



Civil Aviation Advisory Publication August 2002

This publication is only advisory. It gives the preferred method for complying with the Civil Aviation Regulations 1988 (CAR 1988).

It is not the only method, but experience has shown that if you follow this method you will comply with CAR 1988.

Always read this advice in conjunction with the appropriate regulations.

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CAAP 152-1(0)

Parachuting Through Cloud: Evaluation of applications by parachuting operators and issue of approvals by CASA

The relevant regulations

- Regulation 152 of *Civil Aviation Regulations 1988* (CAR 1988)
- Specifications issued by CASA under regulation 152
- Regulations in this CAAP are regulations under CAR 1988

Who this CAAP applies to

- Sport Aviation organisations (the Australian Parachute Federation Inc and the Australian Skydiving Association Inc) administering sport parachuting.
- Sport parachuting operators.
- Sport parachutists.

Why this publication was written

Specifications issued under regulation 152 have been amended to permit parachutists to enter cloud in the course of a descent in locations where this has been authorised by CASA. Approvals will be issued on a case-by-case basis after analysis of the risks and hazard-mitigating strategies available, by issuing a location-specific instrument as a further specification under regulation 152.

This CAAP offers guidance to parachuting operators seeking such approvals, and outlines the criteria CASA will use in assessing such applications and the kinds of operational conditions that may be specified in granting approvals.

Compliance with the relevant conditions will not only enhance the safety of other airspace users and of parachutists, but will also promote good airmanship and situational awareness of all airspace users in the area.

Status of this CAAP

This is the first CAAP to be written on permissions for parachutists to enter cloud under certain conditions.

For further information

Contact the Operational Standards Section of CASA's Operational & Flight Crew Licensing Standards Branch in Canberra, at GPO Box 2005, CANBERRA ACT 2601 (telephone 131 757)

1. Background

1.1 CASA and an industry risk management consultant have developed two mathematical models to evaluate the probability of a collision or a near-miss occurring between parachutists, whether descending under canopy or in free-fall, and aircraft flying through the airspace surrounding the drop zone.

1.2 Because the relative movement of parachutists in freefall is perpendicular to that of aircraft, the potential geometry of any collision makes visual manoeuvring to avoid an impending collision ineffective and improbable in most cases. Therefore, CASA will require certain conditions to be met, depending on the particular mix of traffic, airspace, facilities and terrain that exists at each location. This CAAP seeks to provide guidance for applicants (parachuting clubs and operators), parachuting administering organisations and CASA staff assessing applications, in order to simplify the process of issuing approvals.

2. Application process

2.1 An applicant (parachuting operator) must make a separate application for each drop zone at which it is proposed to seek approval to make parachute jumps that may involve parachutists entering cloud. Applicants may suggest measures that they propose to adopt to mitigate risk when making initial or subsequent applications.

2.2 The application should be sent to the parachuting administering organisation with which the operator is affiliated. This organisation will make an initial assessment of the proposal and may refer it back to the operator for clarification, further information or amendment.

2.3 When the parachuting administration organisation is satisfied that the request satisfies the safety criteria, e.g. by meeting *Appendix 1 (the Australian Parachute Federation's relevant advisory material)*, it will forward the application to CASA with its recommendation.

2.4 If CASA is satisfied that conditions can be applied so as to constrain the proposed operation to acceptable levels of safety, it will then issue an approval as a supplementary specification under regulation 152.

3. Approvals are available to the public

3.1 Approvals to conduct parachute descents through cloud are legal instruments made by CASA in accordance

with regulation 152. CASA may make such instruments as Civil Aviation Orders (CAO) or otherwise in writing, and in this case will follow the latter course of action. As such the instruments will be listed in the CASA register of instruments and published on the CASA Internet site.

3.2 CASA may, either independently or on the advice or request of a parachuting administering organisation or other interested party, review an instrument approving parachuting in cloud. CASA is able to cancel, suspend or vary an instrument and is likely to do so for reasons of the safety of air navigation or on reasonable indication that conditions have been breached or are no longer relevant to the situation pertaining at the applicable location.

4. Assessing an application

4.1 CASA will review the assessment of the parachuting administering organisation in respect of each application against the two risk analysis models, using data provided by the parachute operator as to the amount of parachuting activity which occurs or is expected to occur, together with a consideration of the airspace, terrain, traffic mix and aeronautical facilities and services available for risk mitigation.

4.2 Conditions and requirements appropriate to the location will be imposed on any approval issued.

5. Approval Criteria

5.1 The parachuting operator will be required to provide appropriately qualified flight crew and appropriately equipped aircraft. In addition to the requirements of the standard regulation 152 specification to members of the parachuting administering organisations, these shall require:

- Where flight in IMC is involved, or where conditions indicate the likelihood of flight in IMC, the pilot-in-command must hold at least a Command Instrument Rating (CIR), or a PIFR if the holder has accumulated not less than the total instrument flight experience required by CAO 40.2.1 to hold a CIR.

