



**AUSTRALIAN PARACHUTE FEDERATION**

# **Display Jumper's Guide**

**for Parachute Display Jumpers**



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**STATUS: Educational**

## Warning

**Parachuting and flying in parachuting aircraft can be dangerous.**

### About This Publication

This guide is offered free to APF members. It is produced by the Australian Parachute Federation Incorporated (APF) for the information of APF members. If you want more information or copies of this guide for yourself or your friends, please ask the instructional staff at your DZ or contact the APF Office.

### Version Control

It is important that members refer to the current version of this guide. This guide is current only at the time of release by the APF Office. This revision was published on 9<sup>th</sup> June 2025.

Current versions of APF manuals, guides, the Operational Regulations, Regulatory Schedules and associated forms can be found on the [APF website](#).

### Disclaimer

This guide has been produced for the information and assistance of APF members. The information it contains is based on the opinions of the writers: it does not necessarily represent APF policy. While the writers have attempted to ensure that the information in this guide is correct, it may contain information which is out of date or incorrect.

This is not a do-it-yourself guide. Parachuting is dangerous. You should seek expert guidance before carrying out any of the procedures described here and should ascertain that your proposed actions are consistent with your experience and competence, your equipment and local rules and conditions.

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### Credits

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## **Part 1 FOREWORD**

Have you ever heard any of those old stories about display jumps gone wrong? Perhaps it was the one about the jumper who used a brick tied to a pilotchute for a drifter. The "drifter" landed through the windscreen of a car on a major city freeway. How about the night jumper who was carrying a banner and a night flare - the banner caught alight and nearly turned the jumper into a blazing human torch.

My own experiences with displays gone wrong include, among others, a jump into the Commonwealth Games venue. Our "three stack" was sucked into a storm cell and dragged up to about 12000ft. I subsequently landed about 10km off target.

All these stories make good bar time entertainment. However, that's all they are. In most instances a display gone wrong can seriously endanger jumpers, personal property, pilots and in the worst cases the spectators. Fortunately display jumpers have learnt a lot over the years, mostly from hard won experiences like the ones I have mentioned. This learning, however, can create gaps between the seasoned display jumpers and the newcomers. Sometimes these lessons are not passed onto others, be it for commercial reasons or simply a lack of a suitable systems for passing on the information.

This then is the purpose of this brief training guide. It is an attempt to bridge the gap between the experienced and not so experienced display jumpers. It has been compiled from articles and ideas from some of the top display jumpers from Australia and overseas. It is not so much a "how to do it" guide, more a "how some others do it" collection of hints.

If you have suggestions for improving this training guide, please advise the APF office. The address is P.O. Box 1440 Springwood Qld 4127.

This training guide is written for the jumper participating in a display; it does not cover the details of display organisation, which is covered by the APF Display Manual. Only holders of a Display Organiser rating may take responsibility for organising a display. Information about the requirements for this rating may be found in the APF Regulations.

This training guide, I believe, contains some important information and should be read carefully by anyone intending to become involved in display jumping. There is undoubtedly a lot to be gained from the experiences of others and there can also be a lot at stake. Display jumps present our sport to the public. It is up to all of us to ensure we do it well.

Rick Collins  
APF National Coach  
July 1988

## **Part 2 INTRODUCTION**

Display parachuting presents our sport to the general public, who will judge us on what they see. It therefore must be a professionally presented and executed form of entertainment.

All display organisers and jumpers who accept the responsibility of participating in parachute displays must consider the risks and possible consequences of displays that do not go as planned. Judgement should never be swayed by the desire to avoid disappointing the organiser or the audience. Parachutists landing outside the target area and injuries sustained in view of the public negatively impact the public's opinion of the sport as these instances are usually the result of incompetence or jumping in unsuitable conditions.

Display parachuting calls for the highest standards of planning, co-ordination, experience, mutual confidence and trust, safety consciousness decision making and parachuting skill. Parachutists who cannot be relied upon to meet these standards should not be permitted to participate in displays.

Previously, the conduct of parachute displays was controlled by the Civil Aviation Safety Authority (CASA). A person wishing to organise a display was required to write to CASA at least three weeks ahead, giving full details and seeking permission to carry out the display.

The APF considered that these procedures were cumbersome, difficult to comply with and often failed to ensure the professionalism of displays. The Federation was able to negotiate some concessions for the most experienced display organisers, then in 1992 persuaded CASA to relinquish its control of display parachuting to the APF.

At that time, the Display Organiser's Licence was introduced, transferring all responsibility for the organisation of parachute displays to the Display Organiser. This includes overseeing the approval of landing areas, selecting and briefing jumpers and ground crew, liaising with Air Traffic Control, and reporting incidents.

While the Display Organiser is responsible for the overall organisation and selection of attendees, each individual jumper must ensure they perform competently and professionally. This training guide has been designed to help you understand how to meet these expectations.

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## **Part 3 DISPLAY PARACHUTING GUIDELINGS**

### **3.1 Preparation for a Parachute Display**

To ensure a safe and professional parachute display, several key preparations are required before the event. As a participant, you are personally responsible for meeting these requirements and maintaining a high standard of safety and accountability:

**Qualifications and Currency:** You must be a current APF member with up-to-date display qualifications that meet display requirements.

**Skill Assessment:** Honestly assess your own skill level to confirm you can safely perform the planned jump. Discuss any concerns with the Display Organiser.

**Pre-Event Briefing:** Attend the briefing to review the display schedule, jump requirements, weather conditions, and emergency procedures. It is your responsibility to fully understand all aspects of the event.

**Equipment Check:** Ensure all your gear is in excellent condition and suitable for the display, including any specialized equipment. You are accountable for ensuring your equipment is safe and functional.

**Landing Zone Review:** Familiarise yourself with the landing area, potential hazards, and emergency landing options. Confirm preferred patterns and preparation for any contingencies.

**Safety Awareness:** Understand the boundaries, crowd locations, and safety procedures for both the jump and public safety. It's your responsibility to adhere to these guidelines to ensure the safety of everyone involved.

**Weather:** Check the weather forecast in advance and compare it with real-time conditions at the display location shortly before the event. Meteorological conditions can change rapidly and can have unexpected influences. While the DZSO and DO may determine that conditions are within regulatory limits, individual comfort levels may vary. Do not hesitate to say "No".

By taking ownership of these preparations, you ensure your readiness to contribute to the success of the display, while upholding the reputation and safety of the sport.

### **3.2 Personal Equipment**

Display jumpers must ensure that their personal parachute equipment is in good condition, ready to jump, and suitable for the event. Be aware if you have advertising on your parachute, it may not be acceptable to promote another advertiser, except with the permission of any event sponsors.

You must use a suitable main parachute. High performance main parachutes are not always appropriate when you need to land in a tight area as they require a long "runway". Landing in the crowd must be avoided and is a sure way of not being asked to participate in future displays.

If the landing area is surrounded by tall trees or buildings, you may have to sink your parachute into the landing area. Many modern parachutes are not suited to fly in a sink.

Injuries are often the result from decisions made during the planning and decision-making stages, long before the jump itself. Injuring yourself while attempting to land on the target is unacceptable.

