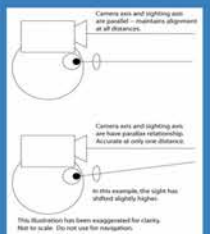
EQUIPMENT AND TECHNIQUES IN SKYDIVE VIDEOGRAPHY/PHOTOGRAPHY



BY STEVE CAMPBELL

INTRODUCTION

So you are a keen skydiver and are always striving for improvement in your skills and performance.

You have seen some skydive videos and are impressed with the sense of action and quality of shooting.

You have always had an interest in filming skydiving and trying to achieve the quality that you've seen in videos before, you would like to share with your friends the skydives that you do together, so why not look into it!

This is a common way that most skydivers start out when they want to get into skydive camera work.

Being a cameraflyer is not everyone's cup of tea. It requires a dedication to self improvement and attention to detail as well as meticulous planning and constant upkeep and maintenance of equipment.

The results of continual practice or the attitude of wanting to improve on each jump from the last one, will eventually reflect in the quality of your products be it filming or photography or both.

Along with getting to grips on camera work itself, you will no doubt notice an improvement in your overall flying ability. When you consider you need to maintain close proximity to jumpers on exit, fall slow to film slow subjects or formations, fall fast for freeflying or manoeuvre your body sideways to film around a formation, its no wonder your flying skills improve.

The art of freefall camerawork is extremely challenging and difficult to master and maintain, take it slow and safe and one step at a time. With practice, self determination and a willingness to seek advice from experienced cameraflyers, you will be able to see good results and achieve the quality of filming and photography that you and your fellow jumpers can be proud of.

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ABSTRACT

This work is intended to be a guide to some of the things you need to consider if you want to be a camera flyer and is in no way the be all and end all to freefall photography but a comprehensive guide to help you get started with a good amount of knowledge and ideas.
The intent is to get you to consider the choices and options available, and to try to match that with the intended use of the camera.
I intend to cover types of equipment used to film and photograph skydiving, the techniques used by camera persons to achieve a desired result, and the technical side of operating cameras in the skydiving environment.

The research on this subject was obtained from a limited number of articles that have been published on the internet and through skydiving magazines.

Other information was obtained from interviews and written reports from various camera people around the world and my own personal experiences.

Photos were obtained through the internet and from personal stock while permission was obtained for use of some photos in this work.

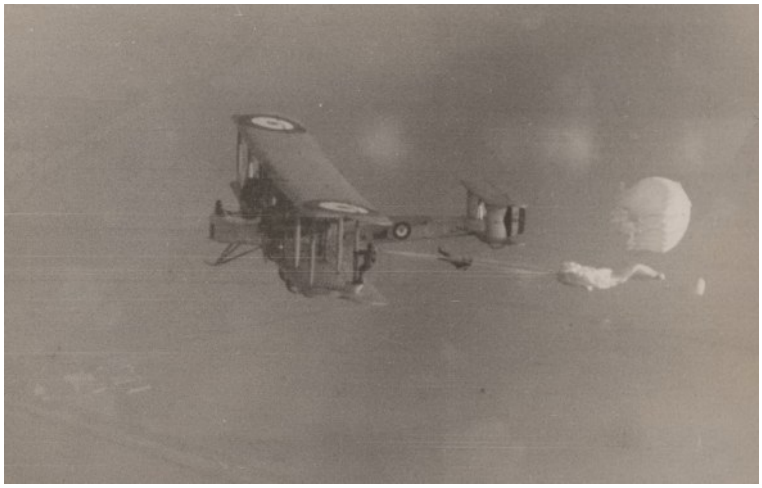
EVALUTION OF THE CAMERAFLYER

Over the last ten years or so video and photography equipment have changed dramatically.
Video cameras have gone from large analogue cameras with no LCD screen that use a large tape cassette, to smaller digital cameras with an LCD screen that use a small digital video cassette, and now the popular high definition cameras that use a memory stick instead of tape to capture images.
In the same token, stills cameras have gone from bulky SLRs or self loading cameras, to smaller pocket sized digital cameras that are a lot easier to use and have a great deal of different functions with the added bonus of viewing the photos you take instantaneously.

The first known pictures of parachuting in Australia were shot from the ground. In 1908 a smoke balloon jumper ascended in a balloon using smoke and heat from a fire to bring them aloft and was released at a height of 1500 feet AGL where the balloon would slowly drift back to the ground.

1916.A balloon observer leaves the basket of an 'AE' balloon using a 'Paulus' parachute.