- Where flight in VMC above more than 4/8 cloud is involved, the pilot must be qualified to navigate by radionavigation aids, either by having these endorsed on a CIR, a PIFR or a NVFR rating, or by log-book endorsement.
- IFR flight notification is to be submitted to Airservices Australia where the forecast indicates flight in IMC, with provision for an instrument approach to be made where the forecast indicates greater than 4/8 cloud below the applicable route or area LSALT plus 500 ft. (Refer to AIP ENR 1.10-4 paragraph 2.2, ENR 1.10 paragraph 1.8.1, and ENR 1.1 paragraph 69.2.11 b)
- where flight in IMC below the LSALT for any route segment in the vicinity is involved (or the 10-mile LSALT surrounding an aerodrome with an IAL procedure), the pilot must hold appropriate flight procedure authorisations (FPAs) or navigation aid endorsements.
- the pilot to meet the recency requirements specified in CAO 40.2.1 for IFR flight where flight in IMC occurs or is required to be planned, including navigation aid recency on the applicable aids where the forecast or actual weather reports indicate IMC below the relevant LSALT plus 500 ft (AIP ENR 1.1 paragraphs 69.2.11 and 69.3.2).
- the aircraft to have at least one serviceable VHF radio for operation in Class G airspace. Failure of this radio after take-off shall require the parachutists to be dropped so that they can remain clear of cloud, or the aircraft return to land without dropping the parachutists.
- the aircraft to have at least one serviceable VHF radio for operation entirely in Class C or D airspace or wholly within an MBZ or CTAF. Failure of this radio after take-off shall require the parachute descent to be abandoned unless other means of communication with ATS or a Unicom or certified A/G operator, where this service is provided, can be established
- the aircraft to have at least two serviceable VHF radios for operation in overlying FIR airspace dropping parachutists into an MBZ or CTAF, or for dropping through controlled airspace (Class C, D or E) into an underlying MBZ or CTAF, or into

underlying FIR airspace. Both radios must be serviceable for a descent from controlled airspace into an MBZ, or at busy locations specified by CASA.

5.2 In controlled airspace within radar coverage, or where a RIS is available, the drop shall not proceed until the pilot has obtained confirmation from ATS that they do not have any conflicting traffic in or below controlled airspace identified on radar. In this situation the lowest cloud shall not be lower than the limits of radar coverage.

5.3 Where descents will involve entry into controlled airspace, or the routine provision of radar traffic information, a letter of agreement between the operator and Airservices Australia shall be in place and its terms shall be adhered to when descents that require the provision of these services. take place

5.4 The drop aircraft shall be required to have an operating transponder, set to a code as determined by Airservices Australia, for all parachute descents.

5.5 The lowest cloud exceeding 4/8 coverage of the sky must not be less than 1000 feet above the highest terrain within 5 NM of the target or 1000 feet above the planned opening height for the parachutists, whichever is the higher. Parachutists must not open their canopies in cloud except in emergency. Opening in cloud is to be a notifiable incident in accordance with the Sport Aviation Organisation's approved procedures.

5.6 The operator should identify a senior pilot to have authority and responsibility for induction and rostering of pilots and overall safety of the aircraft operation.

5.7 For navigation using GPS at night or in IMC, the aircraft must be fitted with GPS navigation equipment that complies with a TSO, ATSO or other IFR approval for enroute navigation, or for non-precision approaches, as applicable to the flight. For enroute navigation the database must show current airspace, navigation aids and reporting points in the area of intended operations. For non-precision approaches the database must show the current waypoints and data for the approach(es) likely to be flown.

5.8 A change of key personnel (Chief Instructor, senior pilot, operator's management) or use of an aircraft of greater capacity than advised in the original approval must be notified to CASA, who may review the approval and vary conditions attached if necessary.

5.9 Other grounds for reviewing the approval will be a change in traffic levels (particularly passenger transport services or IFR operations with 10 or more passengers), nearby airspace structure, provision or withdrawal of ATS facilities and services, or increased levels of parachuting activity, whether on a permanent or temporary basis.

Not all operations may be found suitable to conduct parachute descents through cloud. Approvals should initially be issued with a validity period not exceeding 12 months. Where experience indicates a satisfactory level of safety, these may be renewed for a period up to 3 years.

Bill McIntyre
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APF Advisory Circular

AC 1 Rev C

March 2002

This AC provides recommendations and guidance to illustrate several methods (which may not be the only methods) to meet the legislative requirements of CASA and the APF for parachute descents through cloud

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The purpose of this Advisory Circular (AC) is to provide guidance and information for parachuting organisations wanting permission from the APF and CASA for suitably qualified APF Members to jump through cloud at their DZ.

2. REFERENCES

This Advisory Circular (AC) should be read in conjunction with *CASA Civil Aviation Advisory Publication – CAAP 152-1 (latest issue) Assessment of applications for approval of parachute descents through cloud*.

Airservices Australia Aeronautical Information Publication (AIP) ENR 5.5 specifies requirements in respect to parachuting operations at Licensed Aerodromes, Class B, C, D & E airspace and MBZs.

Aeronautical Information Circular AIC H8/97 provides additional advisory material.

Airservices Australia Manual of Air Traffic Services (MATS) 18-3-5 describes how ATC will separate jump aircraft from other traffic.

3. INTERPRETATION

In this AC the interpretation will be that from CAR 2, or APF Op Regs, or that following:

APF Operational Regulations (Op Regs) means regulations approved by CASA and issued by the APF, which are binding on Members.

APF Organisation (organisation) means any club, organisation, centre, corporation, company or other institution, association or community, in whatever legal form (but excluding any natural person), and whether or not an APF member organisation recognised by the APF as having purposes consistent with the purposes of the Federation.

Applicant means the person making an application on behalf of an APF Organisation.

ATC means Air Traffic Control provided by Airservices Australia.

