maintenance and serviceability of the aircraft (see 5.1.-5.3. below).

3.4.5. The British Skydiving Operations Manual, and any local SOPs.

3.4.6. Any Permissions issued by the CAA relevant to the intended flight.

3.4.7. Pilots must also comply with the documentary requirements of NCO, GEN,135 or SPO, GEN,140 as appropriate.

4. AIRCRAFT MAINTENANCE

Aircraft owned or operated by British Skydiving PTOs or Display Teams in the skydiving role will be maintained in accordance with the current requirements of EASA or the state of registration. Where there is any regulatory conflict over such requirements then the more stringent will apply.

5. FLYING OPERATIONS.

5.1 Authorisation of Flights.

All flights made for the purpose of skydiver dropping are to be authorised in writing. A list of those entitled to authorise flights for this purpose is to be maintained by the CI/ Team Leader. A person thus entitled must be satisfied before authorising such flights that:

5.1.1. The aircraft to be used has a valid Certificate of Maintenance Review or Certificate of Release to Service, or there is evidence in the aircraft logbook or Technical Log that the requirements of the maintenance schedule have been met and are current.

5.1.2 That all task specialists concerned with, or taking part in any flight, have been briefed in accordance with all applicable requirements of the British Skydiving Operations Manual and the EASA Air Operations Regulations and that the pilot is assured that such requirements have been met.

5.1.3. The pilot of the aircraft is appropriately qualified for the intended flight.

1.2. Pilot's Fuel Log/Flight Log

1.2.1. The pilot must have available to them in the aircraft, a record of fuel and oil uplifts made, and the quantity of fuel on board prior to each flight or series of flights, to enable remaining endurance and fuel reserves to be readily calculated.

1.1.2. The following pre and post flight details for each flight must be recorded. All records must be preserved for at least 2 years from the date of the last entry, or longer if required by the ANO. The record must include at least:

a. **Pre-Flight.** The date, the aircraft registration, the destination or dropping zone, quantity of fuel on board, and signature or initials of the pilot in command certifying that they have accepted the conditions under which the flight shall be made.

b. **Post-Flight.** Take-off and landing times of each flight, the number of landings and the signature or initials of the pilot in command certifying the serviceability of the aircraft.

5.3. Aircraft Limitations.

Weight and balance limitations are to be observed throughout all phases of flight. Pilots are required to advise CIs/Team Leaders of any performance or structural limitations of the aircraft they are commanding, that may affect safety during flight and in particular during exit. CI/Team Leaders must ensure that skydivers are aware of such limitations.

5.4. Flight Crew Oxygen Requirements

5.4.1. Supplemental oxygen must be used by the pilot-in-command whenever the cabin altitude exceeds FL 100 for a period of 30 minutes and whenever the cabin altitude exceeds FL 130.

5.4.2. Oxygen requirements for skydivers are detailed in Section 8 (Skydiving Limitations), Paras 5.1 – 5.3.

5.5. Carriage of Task Specialists

Aircraft engaged in skydiving operations under part SPO may only carry task specialists who will be acting in one of the following categories:

1.1.1. Skydivers who are equipped for and intend to make a skydiving descent from the aircraft.

1.1.2. Suitably qualified persons who are engaged in training or checking pilots or task specialists.

1.1.3. Persons (such as television camerapersons) who are carried as task specialists designated in the PTOs operations manual.

5.6 Carriage of Passengers

5.6.1. No passengers shall be carried on a flight conducted for the purpose of skydiving except skydivers who are equipped for and intending to make a descent by parachute during the flight or task specialists.

5.6.2. Task specialists can only be carried for a specific task connected with the skydiving operation and the task specialist duties must be defined within the organisation's SOPs.