If the landing area has a tight approach or isn't suitably long enough, a good option is a seven cell parachute. A seven cell has several key advantages for certain displays; however they require adjustments in both technique and mindset if you're unfamiliar flying one. Notable differences are in the flare and landing characteristics: seven cell parachutes generally have a less aggressive flare than nine cells, meaning the skydiver will need more input and precision during the flare. Seven cell parachutes typically have a slower forward speed and a steeper glide they will cover less horizontal distance, making it important to be mindful when flying your landing pattern, some adjustment will

be required to account for reduction in distance covered. Seven cell parachutes are less responsive and require a more gradual response to control inputs, which feel sluggish or docile compared to the performance of nine cells. Seven cells have better stability in turbulent air, and are typically more resistant to collapsing or diving, making them more predictable and forgiving in rough conditions. While a seven cell is considered less sporty than the nine cell, it offers a more forgiving and stable flight experience, but requires careful attention to flare timing, and flight path planning. Make sure you do some practice jumps on it prior to the display so you are confident and comfortable with its flight characteristics.

As stipulated in the APF Operational Regulations and Regulatory Schedules you are required to clear all spectators or members of the public, as per the height stated in the OR 10.1.4. If your jump takes place near or over a body of water, you must also check whether a Personal Flotation Device (PFD) is required, as stipulated in the APF Operational Regulations.

### 3.3 Display Ratings and Currency

As a display jumper, you must hold a current APF membership and a Display Rating that permits you to jump into the designated landing area. Failure to meet these requirements will void insurance in the event of an incident. While the Display Organiser will verify your credentials, it is your responsibility to ensure you have the correct certifications, currency and ratings. You must be able to provide the Display Organiser with your rating and documentation when requested.

#### OR 10.1.2 Display Organiser Responsibilities

A parachuting display must not be conducted except under the authority of a Display Organiser who must ensure that:

- (b) each parachutist involved in a parachuting display holds the appropriate:
  - (i) display rating; and
  - (ii) APF parachutist certificate class for the intended descent; and
- (c) any parachutist making a display descent has made at least three descents within the previous 90 days.

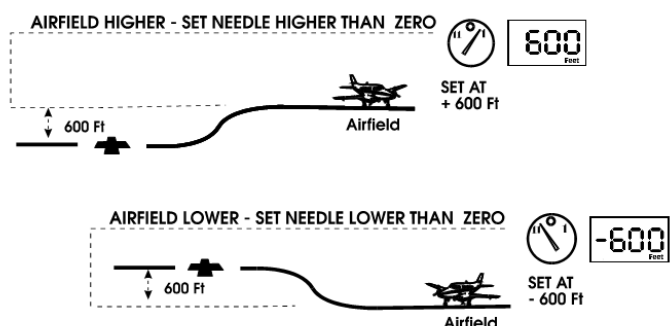
It is crucial to complete currency or practice jumps before adjusting altimeters for the landing area (LZ) altitude on a display jump, if landing at a different location. There have been cases where altimeters were set incorrectly because practice jumps were done at a different drop zone (DZ) before heading to the display landing zone (LZ), after already setting the altitude for the display location. This can lead to errors in altitude settings, as the altimeter may retain the offset from the practice jump. To minimize this risk, always try to visit the display LZ directly prior to the jump to ensure your altimeter is correctly set. If visiting the LZ beforehand is not possible, make sure to ask and note the LZ's altitude and reset your altimeter, audible altimeter, and AAD before taking off for the display.

## Part 4 AAD's, ALTIMETERS AND AUDIBLES

### 4.1 Altitude Offsets

When skydiving into a different LZ, it is crucial to offset altimeters, audible altimeters and AADs correctly to account for any altitude differences between the airfield and the LZ.

Altimeters must be set accurately before takeoff to ensure the correct altitudes are displayed throughout the jump. If the LZ is at a higher or lower elevation than the departure airfield, the altimeter needs to be adjusted to reflect this difference. Setting these instruments correctly is essential for accuracy.



## 4.2 Altimeters

Electronic altimeters vary in functionality depending on the brand and model.

These differences include: resetting the altitude offset after 14 hours, resetting when the device is powered off and resetting automatically after landing. In contrast, others will not change the altitude offset unless the user manually adjusts it.

You must read the manual for your device to understand how your device functions.

For example: It has happened that a team jumping into a LZ 500 feet higher have set their altimeters at 500 feet above zero on the airfield. This resulted in everyone opening 1000 feet below planned opening height.

Incorrectly setting an altimeter like this doubles the error!

## 4.3 AADs

Like Altimeters, AADs, must also be preset to the correct altitude of the LZ. Each AAD has specific instructions on how to set altitude offsets based on the DZ's elevation, and failure to adjust could result in premature or disastrously delayed deployment.

Similarly, AAD altitude settings will vary between devices, and each brand displays the altitude in a different format. Some units will show an offset altitude with specific numbers or symbols on the screen, while others use a different visual reference. You must be familiar with the specific AAD you are using for proper setup.

It is also crucial to understand that not all AADs function the same when it comes to resetting to ground zero (the reference point) after landing. Some AADs will automatically reset their ground zero to the location after landing at a different LZ. This means that the AAD will recalibrate its altitude readings to reflect the new location. Other AADs retain the original ground zero reference (the takeoff altitude) and will not reset after an offset landing. This could lead to inaccuracies in altitude arming if the AAD is not reset. It's important to check whether your AAD resets the ground zero after landing and adjust your settings accordingly for the next jump.

You must read the manual for your device to understand how your device functions.

## 4.4 Audibles

Audible altimeters should also be adjusted accordingly. If the audible altimeter requires a laptop to change settings or cannot be adjusted at the time, it is recommended to turn off or remove the audible altimeter for that jump. Failure to do so may result in inaccurate altitude alerts, which could be distracting or confusing and can affect decision-making and your safety during the jump.

To avoid these risks, make sure to either zero your audible at the DZ before the jump or adjust the alarms accordingly.

You must read the manual to understanding how your device functions.



Warning! Correctly setting your altimeter, AAD, and audible altimeter ensures altitude accuracy, helping to prevent deployment, parachute flight and landing pattern errors that could jeopardize your safety and the safety of others. Always double-check settings for all devices before takeoff, especially when jumping into a different LZ. Failure to do this can and has resulted in serious injuries and deaths.

## **Part 5 THE DISPLAY**

### **5.1 Briefing**

A display jump is not just another jump. You will be jumping into an unfamiliar area, potentially over a town. Caution is advised to those carrying a banner or flares or if you are new to the aircraft type. You must ensure that you are thoroughly briefed on all aspects of the jump. This is the Display Organiser's responsibility, however it is your responsibility, and in your own interests, to ensure that you are fully familiar with all aspects of the jump. If in doubt, do not get into the aircraft!

Are you fully confident in:

- The location and size of the landing area and the hazards there?
- The weather conditions at the time of the display?
- Setting your altimeter, AAD and audible for this jump?
- Who is the loadmaster? Who is spotting the aircraft? Who organises the exit height and exit order?
- Your jump plan, in freefall and under parachute?
- Handling any special equipment such as PFD, flag or flares?
- The location of wind indicators at the landing area and the direction of the prevailing winds?
- Alternative landing areas should you have a bad spot or low opening?
- What to do after landing and your exit from the display landing area?
- The Equipment you are jumping into the display?

### **5.2 Jumper Responsibilities**

There are two main priorities when doing a parachute display:

1. SAVE YOUR LIFE
2. LAND COMPETENTLY

Every other consideration, whether RW or CRW, is of secondary importance. Special attention needs to be considered with any form of movement jump. Wingsuit, tracking or angles jumps must be led to a location which ensures all jumpers will easily get back to the landing area, should only be conducted with an experienced leader and with Display Organiser approval.

In all cases ask the questions: What is the main purpose of the display jump? Is adding RW, tracking, angles or CRW really necessary? Will it add to the benefit of spectators or add unnecessary complexities?