Cloud ceiling means the height above the ground or water of the base of the lowest layer of cloud below 20,000FT covering more than one-half of the sky.

Controlled Airspace means airspace of defined dimensions within which air traffic control services are provided to IFR flights and to VFR flights in accordance with the airspace classification.

DZSO (Drop Zone Safety Officer) means, when student or novice training descents are in progress, the Chief Instructor or at least the Instructor "B" whom he has appointed to supervise training; or when student or novice training descents are not in progress, the holder of at least a Parachutist Certificate "D" appointed prior to the commencement of the operation.

Elevation means the vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Height means the vertical distance of a level, a point or an object considered as a point measured from a specific datum, or the vertical dimension of an object.

ICAO means International Civil Aviation Organisation.

IFR means Instrument Flight Rules. IFR must be used by flights conducted in circumstances other than those specified for VFR and Special VFR. See AIP ENR 1.3.

IMC means Instrument Meteorological Conditions

Loadmaster means the person who, by agreement with those involved, attends to the pre jump briefing. Directs the jump aircraft over the target to the desired exit point. Ensures the airspace above the cloud is clear of all traffic that is likely to conflict with the parachutists, and, when the PIC authorises, permits the parachutists to exit. Where jumping through cloud is contemplated the Loadmaster must hold at least an APF/FAI Certificate D.

LSALT means the lowest safe altitude, which will provide safe terrain clearance at a given place.

Manifester is a term used to describe the person who maintains the Master Log in which all descents carried out by the organisation are recorded. If the organisation's procedures rely

on the competency of the Manifester then the duties and responsibilities of the person shall be defined.

Night VFR (NGT VFR) means flight at night under VFR.

Opening Height means the height at which the parachutist activates the main parachute. (Not to be confused with the height at which the parachute canopy opens). The parachute must be opened by 1800ft AGL except that on a tandem descent the parachute must be open by 4000ft AGL.

Procedures mean the procedures or manual that describes, in detail, the procedures that apply when parachute descents are being made through cloud. It may incorporate the Training Operations Manual and or Op Regs or stand-alone.

PIC means pilot in command.

PJE aircraft means an aircraft engaged in a parachute jump exercise.

Relative Work Descent means a descent in which the participants attempt to bring themselves together, or near each other, during free fall.

Responsible person means the person, or position within the organisation, that the APF holds responsible for ensuring that jumping through cloud is undertaken strictly in accordance with the procedures approved by CASA. It could be, for example, the Chief Executive Officer, Chief Instructor or DZSO. (This does not prevent CASA from also holding others responsible).

Tandem Descent means a descent in which two participants exit the aircraft linked to a common harness/parachute system with the object of landing under a single parachute. The Tandem Master "pilot" is an instructor endorsed for tandem and the "passenger" the holder of at least a Student Parachutist Licence.

TCO (Target Control Officer) means the person appointed by the DZSO who is responsible for communicating with the jump aircraft as to the advisability of exiting the aircraft. It should be noted that a person using a radio to communicate with an aircraft in flight is required to hold a Flight Radio Operator's Licence or Aircraft Radio Operator's Certificate of Proficiency.

VFR means Visual Flight Rules. AIP ENR 1.2-1 stipulates that VFR flight may only be conducted in VMC.

VMC means Visual Meteorological Conditions and its meaning for each class of airspace is described in AIP ENR 1.2-2.

4. APPLICATION

Organisations seeking approval to undertake descents through cloud need to apply in writing to the APF. The *application* needs to specify the name of the *organisation* on whose behalf the application is made and the Drop Zone (DZ), or DZs, for which approval is sought. The latitude and longitude of each DZ must be specified.

The application shall name the person (**The "Responsible Person"**) who will take overall responsibility for the safe conduct of parachute descents through cloud. The duties and responsibilities of this person, the PIC, DZSO and TCO and all others who have a role to play (ie the Manifester) should be specified.

It is recommended the application take the form of a covering letter and *Procedures Manual* that describes how the organisation will manage parachute descents through cloud at the particular DZ (or DZs if more than one is to be covered by the same procedures). It is further recommended that the procedures for jumping through cloud also include those that apply to “normal operations” so that:

- The duties and responsibilities of all those involved are clearly defined,
- Those involved need only refer to one set of procedures for all operations,
- The organisation can seamlessly-shift from “normal” to through-cloud operations,
- It is easier to flow-chart the daily routine and identify where procedures should provide options that take account of changes brought about through, for example, changing weather conditions.

There are other factors to consider depending on whether the organisation is training or non-training. For example:

Training operations: An approved training operation will already have certain procedures in place. It will have a Chief Instructor (CI) who takes responsibility for training operations. It will have a Training Operations Manual (TOM) that, together with the APF Op Regs, prescribes in general terms, how the DZ will operate. It may already have procedures that address “administrative matters” that can be adapted to take account of the particular requirements for jumping through cloud. It is for the organisation to decide whether the application is on the basis of a stand-alone manual, or the procedures for jumping through cloud are integrated with other procedures.

Non-training operation: Parachutists with a Certificate B or higher are not students or novices and are allowed to operate on their own. Generally speaking though, members of a non-training organisations operate concurrently with a training operation. If separate from a training operation the non-training organisation must appoint a DZSO. If it seeks approval for its members to undertake descents through cloud it will need to nominate a person to be the *Responsible Person* for all aspects of the operation - this might be the DZSO but equally it could be someone else. It is unlikely a non-training organisation will already have a *Procedures Manual* and so applicants are encouraged to use the format in Appendix A as the basis for their own.