5.7. Pilot Fatigue.

A pilot who is engaged in skydiving operations should not fly more than four hours without a thirty-minute break away from the aircraft and should not fly more than eight hours in any one day. Air Operators Certificate (AOC) holders should continue to apply the flight duty and rest period limitations associated with their AOC operation. In addition, the flight time limitations prescribed in the ANO are applicable - 100 hours in any 28-day period and 900 hours in any one year.

5.8. Aeronautical Information.

Up to date aeronautical information relevant to the intended flight or flights is published in the UK AIP, (Air Pilot), NOTAMs and AICs. These documents must be accessible to the pilot either as hard copy or online.

5.9. Air Traffic Control Clearance.

Where it is intended to make flights for the purpose of dropping skydivers in notified areas of controlled airspace, the notification procedures published in the UK AIP for 'Non-Standard Flights' must be complied with. For skydiving operations in aerodrome traffic zones, the prior permission of the person having management of the aerodrome or of the appropriate ATC unit must be obtained.

5.10. Transponder

In the United Kingdom, unless a discrete code has already been assigned by ATSU controlling or advising the flight, pilots of transponder equipped aircraft should squawk 0033 with Mode C throughout the flight.

1.11. ATSU Notification

All operators are required to notify the start and finish of skydiving operations to appropriate Air Traffic Service Units (ATSUs) as listed in the UK AIP (Air Pilot) ENR section 5.5. Attention is drawn to the need to notify Area Control Centres (ACCs) outside the operating hours of some ATSUs. Operators are required to ensure that their SOPs specify the person responsible within their organisation for ensuring that this notification procedure is followed. It is recommended that all operators should maintain a record of the times when the drop zone has been notified as active or inactive.

N.B.(5) The record of times may be kept on Form 193, which also gives detailed information on the notification procedure.

5.12. Crash Rescue Procedures and Equipment.

5.12.1. CIs are to specify crash rescue procedures appropriate to their operation. A notice should be displayed at the DZ control position (and/or other suitable location), giving instructions for summoning the local Police, Fire, Ambulance (and Coastguard, if applicable) services in the event of emergencies.

1.1.2. Firefighting, release and rescue equipment should be available whilst skydiving is taking place, to a scale appropriate to the aircraft types to be used and not less than the following:

A vehicle carrying;

a. A foam extinguisher of appropriate size.

b. One axe.

c. One bolt cropper-61cm.

d. One crowbar-1m

e. One fire resistant blanket.

f. Two pairs of fire-resistant gloves.

g. One medical first aid pack.

h. Two blankets.

1.1.3. Holding of the above equipment at a forward site at which a Display Team may enplane is not mandatory. It should nevertheless be provided at such sites whenever it is practicable to do so.

N.B.(6) For aircraft operations at a location other than a licensed or Government aerodrome further guidance is to be found in CAA CAP 793 "Safety Operating Practices at Unlicensed Aerodromes".

5.13. Flying Accidents.

Any flying accidents or incidents which have, or could have, caused substantial damage to an aircraft, or fatal/serious injury to any person while upon, or by direct contact with, an aircraft during any stage of flight must be reported by the quickest available means to the British Skydiving and:

Air Accident Investigation Branch
Department for Transport
Berkshire Copse Road
Aldershot, Hampshire. GU11 2HH
Tel..01252 512299 (24 Hours)

N.B.(7) Attention is also drawn to EU regulation No 376/2014 and its associated guidance material regarding occurrence reporting.

APPENDIX B

AIRCRAFT DOCUMENT CHECKLIST

(for UK registered aircraft used in the parachute role)

The following checklist has been produced by British Skydiving as an aid to assist PTOs in the correct identification of aircraft documentation required to operate a British registered aircraft in the skydiving role at UK mainland PTOs. All or some of these documents may be required depending on the type of aircraft, the operating category and the aircraft weight.