As an experienced parachutist, you already have the knowledge and experience to perform safely under normal conditions. The next priority is arriving accurately on target. The ability to handle a parachute effectively is what separates a skilled display jumper from an unskilled one and often determines whether a display is executed well or poorly.

A tight display landing area is going to require focused accurate parachute handling and well practiced techniques. There are a few basic rules that can be applied to most displays and there are also a few very basic errors that can cause an off landing. Two of the most common are going too far downwind on a windy day or setting up too close (tight or hot) on a low wind day, both which will be covered later in this guide.

### **5.3 Personal Presentation**

Display jumps are an important part of presenting parachuting positively to the eyes of the public. As a display jumper, you should be suitably attired. Scruffy jeans and tee-shirt are not acceptable for displays. If your Display Organiser does not supply or specify a uniform, then either neat casual clothing or your regular jump suit is probably the most appropriate dress. By participating in a display jump, you become an ambassador to the sport. Behave professionally and demonstrate the expertise and discipline that is required in skydiving. It is not a 'cowboy' activity.

## 5.4 Spotting and Loadmastering

One of the most important safety aspects of the display.

Displays have more factors to consider than regular loads at a DZ. Not only do you have the safety of the jumpers on the load to consider, but also the added responsibility for the safety of the general public and show spectators.

If you are the loadmaster, factors you should be considering, and which should be discussed with the Display Organiser, are:

- Is the exit point over a clear area and visible to the crowd?
- Have you allowed for any high openings or flag jumpers that may be planned?
- Is there any other air traffic in the area?
- Do you have to get a "clearance to drop" from Air Traffic Control?
- Have you allowed for sufficient over-shoot and under-shoot areas?
- Do you have a plan 'B' if you cannot get the desired height?
- Have you considered the meteorological report in relation to wind speed at various altitudes?
- Have you briefed the pilot? Briefing the jump pilot will need to be comprehensive.

Loadmastering a display load can be a difficult task; it can also be quite simple provided you are well prepared and practiced in what you are doing. In the past, skydivers would use drifters<sup>1</sup> as a primary tool to assess wind conditions and estimate where to spot an aircraft for a jump. This process was especially important in areas where weather forecasting was less precise, and wind conditions could vary significantly.

However, with advancements in technology, we no longer rely on drifters for this information. Modern weather forecasting, including area forecasts, and GPS systems onboard aircraft now provide more accurate and real-time data about wind speed, direction, and other relevant factors at different altitudes. Inform yourself and use this information to spot with precision.

Above all do not be afraid to cancel the display if your judgement tells you to: don't be hassled by the team who may want to jump under any conditions - there is a lot at stake.

<sup>1</sup> Drifter – A piece of lightweight material attached to a small object, released on the way to height. To be carried by the wind to observe its movement and direction in order to estimate wind conditions for determining the spot.

## 5.5 Orientation

It can be surprisingly easy to get lost over an unfamiliar LZ especially in an inner city or suburban area. It is not uncommon to find you cannot locate the target area immediately on opening. Stay cool, go into deep brakes and make a systematic search of the area in quadrants and remember to look straight down. Watch where other jumpers are heading, as this will give you an idea of where to look. The best way to avoid this problem is to be prepared: have a good idea of what the area looks like before you get into the aircraft, and when you fly over the top of the LZ have a good look around and locate suitable landmarks before you exit. Look at the forecast, use the location of the sun and know what the spot is so you have a degree of accuracy for where you should be open.

## **5.6 Flying your Parachute**

The public wants to see parachutes flying and landing. Do not hang about up wind longer than is necessary: the public wants to see you. (But do not get caught out by coming back too far, too soon in stronger winds).

Gentle spirals are enough to please the crowd. Radical turns can be observed as loss of control. A stadium staggered landing is important to give other jumpers and yourself clear airspace while coming into land. Be alert and keep your eyes up and around you to find your place in the stack. Remember TAPS (Traffic, Altitude, Position) and consider exit orders and wing loadings. If you're higher loaded then get down below those following to give them some space, if you're lighter loaded, sit on brakes if required.

If you are not doing CRW, a follow-the-leader pattern is a crowd pleaser, with each jumper a little above and behind the previous one. Non-contact CRW can be a very attractive spectacle but you do need to practice this at your own DZ first.

## **Part 6 LANDING**

### **6.1 Traffic**

If you are not the lowest or first in, then paying careful attention to the jumpers below you as they make their approaches can give you valuable information of the conditions and strength of the wind. There is often less wind inside a stadium than outside and if the first jumper does get caught out then there is a lot less excuse for anyone following to do the same thing.

A common problem with inexperienced display jumpers or badly organised display jumps, is traffic on final approach. This can present an extremely dangerous situation especially when everyone has all their concentration centred on landing accurately or perhaps flying in close proximity to obstacles.

It is easy to feel that you do not have a traffic problem at 1500ft when there is plenty of airspace around you. That can easily change on final when you have other parachutes coming in at different angles and heading for the same target. The best way to avoid this situation is by carefully planning the display and including exit separation, vertical separation, flying and landing in the stack with the specifics of landing directions and set ups in your briefing. This is especially important if the wind is light and variable.

For example, if you have a very tight landing area it would be unwise to plan a single jump run at 3,000ft with five jumpers. It would be better to plan a second pass or alternatively exit higher and stagger the opening heights. Descent rate and wingloading under parachute should be used to plan the landing order.

If you do find you are on the same level as other jumpers then it may be necessary either to spiral or front riser down to get below them, or if high then sit in brakes to create vertical separation. CRW can also present traffic problems; again, anticipation and planning is the answer. It is worth noting that a parachute formation has right of way over a single parachute.

## 6.2 Too Far Downwind on Approach

The basic golden rule here is not to get downwind of the landing area.

Many pinpoint landings have been missed by taking a downwind leg over the top of the arena and turning into wind over the crowd only to find you are descending vertically and not penetrating into the wind. Staying upwind of the target needs to be practiced in windy conditions. The best time for this is during normal drop zone jumping. You can set up just in front of the target and slightly off windline, edging backwards while crabbing onto the windline. In winds of about 12 knots and above it is not a difficult technique. It does however need practice. If you find that you have blown an approach and are over the heads of the crowd, there can only be one thing to do: land outside the area clear of the crowd. A low turn, downwind landing or landing in a crowd is not acceptable.

## 6.3 Too Tight on Approach

Again, a basic golden rule is: on low wind displays, do not be on finals too high.

This does not mean a low hook turn but may mean turning onto finals later or lower than usual. It can be extremely uncomfortable to turn into wind at 200 feet over ring centre and find that you're on deep brakes and still creeping towards the upwind edge of the landing area or worse still the crowd. In light winds it is not always necessary to be exactly on wind line. You can consider making your final approach along the diagonal of the arena rather than straight across, giving yourself a longer line to land on. This technique is not considered a normal accuracy practice and may be shunned by competition accuracy jumpers. Again, a low hook or a stall in this situation can be dangerous. The solution is careful parachute control. For some demos you may need to be confident in deep brakes and capable of getting in and out of sink without losing control. Practice is the key. The classic competition accuracy techniques and principles do not always apply to display jumping but learning classic accuracy will go a long way towards helping you avoid this kind of error in setting up your approach.

## 6.4 High Performance Parachutes

High performance parachutes are not always appropriate for demos and should only be jumped if you are familiar and consistent flying them. A display is not the time to be jumping an unfamiliar parachute and it is definitely not the time to find out just how much space you require to land in. This is especially important if you are just starting to jump a higher performance parachute. Often tight display sites are fully surrounded which helps to block off any wind, but it can also produce rotors which can suddenly cause you to be travelling downwind on finals. Not a good situation if you are jumping a parachute which already has a forward speed of 25 - 30 knots. If you are going to fly a parachute of this sort, ensure you have the skills and practice to land in all wind conditions.