5. THE PROCEDURES MANUAL

This AC at Appendix A contains headings for a *Procedures Manual* that, if expanded to take account of the local airspace and topography should under most circumstances, be a suitable starting point for applicants wanting authorisation for jumping through cloud under the auspices of a particular organisation at a particular DZ (or DZs).

Alternatively, a relatively large organisation that includes training and non-training activities might wish to take a different approach and state how their present procedures (modified in a particular way) address every requirement of CAAP 152-1 and this AC. As mentioned, this approach might suit those who need to satisfy the APF and CASA that their existing procedures (suitably modified) satisfy the standard.

To aid applicants as well as APF and CASA officers considering applications, a checklist of essential requirements is included as Appendix B to this AC.

The Director Safety and Director Aircraft Operations will not recommend to CASA any *Procedures Manual* which does not comply with all essential requirements of CAAP 152-1 and AC 1 Rev C.

6. DUTIES AND RESPONSIBILITIES

It is important that the duties and responsibilities of all those with a role to play are clearly defined and understood. Applicants are encouraged to include an organisational chart with the duties of each key person and the relationship of one to the other. As an example:

The Responsible person shall:

- Prepare and submit the application with the operational procedures for the location,
- Train and brief the pilot, Loadmaster, DZSO and TCO in the descent through cloud procedures,
- Certify them as competent to perform their respective duties,
- Supervise jumping through cloud operations.
- Determine the meteorological conditions prior to jumping through cloud operations,
- Consult with the pilot when VFR flying operations are planned in cloudy conditions,
- Authorise and supervise the through cloud operations each day,
- Check the currency of IFR rated pilots when IFR operations are involved,
- Ensure the pre-jump briefings are held prior to each descent, and
- Delegate to the DZSO these responsibilities when not present on the DZ.

The Pilot shall:

- Attend the pre-jump briefing and comply with the arrangements made at the briefing,
- Obtain clearances from ATC, the DZSO or TCO, as applicable, to ensure the airspace is clear of aircraft prior to giving the clearance/permission to the parachutists to exit.

The Loadmaster shall:

- Attend the pre-jump briefing and comply with the arrangements made at the briefing,
- During the jump run ensure that the airspace above the cloud is clear of all aircraft that are likely to conflict with the parachutists and advise the pilot, and wait for the pilot to give the approval to exit before permitting the parachutists to leave the aircraft.

The Manifester shall:

- Where the meteorological conditions are such that it is likely parachutist may pass through cloud, manifest only those authorised to jump through cloud,
- Monitor the VHF Base Station radio and ensure the DZSO (or TCO) is notified of an impending exit through cloud.

The DZSO or TCO shall:

- Attend the pre-jump briefing and comply with the arrangements made at the briefing,
- Three minutes prior to the exit of the parachutists, be located on the DZ in an area with the best possible view of the airspace below the cloud through which the parachutists will descend,
- Observe the airspace to ensure that there are no aircraft there that would conflict with the descent of the parachutists,
- Advise the pilot of the jump aircraft when the airspace below the cloud is clear, just prior to the parachutists leaving the aircraft, and
- Delegate these responsibilities when not on the ground.

7. CONSULTATION WITH INDUSTRY

Each State/Territory has a Regional Airspace Users Advisory Committee (RAPAC) that provides a forum for local stakeholders to review proposals from CASA and/or Airservices Australia and/or Industry. The organisation is to obtain the support of RAPAC before submitting an application to the APF. It is conceivable that RAPAC support might be conditional on CASA agreeing to vary the current airspace. For example, creating a Danger Area or changing a Danger Area to a Restricted Area or creating a CTAF or changing a CTAF to a MBZ.

In the case of a licensed aerodrome, the operation needs to come to some understanding, preferably by means of a Letter of Agreement, with the Aerodrome Owner/Operator, or the local District Office of CASA. AIP ENR 5.5-5 refers. See also Air Services Australia website.

8. THE LOCAL AIRSPACE MANAGER

Organisations should consult with the local Airspace Manager about formalising their airspace arrangements. This can take two forms: 1) A Letter of Agreement or, 2) Local Instructions for the DZ that are read in conjunction with the MATS. The former is the better option, as it requires both parties to agree to a change in the arrangements. Either way, the organisation may be looking for:

- ATC to pass on details of unverified traffic likely to conflict with a parachute descent,
- ATC to activate a standard VFR or IFR Flight Plan, as appropriate, at the start of each day's operations,
- Agreement on climb and descent areas,
- A dedicated transponder code,
- Agreement on phraseology between pilot and ATC, and
- How the airspace will be declared clear after a drop (ie parachutists down).

9. ASSESSING AN APPLICATION

When complete, the application together with evidence of "industry consultation" and "airspace arrangements" should be sent to the APF Office to the attention of the Director Aircraft Operations and Director Safety. It is recommended that the checklist at Appendix B be studied, as it will form the basis of the APF review and form part of the Federation's recommendation to CASA for approval.

If the application is found to be deficient the shortcomings will be identified and the organisation advised in writing. Only after all deficiencies have been rectified will the application be forwarded to CASA with the recommendation that it be approved.