1.	**Certificate of Registration**	☐
2.	**Certificate of Airworthiness**	☐
3.	**Noise Certificate**	☐
4.	**Aircraft Radio Licence**	☐
5.	**Weight & Centre of Gravity Schedule**	☐
6.	**Pilots Operating Handbook – Flight Manual**	☐
7.	**Parachuting Supplement to Flight Manual**	☐
8.	**Aircraft Insurance Certificate**	☐
9.	**Certificate of Maintenance Review (CMR)**	☐
10.	**Certificate of Release to Service (CRS)**	☐
11.	**Aircraft Checklist**	☐
12.	**Minimum Equipment Lists**	☐
13.	**Deferred Defects Records**	☐
14.	**Daily Flight Log or Technical Log**	☐
15.	**Fuel Sampling Records**	☐
16.	**ATSU Notification Record (Form 193)**	☐
17.	**Form 144 A, B or C (if applicable)**	☐
18.	**Flight Authorisation Document**	☐
19.	**NOTAM Information**	☐
20.	**Aeronautical Chart (1:500,000)**	☐

Form 246 (i) Issue 3, **Dec 2019**

APPENDIX C

ATSU NOTIFICATION MONITORING SHEET Drop Zone:

		A		B		C
DATE	ATSU	START TIMES NOTIFIED		CEASE TIMES NOTIFIED		REMARKS

DROP ZONE INFRINGEMENTS DURING OPERATIONAL HOURS				
DATE	TIME	A/C REG	TYPE	REMARKS

NOTES:

1. Columns A&B have spaces for up to four time slots. If more are needed (unlikely) then move onto the next line down.
2. Use column C to record any problems or delays of more than 5 minutes in contacting ATSUs.
3. In the infringements section record aircraft registration and type if possible. Otherwise indicate if civil of military and whether a single, twin, glider or other type. It would be wise to record as much other detail of the incident as possible, and then attach this on a separate sheet if necessary.

Form 193 (i) Issue 4, **Dec 2019**

PROCEDURES FOR NOTIFICATION OF SKYDIVING OPERATIONS TO AIR TRAFFIC SERVICE UNITS

1 **Telephone the appropriate ATSU at least 20 minutes prior to the first drop to inform them that your drop zone is active.**

Notification is necessary 20 minutes prior to the first drop and not necessarily prior to the first take off. If there is prolonged difficulty in contacting an ATSU on the telephone, then the notification can be made on the appropriate radio frequency.

2 **Give them the time at which operations will cease if you already know this.**

3 **If your cease time is not known, then confirm that you will notify them when you do know and whether you will do this by telephone or radio.**

Please avoid giving blanket times (e.g. dawn till dusk) if the reality is likely to be substantially different.

4 **Notify the ATSU if you are likely to have a significant break in operations.**

It is not intended that you notify ATSUs of short spells between lifts. It is, however, vital once you have notified a break that you remember to notify the ATSU when you restart operations.

5 **Notify the ATSU whenever you recommence operations.**

6 **Notify the ATSU when you finally cease operations for the day.**

If this is done by radio then please record the fact on the monitoring sheet, (side i of this form).

7 **Record the daily notification times on the monitoring sheet and whether there was any delay of more than five minutes in contacting an ATSU.**

Please remember that the purpose of this system is to enable airspace to be used efficiently and safely for the benefit of as many users as possible. It enables Drop Zones to have infringements by other air traffic minimised during skydiving operations, but it is also intended to enable other airspace users to have as much access as possible at times when skydiving is not taking place. A skydiving Drop Zone is not the exclusive domain of its Parachute Training Organisation (PTO). Other users have the right to use the airspace when skydiving is not taking place. Please use the system conscientiously and make sure that you keep records on the monitoring sheet to prove that you do.