1926.Photograph showing parachutists being pulled off the wings of a Vickers bomber as they deploy their parachutes.



Other forms of early photography were done from aircraft. In 1926 an air force officer jumped from a tiger moth aircraft and was photographed from another aircraft just after exiting the plane.

Photography and film of parachuting descents continued to improve but early on, were only conducted from the ground or from the doors, struts and wings of aircraft.

The first recorded uses of cameras in freefall were in the early 1960s where jumpers would hold onto a camera and take photos of their fellow jumpers in freefall.

Of course , the photos were often very blurry and holding the camera meant you had limited control whilst trying to maneuver your body. There was the added risk of loosing the camera altogether when the parachute opened.

Eventually stills cameras found their way onto helmets where they were mounted to allow ‘hands free’ photography.

Helmet mounted stills camera.1967.

The motorized camera appeared in the early 60s and eliminated the need to wind the camera on to take photographs .However, they were heavy and expensive and required good technical skill to operate.

The 1970s saw the introduction of a lightweight camera by Olympus which offered smaller size and weight and some automation. This made photography much easier and more accessible to the skydiving enthusiast.

Early 1960s motion camera setup. (United States.)

Movie cameras to date were mostly wind up types that ran for 30 to 50 seconds and used 8mm and 16mm film but 35mm cameras were beginning to capture never before seen close up aerial action that was finding its way onto cinemas in the form of commercials and some films.

Claude Gillard with gun camera.1964

Note the APF badge on his shoulder.

In the early 1980s,the ‘video age’ was upon us.

The first systems to be used in freefall used 8mm film and had a self processing cartridge but would only allow three jumps on each cartridge.

With improvements in technology came the first generation of true video cameras that picked up the image from behind the lens, which was a glass tube, and relayed it to the VHS or BETA tape recorders that were usually mounted on the chest and hard wired to the camera.

Early video camera setup. 1972

The second generation of cameras were smaller and used a small 30 minute VHS cassette.

In 1985 the camera and recorder were combined and the first ‘camcorders’ became available.

The new ‘video 8’ system was compact and light for the time and made the task of freefall filming so much easier.

High definition or ‘hi 8’ cameras were soon available and were able to offer a picture with sharper resolution.

Female camera flyer with HI8 camera and stills camera. Note the tongue switch in her mouth used to activate the shutter on the stills camera.

These camera became the mainstay of freefall videography at the time and encouraged more and more experienced skydivers to “strap one on” and film their jumps to put on instant display afterwards.

Meanwhile, the stills camera had improved with lighter weights, ease of lens changing and the all important electronic shutter release. This enabled the photographer to depress a small switch allowing a circuit to close and the photo to be taken. These were initially pressed by hand with a cord running up the arm to the camera, but soon mouth or tongue switches were used to take the photo.

The benefit of a mouth switch is that you do not need to run a cable inside your jumpsuit and allows your hand to be free of objects. It also means you can pick up your helmet mounted cameras as it is one compact unit that doesn’t require a long, awkward cable.

The late 1990s saw the introduction of the digital video camera.

Digital cameras top mounted and side mounted.

Sony seemed to be leading the way in digital camcorder technology and produced a camera that was smaller , lighter and had a much clearer picture than anything before. These cameras also had a colour fold out LCD screen that you could review and share your jumps.

The digital technology also allowed a very smooth slow motion playback and perfect still shot if the motion was paused! The cameras used a smaller DV or digital video tape to record on and could hold up to 90 minutes.

Digital stills and video setup. The camcorder is a high definition Sony HDR-HC1E HD / DV camera fitted with a Diamond 0.3 wide angle lens.

The next evolution was the introduction of the digital stills camera. Although the technology had been around since the early 90s,The first digital SLR designed and manufactured by a single camera company is released in 1999. It is 2.7 megapixels.

The cannon 300D digital SLR widely used in skydiving.

The photographer no longer needed to go to a film processing center to get their film developed. Now the memory card can be inserted into the appropriate machine and all the photos downloaded for viewing.

A skydive photographer prepares to exit the plane. Note the digital SLR mounted atop his helmet.

The side mounted digital camera was and still is very popular with freeflyers. Note the wide angle lens on the front of the camcorder.

The photographer could take more photos without having to change films, view them in higher resolution and then delete them and use the same card over again.

In 2003 Sony pioneered XDCAM, the first tapeless video format, which uses Professional Disc as recording media. Panasonic followed next year, offering P2 solid state memory cards as recording medium for DVCPRO HD video.

In 2007 Sony introduced XDCAM EX, which offers similar recording modes to XDCAM HD, but records on SxS memory cards.