The detail of how the organisation's procedures demonstrate compliance with the Standard is most important. The following gives guidance on how the standard might be satisfied. Subject matter is grouped under the following headings:

- Aircraft operations – VFR or IFR
- Airspace considerations
- DZ topographical considerations
- Declaring the airspace clear
- Safety of parachutists

10. AIRCRAFT OPERATIONS – VFR OR IFR

The APF will not support an application that seeks a concession against any existing rule in respect to VFR or IFR. Aircraft used to support parachuting must be suitably equipped for the type of operation proposed. If the applicant proposes to operate the aircraft in IMC then the aircraft and PIC must be rated for IFR. If the aircraft is only VFR equipped then the aircraft clearly CANNOT operate in IMC.

Some aircraft door-off supplements specifically exclude operations under IFR when the door is off or open. If this is the case the reason must be determined and overcome. It might be that when the door is removed the airflow past the static air source is disturbed, in which case relocating the vent might be all that is necessary.

Organisations are encouraged to obtain specialist advice on what is involved in operating to IFR and the limitations of VFR on-top-of-cloud. The following is for guidance only:

IFR operations: Where IFR operations are proposed the procedures might include details about how the operation plans for, and manages, operations to IFR. The procedures could say, for example, that the PIC:

- Will obtain a meteorological forecast for the area,
- Prepare (or activate) an IFR flight plan which:
 - Takes account of the forecast conditions,
 - Provides for alternate/(s),
 - Specifies minimum fuel for operational requirements and alternate/(s),
 - Takes account of the LSALT
 - at the DZ, and
 - on track when diverting to alternate/(s), and
 - Letdown procedures at the DZ, or elsewhere, after a drop.

VFR operations: Where VFR only aircraft operations are proposed the procedures might include details about how the aircraft intends to confine its operations to VMC although parachutists may be dropped through airspace that constitutes IMC. The procedures might say that:

- PIC is competent in the use of ADF and/or VOR and/or DME and/or GPS. (Note: A NGT VFR rated pilot is generally considered competent in the use of at least two of these aids),
- The aircraft will not take off if, at some stage of the flight, it will have to operate in IMC, and
- Where operations on-top-of-cloud are likely then the aircraft will carry sufficient fuel to divert to an alternate.

A transponder will be required to aid in the aircraft's identification by ATC and TCAS equipped aircraft.

11. AIRSPACE CONSIDERATIONS

The organisation's procedures need to describe in detail, for all classes of airspace through which descents will be made, how risk of a conflict with other airspace users will be minimised. There may be several classes of airspace overlaying the DZ - all of which need to be declared free of traffic before a drop commences. CASA prescribes that for:

Classes C and D: Parachutists are not permitted to exit the aircraft until the PIC has received a clearance from ATC authorising the descent. This applies to VFR and IFR operations. The MATS 18-3-5 describes how ATC manages parachuting operations in Class C and D. See also APF Op Reg 5.2.14.

Class E: Pilots of jump aircraft operating VFR in Class E airspace are required to establish contact with ATC notifying the intent to commence operations before the drop commences. ATC will alert IFR traffic. Jump aircraft operating to IFR will be separated from other IFR traffic and provided information on known VFR traffic.

Class G: The PIC must broadcast advising the intention to drop parachutists when operating entirely in Class G airspace on all relevant frequencies (ie the Area VHF, CTAF or MBZ frequency). See also APF Op Reg 5.2.15.

Licensed Aerodromes: AIP ENR 5.5 requires that parachutists not be dropped onto a licensed aerodrome without the approval of the relevant District Office of CASA or the Aerodrome Operator and then only when certain precautions are taken. See also APF Op Reg 5.2.16.

Transiting non-radio equipped aircraft: **Where the DZ is close to an area where it could be expected that there will be through-traffic without radio, or aircraft with radio on a discrete frequency, the procedures should describe arrangements in place (or that will be put in place) to minimise any conflict. There are a number of ways other airspace users might be alerted. For example:**

- Parachuting symbol and if an area of intense activity a warning on the VTC and ERC LOW charts, as appropriate, and
- Written agreement with the local Airspace Manager to advise of unverified traffic, and/or
- The DZ be promulgated as a Danger or Restricted Area, CTAF or MBZ.

Air Traffic Services: MATS 18-3-5 describes how ATC will separate the jump aircraft from other traffic. ATC generally adds a buffer around the 2NM radius circle centred on the DZ reference point so that another aircraft will not inadvertently penetrate airspace overhead the DZ when a descent is in progress. Extra separation does not apply where:

- The organisation agrees to confine its parachuting operation to one side of a “line feature” in which case the line feature will become the edge of the DZ, and
- PJE aircraft have agreed to self-separate from other PJE aircraft using the same or a closely located DZ.

Note: ATC does not permit a line feature to be used when the parachute descent is from above 10,000FT or in IMC.

Traffic on IFR routes: Where there is a published IFR track near the DZ the organisation is advised to specify how it will ensure the jump aircraft and the parachutists will not conflict with aircraft using the track. IFR tracks have navigational tolerances that splay with distance and vary with altitude and should be taken into account. For example, it could be said that the PIC (or ATC as the case may be) WILL NOT permit the exit to proceed if:

- An aircraft is known to be on an IFR track,
- At or below the planned drop height, and
- It will pass, at the intended time of the drop within a specified distance of the DZ.