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Form 193 (ii) **Issue 4, Dec 2019**

APPENDIX D

AIRCRAFT CRASH LANDING PROCEDURES

When faced with an aircraft emergency landing or possible crash (in situations where it has not been possible to exit the aircraft at a safe altitude) it will be necessary quickly to ensure that cabin occupants are braced for a crash landing. All skydivers (and any other passengers) should be briefed on the emergency crash procedures and brace positions relevant to their seating or kneeling position in the aircraft. Instructors should also ensure that the emergency crash procedures and brace positions are taught to Student Skydivers as part of their initial training. These procedures should also be published in Parachute Training Organisation (PTO) rules and Standard Operating Procedures (SOPs).

The following procedures should be adopted whenever possible in crash situations.

1. The pilot is in command of the aircraft and his/her instructions should be carefully followed.

2. If restraints are available and not already being used, they should immediately be attached and tightened as much as possible.

3. Helmets should be put back on if they have been removed subsequent to the aircraft take off.

4. Skydivers who are floor seated and facing forwards should kneel facing the direction of travel, cup the top of their head in their hands, bring their elbows together and lower their head and arms as far as possible to the floor.

5. Skydivers who are floor seated and facing rearwards should lean backwards towards the direction of travel. They should then cross their arms in front of their face and hold tightly with each hand onto the opposite shoulder. They should also endeavour to bend their legs at the knees and place the soles of their feet flat on the floor.

6. Skydivers who are seated facing sideways should try to push their torso and head back into seat, support their head with their arms, if possible, hold onto the seatback or any structure behind head. It also helps if all occupants in the row try to support each other. i.e. all bunch up together leaving no gaps between each other.

7. Skydivers who are unrestrained and seated on benches or elevated sections of cabin floors (e.g. occupants seated on the rear baggage platforms in Islander aircraft) should endeavour to get onto the main cabin floor and achieve a rearward or forward facing brace position as detailed above. What is achievable will depend very much upon the circumstances of the flight and the loading. It is important, however, that occupants in these elevated positions do their best to ensure that they do not remain in a position where an impact will allow their bodies to be propelled from a distance into other parachutists who are seated facing them.

8. Tandem pairs should be disconnected (but only when a crash landing is inevitable).

9. When the aircraft has come to rest the cabin should be vacated as quickly as possible and all occupants advised to get well clear of the aircraft vicinity.

10. It is the duty of the jumpmaster to ensure that these directions are followed.

It is recognised that alternative procedures may prove to be more suitable in some circumstances, when the above procedures may not be practicable. If this is felt by some operators or instructors to be the case, then they should ensure that guidance notes are included within PTO SOPs and PTO rules, which clearly outline the circumstances in which alternative procedures are to be adopted and what those procedures are.

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Form 261, **Issue 3, Dec 2019**

APPENDIX E

SUGGESTED GUIDELINES FOR THE RESPONSIBILITIES OF A CLUB CHIEF PILOT

In order to comply with the British Skydiving Operations Manual Section 9, Paragraph 1.3 CI's must appoint a Chief Pilot responsible to him/her for the PTO's flying operation. This may be carried out in accordance with Section 4, Paragraph 11.2 i.e. 'The CI may delegate responsibilities to qualified subordinates; this may be by the subordinate signing a form to accept responsibility for a specific area or duty. The CI is to ensure that person accepting responsibility is aware what the responsibility entails.

The role of a CP may vary greatly from Parachute Training Organisation (PTO) to another depending on the size of the operation and the number and type of aircraft used. The flying section of a PTO who operate a single engine UK registered aircraft, such as a Cessna 182, should be relatively simple to manage efficiently, compare this to a large PTO with multi engine turbine aircraft on a foreign register operating in controlled airspace and a completely different set of circumstances emerge. However, the same basic rules apply and a systematic approach with an understanding of the requirements together with a close working relationship between the CI and CP should lead to the successful management of the flying section for the good of all.