Keep in mind that landing in an unfamiliar LZ will require you to plan your approach with more care than usual. It is a good idea to discuss your approach with other jumpers on the display and set up a landing pattern. In this way everyone is flying a planned, predictable pattern and you can concentrate more on your own approach and landing rather than worrying so much about what everyone else is doing.

## **6.5 Landing Area Size and Approval**

Your certificate and display rating allows you a minimum area to land in and the Operational Regulations (OR) and Regulatory Schedules (RS) specify how close to the crowd or an obstacle you are allowed to land. This leaves a distance for you to land in. If you have any doubts about your ability to land in the space available, then you should discuss it with the Display Organiser. If you need a particular runway direction kept clear, make sure this is discussed with the Display Organiser and made known to the GCA. You need to be the judge if you are capable and confident to be able to land in the designated landing area, be honest with yourself about your abilities and headspace. Have you proven that you are accurate and consistent enough? Do not hesitate to say no to a display jump you are not 100% confident with.

Display landing requirements can be found in OR 10.1.4 and RS 58 10.2.

## **Part 7 OTHER FACTORS**

### **7.1 Bad Spot**

The best laid plans can go wrong, so always be prepared for a bad spot. You may be able to salvage your situation if you recognise it in time, so it is beneficial to be constantly aware of your position, even in free fall. The more aware you are, the better chance you have of not being caught out. If you find you are a long way upwind of the LZ under parachute it may be possible to apply a little brakes on the downwind run to the target area. This may give you some extra parachute time allowing you to cover more distance than if you stay on full drive (this only works running with the wind). If you are caught too far downwind then reduce your profile into wind by tucking your legs up or lift them up in front of you to burble your body and collapse your slider to get back.

Another problem is letting your mind wander or not remaining attentive to your position. This can occur if all your attention is on your jump and the people you're jumping with or building a CRW formation or losing altitude spiralling. You need to remember that your major priority is to land safely in the target area. If you cannot salvage the situation and an off landing is inevitable (or even at all likely) then start looking for your suitable safe off landing area. Pay particular attention to hazards such as powerlines and street traffic: if you can't see powerlines then assume they are along all roads and lead to all buildings and houses; they are also found at cross roads.

### **7.2 Turbulence**

Turbulence can cause a parachute to collapse, stall, make an inadvertent dive. Even high performance parachutes with their studier construction can collapse in turbulence.

Although strong wind can cause problems such as lack of penetration and downwind landings, turbulence is the greatest danger with strong winds. Stronger wind increases turbulence and can extend it further downwind.

It is important to note that turbulence can also be present with lower winds and is often exacerbated on hot days. You can encounter turbulence to some extent on almost every display jump. Buildings, trees and ground features cause turbulence and there is no simple answer for dealing with it if its unavoidable. You should be in the habit of looking for anything upwind of the landing area which may cause turbulence as this will give you an indication of when to expect to encounter it. Turbulence can also be experienced on the downwind side of a stadium or arena, when wind hits an obstacle. Flying in full drive will help keep the parachute pressurised, if you do have a parachute collapse close to landing height then there is only one option, apply full brakes and prepare to PLR.

Wind shear and rotors can also cause problems for a display jumper, so it is important to understand this type of turbulence. When a ram air parachute passes through a wind shear or rotor it suddenly shifts from flying into wind to flying with a tail wind. This causes the parachute to surge forward attempting to pull the jumper with it. However, because less force is required to rotate the parachute forward than to overcome the jumper's inertia, the parachute often rotates to a position level with the load (you the jumper). This leaves you without control until you swing back under the parachute. If brakes are applied immediately after passing through the wind shear, the parachute's forward surge can be reduced.

Wind shear and rotors are likely to be found when descending below the roof of a grandstand or behind a tree line. They are generally caused when the direction or velocity of the wind changes when it hits an obstacle, sometimes dramatically. There is little that can be done except to anticipate them and be prepared to react. Ground smoke and wind drift indicators are useful tools when trying to anticipate either turbulence or wind shear. In a large stadium it can be beneficial to have ground crew with smoke on the roof of the stadium (to indicate the winds outside and above the stadium) and at centre of the landing area (to indicate wind and air movement inside the stadium).

### 7.3 Thermals

Thermals can be encountered to varying degrees at almost any display. Although they are not usually a major problem, the lift generated by a hot grandstand roof or even a large crowd can give you quite a bump. Anticipate them and make allowances. Competition accuracy approach practice will help you to learn how to handle a parachute in these conditions.

### 7.4 Flags

The use of any equipment, even different clothing, for display purposes that is not normally used during drop zone jumping can create a new set of problems. The golden rule is: test every piece of equipment on the DZ first, not on the display.

This is especially true for more complicated jumps like flag jumping.

*APF Equipment Standard 260721-A APF Design Standard for Flag Assemblies* refers to requirements for the carriage and attachments of flags. These requirements include:

- (i) comply with the design standard in *APF Equipment Standard 260721-A*,
- (ii) be approved by a STO or Rigger,
- (iii) be used on 2 training jumps prior to a display,
- (iv) if a flag recovery parachute is fitted it should be trialled on one of the 2 training jumps, and
- (v) be used in accordance with the APF Display Manual rules.

For the purpose of this standard a flag is defined as "a flag, banner, streamer or any similar equipment that has a weight attached and is carried by a parachutist and which may constitute a danger to the public".

If you are planning carry a flag, then you will need to refer to *APF Equipment Standard 260721-A* which is Appendix One of this training guide.

The APF regulations (Part 10 – Parachuting Displays) lists specific requirements that must be met before any jumper may carry a flag on a display jump.

## 7.5 Smoke and Flares

Smoke can be very spectacular under parachute or in free fall. However, it is dangerous. When considering taking any pyrotechnic, smoke or flares, on a display jump, two aspects need to be considered: Firstly, is it allowed to be carried in an aircraft, under Civil Aviation Safety Regulations (CASR)? Secondly, can it safely be used on a skydive in general, and a display jump in particular?

The carriage of pyrotechnic flares other than category 1.4G have been deemed illegal under the "Carriage of Dangerous Goods" Act and must be approved for transport under CASA regulations. Pyrotechnic flares are those that produce smoke by heat and most flares fall into this category. These flares also require special means of attaching them. Cases of dropped flares have occurred and hot flares have been known to produce enough heat to burn through metal attachment brackets, wires or chains.

The safest flares are "cold smoke" or powder smoke trails. If you speak to some of the older display jumpers you can hear stories from the "bad old days" of jumpers being hospitalised with a foot badly burnt by a smoke flare. There has also been a fatality in Australia where a deployment bag became entangled with a foot mounted smoke bracket. Smoke can also present a very real danger to the pilot and the safe operation of the aircraft if the flare is ignited inside the aircraft during flight.

Most smoke flares are generally toxic and dangerous to anyone breathing the fumes. This applies to the parachutists, the GCA or even spectators. They can also present a very real danger if allowed to start a fire in dry grass, especially in rural areas. (Make sure your ground crew has a metal bucket ready if this is a possibility).

Pyrotechnic night flares are also extremely dangerous and are illegal for carriage in an aircraft without approval. Most incidents with these types of flares have been caused by the flares being inadequately secured. These flares can also produce enough heat to burn through heavy wire, metal brackets and especially clothing and flesh. It also takes very little imagination to envisage the amount of damage a flare of this type could do if released or dropped over a populous area.