Application of risk analysis: Applicants have a common law duty of care to ensure that risk is "...as low as reasonably practical (ALARP)". Therefore, through cloud descents not conducted entirely within controlled airspace require a formal assessment of risk.

Where a risk is identified, the applicant, APF and CASA must reach agreement on the level of risk. This is generally expressed as a mathematical value for the number of fatal accidents possible due to a collision per X number of flying hours and/or parachute descents for the class of airspace. Class C and D airspace requires an airways clearance from ATC authorising the descent - so that the risk of a conflict in Class C or D should not be an issue. Class E has protective measures for IFR traffic but not for VFR traffic, except where ATC agrees to provide a traffic information service. It might be that the Airspace Manager gives such an undertaking or, that a drop will not proceed in cloudy conditions if ATC due to workload, cannot provide information on other traffic.

A risk assessment for Class G airspace may be necessary as to the "probability" and the "severity" of a chance-collision between a freefalling parachutist and a passing aircraft needs to be quantified. Probability is related to the number of parachutists using the airspace and the number of aircraft transiting the same airspace. Severity is a measure of the likelihood of a relatively large aircraft, (say one carrying more than 6POB), being involved in a collision and, predicting the consequent loss of life. For example, it might be determined that the risk of a collision is 3×10^{-7} per year and is so slight as to be a "socially-acceptable" risk.

In arriving at a mathematical probability the factors generally considered are causation, foreseeability, preventability and reasonableness. ICAO has set down ways in which the risk can be quantified and the applicant may need to obtain expert help to put a numerical value on the risk.

12. DECLARING THE AIRSPACE CLEAR

Parachutist may fall through several types of airspace – three is common and with Class E four is possible. All the airspace needs to be assessed as being free of conflicting traffic before any parachute descent is initiated. Different techniques may be necessary to declare each piece of airspace clear of conflicting traffic. The following are examples:

- The Loadmaster scans the airspace beneath the jump aircraft before authorising exit to ensure that there are no aircraft above the cloud; and/or
- ATC declares the piece of airspace free of conflicting traffic, and/or
- Radio call/(s) on the appropriate frequency (or frequencies) fails to produce a response from other traffic, and/or
- TCO scans the airspace above the DZ and declares it free of conflicting traffic.

If any part of the airspace through which the parachutists may fall cannot be determined to be clear of conflicting traffic, a parachute descent should not be allowed to proceed.

An example of when a parachute descent SHOULD NOT proceed is where the PJE aircraft is above two layers of cloud separated by at least 2000FT of clear air. In such a situation another aircraft, operating to VFR, may fly between the cloud layers and not be required to monitor the radio. Unless there is some other way to declare the airspace between the two layers of cloud free of conflicting traffic (eg ATC advice) the procedures must say that under such conditions a parachute jump WILL NOT be made from above the upper layer of cloud.

13. DZ TOPOGRAPHICAL CONSIDERATIONS

The procedures need to take account of significant topographical features within a 3NM radius of the DZ target. Topographical features >500FT above the DZ target elevation are considered a hazard to aircraft and parachutists.

The organisation is advised to modify the normal *opening height* of the parachutists, when descents through cloud are to be made, to take account of such topographical hazards. It is recommended that the opening height be raised by the elevation of the highest hazard within 3NM of the DZ.

The following example shows how the applicant might take account of the DZ topography and satisfy the APF and CASA in respect to the safety of parachutists: Say the topographical feature is 500FT above the DZ target elevation, and parachute opening is normally initiated at 2500FT then, for *relative work*, jumping through cloud requires an additional 1000FT clear of cloud for break-off and tracking. In this example the *cloud ceiling* should be not lower than 4000FT (ie 2500 + 1000 + 500) above the DZ target. For tandem the cloud ceiling needs to be not less than 6000FT (ie 4500 + 1000 + 500) above the DZ.

IFR aircraft operations must take account of topographical features when determining LSALT. This is mentioned under the heading for Aircraft Operations – VFR or IFR.

14. SAFETY OF PARACHUTISTS

Apart from the DZ topography considerations, the procedures must address: 1) the authorisation of, 2) briefing before and, 3) conduct of parachute descents through cloud.

Note: It is planned that, after a period to consolidate and refine procedures to protect the safety of parachutists, these will be written into the APF Op Regs, removing the need for them to be stipulated in an organisation's own procedures. However, until this happens, the organisation's procedures should address parachutist safety.

Authorisation: Except for tandem descents, parachutists with less than a Certificate B shall not be permitted to undertake a descent through cloud. It is recommended that the authorisation for an APF Member to jump through cloud be via a logbook endorsement by the CI, or DZSO, as applicable. The endorsement should confirm that the person is competent, capable, current and safe to jump through cloud, and may include specific or general limitations.

Briefing prior to jump: The organisation's procedures need to state that, prior to any descent that is likely to result in a parachutist passing through cloud, the person (or persons involved) will be briefed by the Loadmaster. The briefing should cover, as applicable:

- That parachutists will not be permitted to exit the aircraft if it is likely that they will need to deploy their parachute in cloud,
- Given the prevailing meteorological conditions, agreement be reached on:
 - The manoeuvres to be performed,
 - Break-off height and opening height,
 - Parachutes are not to be deployed in or flown through cloud, and
 - There will be no tracking or horizontal movement in cloud when all members of the group are not visual.
- In the event parachutists find themselves under canopy in cloud – to maintain position and minimise the possibility of collision with other parachutists who may also be in cloud they are to be briefed, until clear of cloud to:
 - Orbit the parachute,

- At reduced speed,
- On half brakes.