In order to help identify the role of CP, listed below are some suggested areas of responsibility:

1. To liaise on a regular basis with the CI and manage the flying section of the operation.
2. To ensure the flying section of the PTO is carried out within the Terms and Conditions laid down in the British Skydiving Operations Manual and the PTO SOPs.
3. To ensure all aircraft operated by the PTO are operated in compliance with the Flight Manual and any supplements issued by the CAA or any other governing body.
4. To set in place a system for ensuring that the proper maintenance management is carried out in accordance to the agreed schedules.
5. To maintain a record of all documentation relating to maintenance and serviceability in accordance with British Skydiving Operation Manual Section 9, Paragraphs 4 and 5.3.
6. To maintain a list of the regular pilots together with their currency and qualification.
7. To ensure all pilots are familiar with SOPs updates.
8. To brief all pilots and instructors on aircraft used by the centre, specifically on loading, run-in speeds, emplaning and any other special requirements such as the use of restraints, in-air communication between jumpmasters and pilots and aircraft emergencies.
9. To maintain a system for checking pilots flying hours and breaks.
10. To set in place a system of ensuring that flights in controlled airspace are carried out only by pilots qualified to do so, i.e. when the PTO operates within an airway or during Skydiving displays away from base.
11. To set in place a system for the notification of the ATSU on start/stop and stand-down times including the recording of such on Form 193.
12. To maintain aircraft and ground station radio licence requirements.
13. To ensure all aircraft are kept adequately equipped with required items such as checklist, first aid kit, fire extinguisher, and a suitable knife and keep regular checks on aircraft suitability for use ensuring sharp edges are covered over or taped up, clean and free of any loose objects.

14. To maintain a proper system of fuel management including sampling and recording of all checks in accordance with CAA Safety Sense Leaflet: Fuel Handling & Storage, including a list of persons responsible for fuel checks on a daily basis.

15. To liaise between CI, pilots, jumpmaster and DZ control ensuring a proper understanding of the non-confliction procedures exists both on the ground an in air.

16. To manage the procedures for obtaining meteorological information.

17. Ensure pilots have access to CAP 393, Notams, AIC's and any other paperwork they require to carry out their flight in conformity.

18. Maintain supplies required such as engine oil, blank daily flight sheets, spare bulbs etc. etc.

19. Oversee fuel pump installations, ensuring mandatory requirements are met.

20. Continually assess pilot's performance and coaching pilots positively where required.

21. Promote a healthy and friendly atmosphere between pilots and skydivers.

22. Be responsible for the checking out and briefing of new pilots and for maintaining a file on each pilot, containing all relevant information relating to that pilot.

23. To check that any hired aircraft visiting the PTO for the purpose of skydiving have been properly maintained and will be operated legally in accordance with the BSOM. Typically, this should involve a check that the aircraft is cleared for skydiving, and operated in accordance with the aircraft Flight Manual and applicable Flight Manual Supplements and that the pilot is properly licenced. In the case of foreign registered aircraft operating under Part SPO, it must be ascertained that an appropriate CAA permit has been issued in accordance with article 250 of the ANO.

24. To ensure that the responsibilities regarding hired aircraft are allocated to an appropriately qualified individual who understands and accepts their role liaising with the CI regarding any performance or structural limitations that may apply.

25. To ensure that all aircraft are flown in accordance with Article 68 & 69 of the ANO which defines the responsibility of an aircraft commander.

26. To encourage PTO pilots to attend a CAA Safety Evening every 3 years.

The following publications should be of assistance to the Club Chief Pilot:

British Skydiving Operations Manual
British Skydiving Jump Pilots Manual
Club SOPs
CAA CAP 393
CAA CAP 793
Safety Sense Leaflet: Fuel Handing & Storage.

APPENDIX F

GUIDELINES FOR PRODUCING STANDARD OPERATING PROCEDURES (SOPs)

British Skydiving Parachute Training Organisations (PTOs) should produce Standard Operating Procedures (S.O.Ps). Areas to be considered are listed below, they are not exhaustive, as there may be other aspects particular to a specific PTO.

SOPs should be designed to achieve the safe and smooth running of a parachuting operation. They should include procedures for the prevention of confliction with other activities, both in the air and on the ground at or near the dropping zone and parachute landing area.