## 7.6 What Impresses the Public

Complex skydiving RW manoeuvres don't always impress non-jumpers as much as smooth looking ones that are to us quite simple techniques. Sequential RW on a display is really a waste of time and the audience will not appreciate what is going on. On the other hand, show organisers have been ecstatic with a simple triplane from 3000ft landing right on the cross.

A high altitude exit is unlikely to impress, unless you have a large aircraft and a lot of jumpers. What a crowd may really appreciate is a simple relative work display from a medium altitude. A simple star, built slowly allowing the spectators time to see each jumper dock and then perhaps opened into a line, can be very spectacular, or a starburst with smoke is always a great visual. Similarly, complex CRW formations are not always as spectacular as smaller ones built at a lower level. A large formation built high takes a long time and it can be difficult to hold crowd attention, it is also much more difficult to spot for larger, high loads. If you do exit high use a smoke trail from the aircraft on at least one of the jumpers.

Anticipation and suspense is what the audience appreciates. Do not get too specific about your intentions, this could backfire if you fail to build the planned stack or 10 way, and no matter what you choose to perform on the display, remember that the show is not for you, it is for the audience.

Soft, stand up landings are a must, the crowd will always cheer when achieved. The crowd won't be impressed by high performance landings if you're not accurate or if you are sliding in. They will be more impressed by someone who stands up in the centre or on the target.

As you land, let your parachute settle and turn and face the crowd. Do not turn your back, you are still on stage. Wave and point to the descending parachutes, but do not become a spectator. Keep moving and smiling. Be sure to watch for parachutists landing after you and avoid being in their way.

The display does not finish with all the jumpers landing. The Display Organiser should have a pre-arranged place for the jumpers to gather and leave the area waving and smiling. Alternatively, you could continue the show by lining up and waving to the crowd. You can gain further mileage for our sport by giving a packing demonstration after the jump. Have the commentator announce the time and place for this.

## **7.7 Skydive into a Stadium**

Organising a skydive into a stadium, during a crowded event, presents a unique blend of excitement and complexity. This can be a spectacular experience for attendees and is great promotion for skydiving. However, it requires careful planning and consideration of various challenges to ensure individual and public safety.

These demonstrations involve the Display Organiser to navigate the regulatory and legal landscape. Securing the necessary permits from local governments and agreements with Airservices can be a complex and time-consuming process.

Flying a parachute into a confined space like a stadium introduces additional technical challenges. You must navigate to a small landing zone accurately, with a tight approach, flying over crowds of people. There have been incidents where parachutists have flown and crashed into crowds and the consequences, attention and ramifications for individuals can be life changing and damning for the reputation of skydiving and the sports public image.

Obstacle avoidance is a critical aspect. You may need to manoeuvre around stadium light poles, flag poles, scoreboards, grandstands filled with spectators, which can generate turbulence and lift from body heat and cheers from the crowd. All of this requires heightened awareness and focused navigation. Turbulence can further complicate the descent, leading to unpredictable changes in altitude and direction, increased descent rates, and challenges in maintaining steady flight. Wind conditions can be unpredictable, even light to moderate wind can generate a large amount of turbulence in a stadium.

The human element cannot be overlooked. Your experience level significantly impacts your performance. Remaining calm and focused during the jump is essential for making good decisions. Stress and anxiety can affect decision-making and performance, particularly with the added pressure of a crowd. Practice jumps, and mental preparation are vital for jumpers to effectively manage these pressures.

The perception of the events like this are closely tied to regulatory adherence and professionalism. If the public feels that the event is not well-regulated or organised, they may view it as reckless.

Positive engagement with the community, including opportunities for participation and dialogue, can further enhance public support. So, keep your ego in check and act professional while engaging with the crowd.

Display jumps into a stadium at a high-profile public event are best left to very experienced display jumpers, and very experienced Display organisers (DO), and should only be considered in optimal weather conditions.

## **7.8 Personal Flotation Device (PFD)**

Before jumping on a demo near a body of water, it is essential to have and know how to use a Personal Flotation Device (PFD) and follow several key safety steps to ensure your safety. First, make sure the PFD fits securely and is in good condition. Inspect and test the PFD to confirm it is in date and functioning properly. Make sure you know your water landing procedures and are prepared, shoes and clothing can impede your ability to swim, and helmets will prevent you from being about to put on your PFD. Proper briefing and training are vital, including knowing how to wear the PFD and how to inflate it manually if necessary. Disconnect the RSL before landing in water and ensure your helmet visor is open. When preparing for the landing, aim to land into the wind and as close as possible to

any boats, while staying beyond the breaking waves. Just before water impact, take a deep breath and hold it. Perform a normal flare and aim to enter the water as vertically as possible. When in the water, cut away the main canopy inflate the life jacket. If you become entangled in the canopy, stay calm and free yourself. Stay near your equipment for visibility and conserve energy while waiting for rescue.

If a display is planned as an intended water jump, it will require additional planning with additional safety measures. This will include a full risk assessment, thorough water landing training, use of appropriate equipment, and adequate watercraft on standby to retrieve the jumpers.

## **7.9 Malfunctions**

Before you decide to go on a display jump, consider the type of reserve parachute in your system. You may never have used this before. Ask yourself whether you'd feel confident completing the display and landing safely on the display DZ using only your reserve.

You may be happy using your main, knowing it's speed and descent rate, and feel comfortable landing that in the prevailing weather conditions. But will you be equally comfortable using your reserve? An F111 reserve will not have the same flight characteristics, flare and stall point, size, speed, penetration or stability in turbulence your main parachute has.

At a regular DZ, Sometimes the decision is made to land with our main parachute and/or freebag to ensure it isn't lost. On a display, the main priority is to land safely. As most displays are done in urban or built-up areas, you may be much lower after a malfunction and cut-away. If an off-DZ landing is required, finding a safe landing area early will be your main priority. Do not attempt to land close to your main.

The ground crew should be briefed to check for malfunctions and then attempt to chase and find the equipment wherever it lands.

## **Part 8 OPERATIONAL ROLES FOR A DISPLAY JUMP**

### **8.1 Display Organiser (DO)**

The Display Organiser is the key figure responsible for the overall planning, coordination, and safety of a parachute display. The DO selects and oversees all personnel involved, including parachutists, the GCA, the DZSO, and aircrew. They ensure that all participants are properly qualified, equipped and competent, and that the drop zone complies with APF standards. The DO is also responsible for ensuring the crowd is managed safely and that wind indicators, exit point and aircraft are suitability. Additionally, they must ensure full compliance with APF and CASA regulations, maintain safety throughout the display and conduct the operation professionally. Record keeping and reporting to the APF are also part of the DO's responsibilities.

### **8.2 Drop Zone Safety Officer (DZSO)**

Display Organisers (DOs) must select and appoint a Dropzone Safety Officer (DZSO) for parachute displays who are suitably experienced.

DO's must consider the experience, currency and suitability when choosing a DZSO, not only based on their experience in display jumping, but also based on the type of display, the complexity of the jump and the public profile of the event.

Being a DZSO at a display is a big responsibility and not one to be taken lightly. They make decisions at the event regarding weather, procedures, and ensure the jumpers are briefed and ready for all aspects of the jump.

## 8.3 Ground Control

### 8.3.1 Ground Control Assistant (GCA)

The Operational Regulation require that the Ground Control Assistant (GCA) be an APF member trained in accordance with the APF Training Operations Manual. It is the GCA's job to ensure that the DZ is cleared and safe before giving the "clear to jump" signal. As with other GCA's, a main responsibility is communication between the ground and the pilot/aircraft.