Jump aircraft descent: It would be prudent for the organisation's procedures to address the jump aircraft descent profile and show what will be done to ensure that the aircraft will not conflict with the descending parachutists. Some possibilities are:

- Aircraft will descend away from the exit point until 1000FT below the cloud ceiling
- Aircraft will descend at a rate less than the minimum rate possible by the parachutists,
- PIC will maintain a watch for descending parachutists,
- Aircraft will not return to over DZ until TCO accounts for all canopies and communicates their position to the PIC.

The Airspace Manager may require that the TCO or PIC notify ATC when all parachutists are down before clearing other traffic through the area.

15. SAFETY SYSTEMS

The systems in place for "normal operations" have evolved over time, are documented in the APF Op Regs, and are well known. The applicant should consider the "what if" scenario for systems put in place specifically to control of jumping through cloud. The application of "risk assessment principles" has been made under the heading of 'Airspace Considerations' for predicting the likelihood of a collision between a parachutist and aircraft. There are other factors to consider as well:

Ground-to-air communications: It is recommended that the organisation have more than one way of communicating with the aircraft. If the Manifester has a VHF Base Station it is recommended the organisation's procedures identify this as a backup in the event of failure of the TCOs communication link with the PIC. For example, if the PIC loses contact with the TCO the PIC could:

- Ask the Manifester to use the DZ Public Address system to summon the TCO to the Base Station transceiver.
- If the PIC fails to respond to a radio call by the TCO on the frequency dedicated to parachuting then,
 - A call might be made on the Area Frequency, or if this fails then,
 - ATC might be contacted by telephone to pass on a message.
 - If communication cannot be restored it be agreed that the descent must not proceed.

Air-to-ground communication: If the aircraft is in controlled airspace and loses radio contact with ATC, it might be agreed with the local Airspace Manager that, the PIC shall attempt to restore communications through the TCO (or the DZ Base Station) to ATC by telephone. It is recommended that procedures in respect to a total loss of two-way communication be agreed with the Airspace Manager.

If the PIC fails to elicit a response from the TCO, on the applicable frequency, or via the Manifester on the same frequency, then the PIC should not allow a descent to proceed that would have the parachutists pass through cloud. The PIC may decide to descend below the cloud ceiling and continue the operation, or land.

Diversions: It is an IFR requirement the jump aircraft have the capability to divert to its flight-planned alternate if the meteorological conditions are such that the aircraft cannot safely

return to the DZ. Where VFR on top of cloud is contemplated it is recommended the aircraft always carry sufficient fuel to divert to an alternate.

In-flight emergency: It is recommended the organisation implement procedures to deal with an in-flight emergency. Depending on the nature of the emergency, the pilot might, for example, elect to:

- Divert to an alternate which can provide the necessary ground support, or
- Declare an emergency and issue a drop authorisation to the Loadmaster for the parachutists to exit immediately.

Illegal operations by others: APF and CASA should not reject an application on the basis that another airspace user, not associated with parachuting, could operate illegally and therefore threaten the safety of the parachutist. Nevertheless, the organisation might wish to address how it sees its obligations and manage the risk with respect to aircraft, not engaged in parachuting, operating illegally. Under such circumstances the organisation might rely on:

- The parachuting symbol on the VNC / VTC / ERC LOW warning about parachuting activity, and/or
- ATC agreeing to report, where radar coverage allows, unverified traffic that might conflict with the descending parachutists, and/or
- The PIC's broadcast of intentions on all applicable frequencies, and/or
- The Loadmaster looking for traffic above the cloud that could conflict, and/or
- The TCO looking from below and advising the PIC of traffic that could conflict.

APPENDIX A

Procedures Manual – Suggested Format

Organisation: The full name and address of the organisation needs to be stated. The person who takes overall responsibility is to be identified, by name, as well as how this person can be contacted by APF, ATC and CASA when parachuting operations are in progress.

Location: A description of the drop zone location including the latitude and longitude of the DZ (or DZs). Specify significant topographical features within 3NM radius of the DZ target that determine the applicant's nominated LSALT for the aircraft and parachutists.

Airspace: The overlying airspace up to the maximum altitude from which parachute descents will be made needs to be described in detail.

Duties & responsibilities: All those with a role to play shall need to have their duties and responsibilities explained. Of particular importance are those of the Responsible Person, the DZSO, TCO, PIC, Loadmaster and Manifester.

Arrangements with the Airspace Manager: If these are described in a Letter of Agreement, it could be appended to the procedures. If arrangements are via "Local Instructions" to ATC personnel then the details need inclusion in the procedures manual.

Authorisation to jump through cloud: The procedures need to explain on what basis a person is permitted to jump through cloud. Specifically: 1) the minimum qualifications and experience to be eligible, 2) the training of, and 3) means by which endorsement to jump will be made.

Meteorological conditions: Explain how, prior to each day's operations, the likely conditions are determined. This might be a pilot responsibility but involve the DZSO and the Loadmaster(s) in respect of who might jump.

Flight plan or notification: Describe how aircraft operations for the day are planned and ATC notified. The PIC might activate a standard Flight Plan or lodge one based on the forecast conditions.

Determination of exit point: The DZSO, in conjunction with the pilot, must calculate the exit point, for example, from the forecast winds. How is this determined in the first instance and how is it subsequently modified in light of changed conditions.