In the case of PTO based at an aerodrome, the procedures must be compatible with the operational instructions applicable to that aerodrome (at a licensed aerodrome, the Aerodrome Manual and the Manual of Air Traffic Services (MATS) Part 2).

It may be necessary in SOPs to duplicate areas covered by the British Skydiving Operations Manual, though SOPs may refer to the Operations Manual if applicable.

Areas to be considered:

1. **Duties and responsibilities** of all of those involved in the management of the PTO, including who may authorise what. Names of key personnel, and their duties and responsibilities.

2. **Chief Instructor** Details concerning the Chief Instructor should be included.

3. **Chief Pilot**
- Details concerning the Chief Pilot should be included.
- Responsibilities must be stated.
- System for the (periodic) checking of all pilots.

4. **Person responsible for aircraft maintenance management**
- Details concerning that person should be included.
- Responsibilities must be stated.

5. **Rigger/Equipment Member**
- This may be the Chief Instructor or an appropriately qualified person who will be responsible to him/her for equipment matters.
- Responsibilities must be stated.

6. **Staffing Levels.** The staffing of the PTO will be dependent upon the degree of complexity and level of activity of the operation. Numbers and qualifications must be specified. Instructor/novice ratios must be specified.

7. **Instructions to all Operating Staff**

- list of those persons entitled to authorise flights
- system to ensure Tandem Instructor medical/recency/emergency drills
- checking of skydivers' personal documents
- manifesting
- pre-flight checks
- briefing
- Major and Special Hazards
- rescue boat
- informing non-Public Transport
- emplaning point
- embarkation/disembarkation
- incident/accident reporting

8. Instructions to Dropping Zone (DZ) Controllers

- duties
- DZ vehicles
- non-confliction procedures
- communication/co-ordination with other local activities
- radio frequencies and procedures
- incident/accident/emergency procedures
- crash rescue equipment and procedures

9. Instructions to Jumpmasters

- briefing of pilots
- conduct of lifts
- performance or structural limitations of aircraft
- use of in-flight door
- knife
- static line operations
- signals to/from the pilot
- ground to air signals
- emergency procedures

10. Instructions to skydivers

- parachute landing area and overshoot/undershoot areas
- skydiving limitations, e.g. deployment heights
- parachute equipment and ancillary equipment
- performance or structural limitations of aircraft
- emergency procedures
- non-confliction procedures, in the air and on the ground (DZ drills)

11. Instructions to pilots

- flight and rest period limitations
- minima and MTOWs for specific aerodromes
- special instructions relating to particular aerodromes
- weather minima
- carriage of passengers
- ATSU procedures
- Minimum Equipment Lists (MELs) for each aircraft
- payload
- normal fuel reserves
- location of aircraft documents
- documents to be carried
- care and maintenance away from base
- location of Aeronautical Information
- security - locks, covers, chocks, picketing
- pre-flight/daily/check A - as appropriate to each aircraft
- start up
- taxying
- fuelling
- emplaning point
- signals/communications with jumpmaster
- frequencies and squawk
- AADs - procedure prior to descent
- non-confliction procedures on the ground and in the air, to include procedures for landing, taking off, taxying and engine running if skydivers are in the air or moving airside
- emergency procedures

12. Equipment

- system of checking/approval of parachute and ancillary equipment including cameras
- AADs - and procedure for switching on/off
- System for obtaining and implementing equipment safety information
- maintenance, servicing, repairs and packing; including:
- Tandem parachute equipment
- who may do what
- records and logs
- use of ground training equipment and facilities

13. Weather criteria and dropping restrictions, including restrictions on operating procedure/wind limits due to local hazards etc.