On a display, the ground crew have a lot more to do than the GCA at a regular DZ. In addition to the normal duties, it may also include preparing the landing area for the jumpers (providing wind direction, landing direction and a specific ground target area), ensuring the landing area is kept safe and clear of people or obstacle and communicating with the event organisers and public announcers. On very simple displays all of this can be done by one person, but in most cases, it is best to have a ground crew team, with several people each responsible for specific duties.

A poorly equipped or briefed ground crew can ruin a display. It will simplify matters if you have a ground crew kit containing:

- Orange traffic cones to section off landing area, if required.
- Large target panels - the larger and more brightly coloured the better.
- Pegs to secure target panels if there is some wind.
- Smoke or any other special equipment you plan to use.
- A portable wind indicator (long stick with streamer attached, wind blade or windsock).
- Windmeter (Anemometer)
- A radio for aircraft contact.
- Assorted items such as; spare money, first aid kit, pull up cords, rubber bands for packing, commentator's sheet, jumping pamphlets, plastic bag for rubbish and perhaps a loud hailer that could be used for crowd control.







### 8.3.2 Crowd Control

A crowd of any size presents a special set of problems for the GCA. If the LZ is, for example, a football stadium then crowd control is simplified as the landing area will usually be fenced off from spectators. However, if the display is onto a beach front Mardi Gras, then there may be problems keeping the spectators clear of the designated landing area. A single GCA can hardly be expected to keep thousands of people back if there is no fencing. These problems should be discussed by the Display Organiser with the festival organisers and if necessary additional crowd control marshals should be appointed. These marshals should be wearing something that distinguishes them from spectators and indicates they have some sort of authority over the display.

You do not suddenly want to find after setting up for a final approach onto the target that your landing area has disappeared into a sea of upturned heads. A nasty situation especially when children are involved.

### 8.3.3 Ground to Air Signals

The GCA will also oversee the target panels which can serve the dual purpose of indicating the target centre and also be used to communicate signals to the aircraft. There are different methods of using these panels to signal the aircraft and the jumpers. To give you a couple of examples:

 Do not jump, land aircraft	 Do not jump yet, orbit aircraft	 Clear to jump now
 strong wind, clear to jump now. < arrow points into the ground wind.	 moderate wind, clear to jump now. < arrow points into the ground wind.	 light wind, clear to jump now. < arrow points into the ground wind.
<p>Important –</p> <p>These are not all official APF ground to air signals. The point to remember about signals of this nature is that they must be predetermined and fully understood by both the jumpers and the GCA.</p>		

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## **Part 9 FINAL THOUGHTS**

This training guide is not meant to be an exhaustive "how to do it" manual. It is an amalgamation of extracts from various articles including extracts from a British article "Additional Notes On Displays" by Ray Ellis.

Display jumps can be a most enjoyable part of skydiving. Remember that the APF Operational Regulations make you responsible for compliance with not only those regulations but the Regulatory Schedule, Display Manual and other advisory documents relating to displays. Log the jump and the notification number issued by the APF to the DO as evidence of currency and to aid in future applications and renewals.

With appropriate planning and preparation and a responsible attitude to weather, display jumps can be conducted safely for both spectators and jumpers alike.

Experience is the name of the game and jumpers new to display jumps should not be shy in asking experienced display jumpers for their assistance and opinions. There are some very proficient, professional display jumpers in Australia, most of whom would be happy to pass on their knowledge. If you are unsure of who you can talk to for this sort of information, ask at the APF office for names and contact details.

Your Safety and Training Officer or an experienced, Display Organiser is also an ideal person to talk to regarding any aspects of display jumping and regional display requirements.

As a display jumper performing for the public, you are a representative of the Australian Parachute Federation and your fellow parachutists, and you should behave accordingly. It will benefit the display and parachuting in general if you perform in a professional manner.

The future of parachuting as a sport relies heavily on our public image.

## **Appendix One**



# **AUSTRALIAN PARACHUTE FEDERATION**

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## **EQUIPMENT STANDARD No. APF260721-A**

**Issued 26 July 2021**

(Replaces APF RAC222B dated 01 July 1995)

**SUBJECT: APF DESIGN STANDARD FOR FLAG ASSEMBLIES.**

**STATUS: MANDATORY**

### **IDENTIFICATION:**

For the purpose of this standard, a flag is defined as a flag, banner, streamer or any similar equipment that has a weight attached and is carried by a parachutist and which may constitute a danger to the public.

### **BACKGROUND:**

The APF requires that equipment used for the carriage and attachment of flags on a display shall:

- (i) comply with the design standard in this Equipment Standard,
- (ii) be approved by a STO or Rigger,
- (iii) be used on 2 training jumps prior to a display,
- (iv) if a flag recovery parachute is fitted it should be trialed on one of the 2 training jumps,  
and
- (v) used in accordance with the APF Display Manual rules.

### **APF DESIGN STANDARD:**

For the purpose of this standard equipment shall be classified by size and/or weight as follows:  
(should the equipment fall into 2 categories re. size/weight, it shall be classified in the larger)

Small, up to 1000 sq ft or 12kg total weight.

Medium, from 1001 to 2000 sq ft or 30kg total weight.

Large, 2001 to 5000 sq ft or 50kg total weight.

Very large, over 5000 sq ft or over 65kg.

**CONTAINER:**

The flag container shall be constructed to securely retain the flag and weight assembly to the parachutist during freefall and canopy deployment. Although the design may not need to cope with terminal velocity opening shock loads it is recommended the design should retain the contents without inadvertent release or failure at 8g's. (8g's being equivalent to a hard opening).

The flag container assembly shall be constructed such that the flag and weight is not able to slump in the flag container (i.e., a reasonably tight fit).

The flag container should be constructed from robust material. It is recommended 420 denier parapac or equivalent be used for small and medium size flag containers and 1000 denier cordura or equivalent for larger sizes.

The flag container for large and very large flags shall be fabricated with structural webbing sewn externally to surround the flag container. The webbing shall incorporate the anchor points for attaching the flag container to the harness and the closing mechanism.

Where the flag container is mounted on the front of the body the width of the flag container shall not inhibit access to the cutaway and reserve ripcord handles.

The opening and closing mechanism on all flag containers shall incorporate a safety catch so that it requires two actions to open. Small and medium flags may use velcro and press studs (or similar). Large and very large shall use a multiple pin and loop closure system (or equivalent) with an operating handle that is itself secured to prevent inadvertent release.

**HARNESS:**

Flag assemblies will use a separate harness worn under the parachute harness, or a tandem parachute harness. A tandem parachute harness and tandem container is highly recommended as there are shoulder and side attachment points which are suitable for direct attachment of a flag container assembly.

**FLAG ATTACHMENT / RELEASE:**

Flag assemblies will incorporate a means of releasing an unpacked flag in the event of an emergency. Flags assemblies will incorporate a 3-ring release or equivalent release-under-load device. Where a 3-ring or similar is used the operating handle will incorporate a safety catch so that it requires two actions to release.

To avoid an offset load, flags shall be configured so that they are suspended from a central point below the parachutist.

A hook knife shall be carried on all flag descents. The hook knife shall be of suitable size and design for the equipment being used and shall be a suitably large hook knife which must be accessible both before and after flag deployment.

Where it becomes necessary to release a flag during the descent, the parachutist shall take every measure to reduce the risk of causing injury or damage to persons on the ground.

Flags, flag weights, flag recovery parachutes, and their attachment to the parachutist should not incorporate knots. Where knots are used the material strength shall be double that recommended under 'flag weight'. (Knots can reduce webbing strength by 50%).