Manifesting: The procedures should specify how the DZSO, using the Manifester, would ensure only those with the appropriate authorisation are permitted to manifest for a jump.

Pre-flight briefing: There are two aspects: 1) before take-off the PIC and Loadmaster need to agree on the run-in direction and exit point. 2) The Loadmaster needs to ensure all those about to board the aircraft are conversant with the prevailing meteorological conditions and are clear about the procedures for a descent through cloud. The details of the briefing could be specified here.

Aircraft operations: The procedures need to describe arrangements with ATC and others in respect to the aircraft used and the type of operation, ie VFR or IFR, frequencies to use, phraseology, climb and descent areas, etc.

Spotting: The process by which the PIC and Loadmaster determine the correct exit point needs to be specified and what reliance will be made on navigation aids, visual observation, etc specified.

Determination that the airspace is clear – authorising the exit: How will: 1) the airspace above the cloud be declared clear, 2) the airspace with cloud be declared clear, and 3) that below the cloud declared clear before the Loadmaster allows the exit to proceed.

Descent phase: What protective measure will be used to ensure the PJE aircraft descent will not conflict with the parachutists or other airspace users.

Landing & debriefing: Normal procedures would apply, however, if the cloud introduces other factors that were not predicted what can be learned and how will this be passed on.

Reporting of incidents: If the organisation has reporting procedures additional to those normally required then these need to be specified.

Safety systems: The systems that are in place in the event of a failure of ground-to-air communications, deteriorating weather, etc need to be documented.

APPENDIX B

Checklist for APF and CASA to evaluate applications

Organisation:	Paragraph/Section number
- Is full name & address provided?	
Are contact details specified and correct?	
- Is nominated Responsible Person acceptable to APF (and CASA)?	
Location:	
- Is Drop Zone already ASO approved?	
- Is Latitude & Longitude correctly stated?	
- Topographical features within 3NM:	
Is the highest feature taken into account for opening heights?	
Do aircraft procedures reflect appropriate LSALT for aircraft ops?	
- Is DZ adequately identified on aeronautical charts?	
- Have other operators in the area been consulted regarding the proposal?	
Airspace:	
- Is overlying airspace correctly described?	
- Do procedures reflect stated ATC clearance and/or broadcasting requirements?	
- Has "Mind Matters" risk modelling been completed and are the results within ALARP range?	
Duties & Responsibilities:	
- Do procedures include an organisational chart?	
- Are all necessary key-personal with management responsibility identified?	
- Are their duties & responsibilities adequately stated?	
- Is the nominated Chief Pilot appropriately qualified for the type of operation envisaged?	

Arrangements with Airspace Manager:	
- Has a Letter of Agreement from Airservices been included with application?	
- Are Local Instructions promulgated?	
Do they reflect what is proposed?	
Has ATC agreed to provide traffic information for all airspace above jumper opening height?	
Authorisation to jump through cloud:	
- Are jumper minimum qualifications in accord with APF requirements?	
- Is training for through-cloud descents adequate & adequately described?	
- Is there an appropriate means of granting authorisations?	
- Do procedures preclude no-approved persons from jumping?	
Meteorological conditions:	
- Does the organisation have an appropriate way of determining forecast met conditions?	
- Is there a system for on-going monitoring of conditions?	
- Do procedures provide for suspending operations when conditions fall below minima?	
Flight plan or notification:	
- Are flight-planning / flight-notification procedures appropriate?	
- Do these procedures include CASA requirements for flight under VFR or IFR as appropriate?	
Determination of exit point:	
- Is the proposed method of determining exit point appropriate and reliable?	
- Does the system provide for a timely review when conditions change?	
Manifesting:	
- Do the manifesting procedures conform to APF OpReg requirements?	
- Does the Manifester position have a statement of Duties & Responsibilities which:	

Ensures only those with the appropriate qualifications are manifested?	
An appropriately qualified person is appointed as loadmaster?	
Pre-flight briefing:	
- Is it clearly stated the Loadmaster must conduct a briefing with PIC and jumpers?	
- Procedures ensure Jumpers are made aware of limitations posed by "actual" conditions?	
- Does the system ensure only persons with appropriate qualifications board the aircraft?	
Aircraft operations:	
- Are precise arrangements with ATC specified for climb, descent, etc?	
- Do procedures take account of other traffic likely to be operating in the vicinity?	

Spotting:	
- Is the system of spotting appropriate:	
If non-visual spotting is proposed does system have a way of verifying exit point?	
Is aircraft nav-equipment appropriate for what is proposed?	
Determination that airspace is clear	
- Procedures ensure that airspace above cloud is clear?	
- Adequate system of communication with ground to declare airspace below is clear?	
- System ensures aircraft in or between cloud layers will not conflict?	
Descent phase:	
- System ensures PJE aircraft descent is away from jumper opening point?	
- Do procedures include a means of accounting for all canopies?	
- Does descent take account of topographical features?	
Landing & debriefing:	
- Do procedures require de-briefing of participants and are these appropriate?	
Reporting of incidents:	
- Is there a documented system for reporting incidents?	
- Does APF require additional requirements and are these agreed with the applicant?	
Safety systems:	
- Does system have appropriate ground-to-air communications?	
- Is there a back-up communications system and is it adequate?	
- Are there appropriate mechanisms to call off jump if conditions deteriorate?	