14. Other procedures peculiar to the operation.

15. Night jumps - local procedures.

16. Water jumps - local procedures.

17. The person designated to amend/update British Skydiving Operations Manual and SOPs.

Note (1) The normal Standard Operating procedures may be inadequate for special events such as competitions, championships and boogies. Operators should review their procedures at the planning stage and ensure that adequate provision is made for the safe conduct of any such event.

Note (2) Details of any variations or waivers from the provisions of the British Skydiving Operations Manual which have been authorised by British Skydiver and any other Exemptions issued by the CAA should be stated at the end of this Section.

APPENDIX G

To be used in conjunction with Form 244b British Skydiving PTO Risk Assessment Form

Introduction to Risk Assessment

A risk assessment is nothing more than a careful examination of what, in your activities, could cause harm to people. You can then decide whether you have taken enough precautions or should do more.

The ideal is to try to make sure that no one ever gets hurt. But accidents do occur. They may have significant adverse effects on your PTO in terms of lost income, additional expenditure and loss of goodwill. Poor risk management is just a form of poor management. So there are real benefits - both moral and economic - of getting it right. And, when you do, you start a virtuous cycle of continuous improvement.

As with most exhilarating activities, there are many hazards within our sport of skydiving. So, where should you start… or stop?

What to assess

A 'hazard' is defined as 'something with the potential to cause harm'. Below is a non-exhaustive list of typical hazards associated with the activities of a Skydiving PTO.

- Active or disused runways
- Hazards associated with jumpers landing - water, trees, buildings, fences, etc
- Canopy collisions in the air
- Canopy collisions with a moving object on the ground
- Aircraft infringements
- Aircraft failure - engine or structural
- Off-landings
- Refuelling procedures - risk of fire; slips, trips and falls
- Hazardous substances - aviation fuels and oils (Control of Substances Hazardous to Health, COSHH)
- Radio failure - student, aircraft, ground
- Parachute failure - AAD, main parachute
- Body entanglement
- Manual handling
- Control of spectators.

The first thing to decide is whether a hazard is significant and whether you have in place satisfactory controls (precautions) so that the risk is small. This should be checked when you assess the risks.

Consider how likely the hazard is to cause harm, and how serious that harm might be. This will determine whether or not you need to do more to reduce the risk. Even after all controls have been put in place, some risks will be likely to remain, but they may well have been reduced.

How to record your assessment

Start by making a list of hazards associated with our sport in general, and then with your PTO in particular. This will make it easier when you come to complete the risk assessment form. You may wish to list everything and then concentrate on those that pose a significant risk where control measures could be improved. The risk assessment form (Form 244b) is in two parts, as follows.

Part A This consists of details of what is being assessed, who is doing the assessment and on what date, etc. It also includes the latest date by which the assessment will need to be reviewed and updated.

Part B (please refer to the form when reading these guidelines) is divided into 6 columns and uses a Risk Level Matrix. This is an easy way of identifying how we can improve the control of risks using **pre** and **post** control categories. This will enable you to categorise a risk before and after you have improved its control measures. You may find that even with more control measures in place, the risk has not been eliminated or reduced by very much, sometimes hardly at all. Don't worry - this sometimes happens. It simply means that you need to think some more about the nature of the risk and the strategies for its control.

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It is important only to record those control measures that you will actually use or can implement.

In column 1 of the risk assessment form, record the hazard or activity that may cause harm - such as obstructions, trees, buildings, etc.

In column 2, record who may be harmed by the hazard, such as skydivers or members of the public, etc. You may wish to distinguish between students and experienced skydivers as some risk may be lower to one group than the other.

In column 3, record the **pre** control risk rating. This is your assessment of how much harm the hazard identified in column 1 has the potential to cause. It is based on the **likelihood** of something happening, and - if it does happen - how serious the harm is likely to be in terms of **severity**. Attach a numerical value from 1 to 5 to likelihood and severity and record this within the column, for example 4 (likely) x 3 (significant injury) = 12 (High Risk). A High Risk needs to be reduced.