**FLAG WEIGHT:**

The weight shall be contained in a bag constructed of robust material. 1000 denier cordura has been found to be acceptable. The weight bag shall have external webbing that surrounds the base of the bag and incorporates the attachment to the flag. The bag shall be free of seams at the base.

Material in the weight bag may be granular lead shot or sand (or equivalent), at no more than 5g per particle, are considered acceptable materials.

Materials used to transmit loads from the parachutist to the flag weight, including the leading edge of the flag, shall have a minimum tensile strength of (20 x the total suspended weight). Nylon is preferred over polyester for absorbing the loads associated with deploying the weight as nylon stretches up to 30% compared to 15% for polyester.

Hardware, where used, shall be forged and be free of sharp edges which could cause damage and/or failure of other materials. Webbing shall be synthetic. Sewing thread shall be of appropriate size and shall be of the same material as that being sewn.

**PARACHUTES USED FOR FLAG DESCENTS:**

The parachute assembly (including the reserve) shall be suitably sized to carry the combined weight of the parachutist and flag assembly.

Typical gross weights are:

Small 95kg (70 kg jumper, 15kg flag assembly, 10kg parachute)

Medium 105kg (70 + 25 + 10)

Large 125kg (70 + 40 + 15)

Very large 165kg (70 + 70 + 15)

**PACKING / DEPLOYING FLAGS:**

The packing of the flag shall be such that the flag is able to unfurl in an orderly manner. It has been determined that bringing the trailing edge of the flag up to within 1 metre of the leading edge, then folding the flag towards the leading edge (in container width folds) is an acceptable means of packing to avoid the flag forming a "spinnaker" and malfunctioning.

In order to prevent entanglement between the flag and the weight, the flag weight shall be stowed so it deploys before the flag.

Prior to a display jump the method of packing the flag and weight shall be trialed on at least two training jumps.

**APPROVAL:**

Prior to use at a display, and after any significant alteration, a flag assembly including its component parts shall be approved by a STO or Rigger.

**DISPUTE RESOLUTION:**

Where a flag owner/parachutist and STO/Rigger are unable to agree on the interpretation of this standard the matter shall be referred to the Rigging committee to resolve.

**COMPLIANCE DATE:** Immediately

**AUTHORITY:** National Aviation Officer, Safety and Training Manager

**DISTRIBUTION:** All STO's, Licensed Display Examiners, APF Riggers

## **Appendix Two**

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### **SAMPLE COMMENTATOR'S INFORMATION SHEET**

If the commentator is inexperienced in the describing a parachute display they should be provided with an information sheet to aid their commentary. The sheet should be bold typed and double spaced to facilitate reading it, perhaps in ring centre.

The information should be brief, interesting and to the point. It should be written well enough to allow it to be read directly to the crowd if the commentator does not wish to fill in with their own comments. "Cue" information may also be given to the commentator, i.e. jump run, exit & opening.

Selection of a suitable commentator is an important part of your display preparations. If you are to provide your own commentary you will require a person who is well spoken and presentable, remembering that they may also be considered part of your parachute display team. The person selected should have as much personal detail on the participants as possible and also a good background of general parachuting experience (not necessarily practical). They also need to have a prior knowledge of the alternative plan should there be weather problems etc. Additionally the commentator must be able to handle any situation that may arise in the course of the commentary. For example if there was a parachute malfunction it would be far better to explain the technical details of the problem to the spectators than to dramatise the situation. Well handled, this situation could leave the spectators feeling that the parachutists must be very professional and competent to have handled such a situation under the circumstances.

You should remember that the commentary can greatly affect the success of the entire presentation, and that a poor commentary may have an adverse effect on the public image of your team and our sport in general.

(sample commentary sheet)

### **THE SCATTERED ACES PARACHUTE DISPLAY TEAM**

#### **THE TEAM MEMBERS**

DAVE BLUEY - (all black parachute) DAVE IS CAPTAIN OF THE SCATTERED ACES PARACHUTE DISPLAY TEAM. HE HAS MADE OVER 1000 JUMPS SINCE HE STARTED PARACHUTING IN THE SYDNEY AREA BACK IN 1985. HE IS 30 YEARS OLD AND WHEN HE IS NOT PARACHUTING HE WORKS AS A COMPUTER OPERATOR. YOU WILL RECOGNISE DAVE BY HIS DISTINCTIVE ALL BLACK PARACHUTE. HE SHOULD BE THE FIRST TO TOUCH DOWN AS HE LEADS THE REST OF THE TEAM INTO THE TARGET AREA.

SUSAN WRIGHT - (blue striped parachute) SUE IS 25 YEARS OLD AND IS A PRINTER BY TRADE. SHE HAS OVER 800 JUMPS, MOST OF WHICH SHE DID AT HER HOME DROP ZONE IN PERTH. ONE OF SUE'S MOST MEMORABLE EVENTS WAS WHEN SHE PARTICIPATED IN AN ATTEMPT TO BREAK THE RECORD FOR COMPLETING THE MOST PARACHUTE JUMPS IN ONE DAY. THE ATTEMPT FAILED ALTHOUGH SUE MANAGED TO DO 50 JUMPS, JUST 5 SHORT OF THE RECORD AT THE TIME. SUE WILL BE JUMPING THE PARACHUTE WITH THE BLUE STRIPES ON HER DISPLAY TODAY.

DICK RODGERS - (rainbow, butterfly parachute) 22 YEARS OLD & SINGLE, DICK IS THE YOUNGEST TEAM MEMBER AND HAS HIS OWN BUSINESS SKIPPING YACHTS FOR OVERSEAS DELIVERIES. ALTHOUGH SPENDING A LOT OF TIME AT SEA HE HAS STILL MANAGED 900 JUMPS IN THE FOUR YEARS HE HAS BEEN JUMPING. DICK HAS ALSO BEEN SUCCESSFUL AT COMPETITION PARACHUTING. HE HAS TWICE BEEN SELECTED TO REPRESENT OUR COUNTRY ON THE AUSTRALIAN PARACHUTE TEAM IN

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COMPETITIONS OVERSEAS. DICK JUMPS THE PARACHUTE THAT HAS THE DISTINCTIVE "BUTTERFLY" ON ITS UNDERSIDE.

## **THE DISPLAY**

TODAY THE SCATTERED ACES WILL BE GIVING A DISPLAY OF FREE FALL MANOEUVRES FOLLOWED BY A TEAM ACCURACY DISPLAY.

THE DROP AIRCRAFT WILL FIRST CIRCLE OVER HEAD AT APPROXIMATELY 2000 FEET ABOVE THE ARENA AND ON THE 2ND CIRCUIT A STREAMER WILL BE THROWN TO INDICATE THE WIND DIRECTION AND STRENGTH TO THE TEAM LEADER, WHO WILL THEN CALCULATE THE EXIT POINT FOR THE ACTUAL DROP.

THE AIRCRAFT WILL THEN CLIMB TO A HEIGHT OF 6000 FEET AT WHICH TIME IT WILL BEGIN ITS JUMP RUN OVER THE ARENA HEADING INTO THE WIND. YOU WILL KNOW THEY ARE ABOUT TO JUMP WHEN YOU SEE A POWDER SMOKE TRAIL COMING FROM THE AIRCRAFT. YOU SHOULD THEN HEAR THE AIRCRAFT CUT ITS ENGINE AS THE TEAM EXITS THE AIRCRAFT.

YOU WILL SEE THEM MANOEUVRE THEMSELVES WHILST FALLING AT SPEEDS OF UP TO 200 MPH. THE TEAM WILL BE PERFORMING A BOMB BURST WHICH MEANS THEY WILL "TRACK" AWAY FROM EACH OTHER FOR 15 SECONDS TO SHOW JUST HOW FAR YOU CAN TRAVEL AT THAT SPEED. AT 3000 FEET THEY WILL BEGIN TO OPEN THEIR PARACHUTES. THE LAST TO OPEN WILL BE DAVE, HIS PARACHUTE SHOULD BE OPEN AT 2500FT.

DAVE WILL LEAD THE TEAM INTO THE TARGET AREA AND HOPEFULLY ONTO THE ACTUAL TARGET CROSS IN RING CENTRE. HE WILL BE FOLLOWED BY DICK AND SUE. AFTER LANDING, THE TEAM WILL GATHER THEIR PARACHUTES AND BE PICKED UP BY THEIR RECOVERY VEHICLE WHICH WILL THEN DO ONE LAP OF THE ARENA.

IF ANY MEMBERS OF THE CROWD WOULD LIKE TO TALK TO THE TEAM OR WATCH THEM PACK THEIR PARACHUTES THE TEAM WILL GATHER AT THE REAR OF THE BIRD PAVILION.

THEIR NEXT DISPLAY WILL BE CONDUCTED AT 2.47 PM THIS AFTERNOON.

## **SOME POINTS OF INTEREST**

### **PARACHUTES:**

THEY ARE CALLED RAM AIR WINGS. THIS IS BECAUSE THEY ARE INFLATED BY AIR BEING FORCED INTO THE FRONT OF THE CANOPY. THEY HAVE A FORWARD SPEED OF 25 MPH AND USE AERODYNAMICS SIMILAR TO THAT OF A HANG GLIDER. THE PARACHUTES ARE CONTROLLED BY STEERING LINES ATTACHED TO EITHER SIDE OF THE CANOPY. WHEN SKILFULLY CONTROLLED THEY PRODUCE A LANDING WITH THE SAME FORCE OF STEPPING OFF A CHAIR.

### **THE TARGET:**

THIS IS THE CROSS AT RING CENTRE. NOT ONLY IS IT THE AIMING POINT FOR THE PARACHUTISTS, IT IS ALSO USED TO COMMUNICATE TO THE JUMP AIRCRAFT. THIS IS DONE BY THE TARGET CONTROL OFFICER WHO MAY MOVE THE PANELS INTO DIFFERENT CONFIGURATIONS. THIS CAN BE USED TO ABORT THE DROP OR PERHAPS JUST TO DELAY IT FOR SOME REASON.

**FREEFALL:**

THIS IS WHAT WE CALL THE FALL FROM WHEN THE PARACHUTISTS EXITS THE AIRCRAFT UNTIL THEY OPEN THEIR PARACHUTES. IT IS POSSIBLE TO REACH SPEEDS IN EXCESS OF 120 MPH DURING FREE FALL. ONCE THE PARACHUTES HAVE OPENED THE DECENT RATE SLOWS TO A PLEASANT 10 MPH.

**AIRCRAFT:**

THE AIRCRAFT BEING USED BY THE "SCATTERED ACES" IS A CESSNA. USED EVERY WEEKEND FOR SPORT PARACHUTING IT IS A SINGLE ENGINE, HIGH WING AIRCRAFT AND IS PILOTED BY JOHN SMITH WHO IS THE TEAM'S REGULAR PILOT HE IS ALSO A VERY EXPERIENCED PARACHUTIST WITH OVER 1400 JUMPS. YOU WILL NOTICE THAT AFTER THE PARACHUTISTS HAVE JUMPED THE AIRCRAFT WILL PROBABLY CIRCLE OVERHEAD UNTIL THE PILOT HAS CONFIRMED THAT THE JUMPERS ARE SAFELY ON THE GROUND. IT WILL THEN LEAVE THE AREA AND RETURN TO THE LOCAL AIRPORT.

ALTERNATIVE PLAN SHOULD THE WEATHER CONDITIONS BE ADVERSE

IF THE CLOUD IS TOO LOW IT MAY BE NECESSARY TO FORGO THE FREEFALL EXHIBITION AND DO THE TEAM ACCURACY ONLY. THE LOW CLOUD MAY MEAN THAT ALL THE PARACHUTES WILL HAVE TO BE OPENED AT THE SAME HEIGHT. THIS MAY ALTER THE LANDING ORDER INDICATED IN THE ABOVE PLAN.

**DISPLAY ORGANISER CHECKLIST**

<i>Landowner's permission</i>		<input type="checkbox"/>
<i>Possible CASA/ATC permission</i>		<input type="checkbox"/>
<i>APF notification</i>		<input type="checkbox"/>
<i>CI approval if tandem</i>		<input type="checkbox"/>
<i>Qualifications for jumpers</i>	<i>Sporting licence in date</i>	<input type="checkbox"/>
	<i>Display rating in date</i>	<input type="checkbox"/>
	<i>Within currency &amp; current on canopy</i>	<input type="checkbox"/>
	<i>LM minimum Certificate D</i>	<input type="checkbox"/>
<i>Aircraft and pilot</i>	<i>Suitably prepared and qualified</i>	<input type="checkbox"/>
	<i>Pilot approved Pyrotechnics (if applicable)</i>	<input type="checkbox"/>
<i>Parachute</i>	<i>Packed and compatibility checked</i>	<input type="checkbox"/>
	<i>Reserve in date</i>	<input type="checkbox"/>
	<i>Appropriate for DZ and conditions</i>	<input type="checkbox"/>
<i>Personal equipment</i>	<i>Altimeter</i>	<input type="checkbox"/>
	<i>Helmet, jumpsuit, gloves</i>	<input type="checkbox"/>
	<i>Pull-up cord, elastic bands</i>	<input type="checkbox"/>
<i>Special equipment</i>	<i>First aid kit, Flag, streamer, smoke</i>	<input type="checkbox"/>
	<i>Costume/uniform</i>	<input type="checkbox"/>
	<i>For GCA: radio (frequency), target, smoke, WDI</i>	<input type="checkbox"/>
	<i>For GCA: metal bucket with sand or water</i>	<input type="checkbox"/>
	<i>Give GCA your gear bag</i>	<input type="checkbox"/>
<i>Inspected site</i>	<i>Hazards/obstacles</i>	<input type="checkbox"/>
	<i>Wind Direction Indicators placement</i>	<input type="checkbox"/>
	<i>Outs</i>	<input type="checkbox"/>
	<i>Altitude of landing area</i>	<input type="checkbox"/>
	<i>Can everybody get in safely?</i>	<input type="checkbox"/>
	<i>Size and shape matching Display ratings</i>	<input type="checkbox"/>
<i>What is the landing pattern?</i>	<i>Aerial map</i>	<input type="checkbox"/>
<i>Wingloading and landing order?</i>		<input type="checkbox"/>
<i>Altitude adjustment</i>	<i>Altimeter</i>	<input type="checkbox"/>
<i>Altitude adjustment</i>	<i>AAD</i>	<input type="checkbox"/>
<i>Remove or adjust</i>	<i>Audible altimeter</i>	<input type="checkbox"/>
<i>Meeting place</i>	<i>Time, place</i>	<input type="checkbox"/>
	<i>How do people get back to their cars?</i>	<input type="checkbox"/>
<i>Where they should be</i>	<i>DZSO and GCA</i>	<input type="checkbox"/>
	<i>Position the plane, and who's LM?</i>	<input type="checkbox"/>
	<i>Position in freefall/exit order if hop n pop</i>	<input type="checkbox"/>
	<i>Position under parachute? (Landing order)</i>	<input type="checkbox"/>