In column 4, record your existing controls - the precautions you already have in place. Relevant sections of the Operations Manual can be highlighted here, in addition to other controls.

If additional control measures are required, details of these should be set out in column 5. This may consist of references to extracts from your SOPs or new controls that you have identified, to be used in addition to those already in place.

In column 6, record the **post** control risk rating. This is a new calculation of the likelihood and severity now that you have implemented additional controls (if any). Be honest in your assessment. You may find the risk level does not reduce, as the same risk still remains. Calculate the post control risk rating for each of the other hazards or activities on your list.

If the risk rating does not reduce sufficiently, you may need to consider what additional control measures can be implemented to reduce it further. Discussing the risk with those from other PTOs can be helpful in developing new or improved risk control measures.

The aim is to reduce all risks and to keep them as low as possible.

Review your assessments

Risk assessments are only useful if they are current. A risk assessment is a living document and if it is filed away on a shelf it will soon become useless.

You must review your risk assessments to make certain that the control measures are still working effectively. The need for a review may be triggered:

- whenever you have a change of aircraft or equipment
- whenever you have a change of people
- whenever you have a change of activities
- whenever there is an amendment to the British Skydiving Operations Manual
- whenever there is an amendment to your PTO's SOPs
- after a significant accident or incident, and taking into account any subsequent recommendations made by Boards or Panels of Inquiry, or safety working parties or groups
- when manufacturers' safety notices or British Skydiving Safety Information Bulletins are issued
- if you suspect that your current assessment is no longer valid for any reason.

Even if everything appears to have stayed the same, risk assessments need routinely to be reviewed at least annually to make sure they are still current.

Retention of Risk Assessments

Risk Assessments need to be retained for a minimum of five years. They may be audited by the British Skydiving at any time for compliance. They should also be used as part of your safety management system for continuing improvement.

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APPENDIX H

PILOTS VOLUNTARY REPORTING

☐ If report is confidential place a X in the box above.
Please provide a Tel. No/Address

The object of this paper is to encourage aircraft Operators and/or Pilots to share information, following an occurrence or incident. Identities will only be revealed with the informant's permission. Please fill in each section with as much detail as possible. If you do not wish to fill in a section, for the purpose of staying anonymous, strike a line through the section with a pen.

Aircraft type	Registration	Operator	Date	Time	Location/Position/Runway	Day Night Twilight

NATURE OF FLIGHT	TANDEM	STATIC LINES	AFF	FS	FF	MIXED	OTHER (STATE):

FLIGHT PHASE	PARKED	TAXYING	TAKE OFF	INT CLIMB	CLIMB	JUMP RUN	CRUISE	DESCENT	APPROACH	LANDING

ENVIRONMENT DETAILS

WIND		CLOUD			PRECIPITATION				OTHER METEOROLOGICAL CONDITIONS							RUNWAY STATE				
DIR	SPEED MPH	TYPE	HT (ft)	8TH	RAIN	SNOW	SLEET	HAIL	VISIBILITY	ICING			TURBULENCE			DRY	WET	ICE	SNOW	SLUSH
					LIGHT	MOD		HEAVY	KM	L	M	S	L	M	S	CAA Category of Airfield		P	1	11	111

Brief Title of Occurrence/Incident

Description of Occurrence/Mistake/Incident

continue overleaf as necessary

Form 176 (i) **Issue 4, December 2019**

Description of occurrence continued

The following information is voluntary, anonymity will be respected

Pilots Name	Name of informant	No of years flying Experience		Total flying hours	
		Age		Total hours on type	
				Total hours in last six months	

If report is submitted voluntarily (ie, not subject to mandatory requirements). Can identities be disclosed?	Yes / No	Signature of Informant	Address or Telephone No. (if reporter wishes to be contacted privately)

ORGANISATION COMMENTS-ASSESSMENT/ACTION TAKEN/SUGGESTIONS TO PREVENT