Today , high definition video and stills cameras are used to film in freefall. They are smaller and lighter than ever before and offer crystal clear imagery with digital SLRs that have over 20 mega pixels for optimal clarity.

Sony HDR CX100 memory stick camcorder. Offers up to 3 hrs recording and 4 mega pixel still imagery.

Other features include a range of effects or enhancements and built in editing features which can enable the operator to create their own edited movie complete with special effects and titles.

The ability to view the film or photo directly after taking it is now also very efficient and convenient thanks to the LCD screens on cameras. And memory cards of various capacity can enable hundreds of photos to be stored and hours of footage.

On the market now are even smaller cameras that record images on micro SD cards. They are powered by a rechargeable lithium ion battery with up to a three hour life.

Four types of helmet mounted SD cameras

Showing their positioning and small size.

The lens angle can vary from 90 to 140 degrees enabling a wider angle of view.

They also come with a range of resolution settings which can effect the quality and recording time available on the SD card. High definition models are also available and offer a sharper picture.

Generally, these cameras lack the features and menu settings found on traditional camcorders. These new cameras are purely made to capture the image which can then be downloaded onto a computer and edited from there.

The evolution in camera flying with an SD camera to capture images.

Camera technology has advanced now to the point that cameras are miniature in size yet can provide a wide angle of view and a clear picture. Who knows what the future will hold for cameras but these advancements have allowed skydivers to film their jumps more easily and view them quicker than ever before.

GETTING STARTED & YOUR EQUIPMENT

When you first start camera flying ,it can be a lot of fun but frustrating at times also especially when you have spent a lot of money on your equipment and its not performing the way you want it to.
Over time you become more proficient at using your gear, and, as the quality and consistency of your work increases, you may reach a stage where people are willing to pay your slot in the plane to film them.
Everyone has a desire to improve their performance and quality of filming when first starting to fly the camera. This wont happen overnight but may take hundreds of jumps depending on the difficulty of filming and your individual flying skills.
It will take at least 50 to 100 jumps just to get used to having a camera on your head .You may not even be used to wearing a helmet let alone a firm fitting one .Your first jumps should be familiarization jumps only just to get used to wearing the gear and flying with it.
When you first purchase your camera equipment, you have to know what you are going to do with it. The same camcorder may be useful for tandems, AFF, 4-way, and Freeflying , but if you don't know which brand and model that is, you'll likely end up with something that does not do what you expect.

Sony is without question the most popular brand of camcorder that is found in the sport today. Sony builds top-quality equipment that is small and light, yet packed with features - some of which are useful and some of which are useless. Overall, the Sony line has a reputation for quality and is widely used - therefore it will probably be the easiest for you to learn and understand.

JVC is also popular, but many models do not offer Firewire ports (for perfect digital copies) and do not offer the same image quality as Sony.

The important features you need to look for in a camera are;

Lens thread

Some of the modern cameras on the market today do not have an internal thread inside the lens housing which you need if you intend to fit a wide angle lens to your camera. It is important to check there is a thread on the camera you want to buy. Different makes and models have different size lens threads and a particular wide angle lens you want to use may not fit directly onto your camera. DON'T WORRY! Specialist skydiving equipment stores today have a range of adaptors that can screw onto the thread of your camera and allow a lens to screw onto it so your camera can use the lens you want.

Record light indicator

It is important to know when you have your camera on and recording when filming your subject(s).It can mean lost points in competition, loss of commission and generally unhappy skydivers if you fail to capture the footage. These days there are ports on most cameras that connect with special cables that have a light emitting diode (LED) And will shine red or blue when the camera is recording. These cables are generally called 'cam eyes' and have an added feature of incorporating a button in the cable that can start or stop recording without having to press the button on the camera.

Typical 'cam eye' setup showing cable, record on/off button and indicator light.

The plugs fit into the LANC port of most DV camcorders and the half moon A/V port on HD and DV camcorders. It is important to check that your camera has one of these ports to be able to accept a cam eye.
Alternatively, if your camera has an inbuilt record light indicator, you can use this by covering it with a photo static light sensing diode and cable connected to a power source and light indicator diode.
This is a crude setup and relies heavily on no outside light interference with the light sensing diode and good batteries as they will affect how much light is transmitted to the indicator once recording is started.

Focus hold

Modern cameras today come with automatic focus which will quickly adjust to the subject that is being filmed.
It is important to find a camera that has manual focus which can allow you to set the focus to a desired distance. This is done by focusing the camera on something in the distance (don't focus on something to far away. About the distance you would be away from the formation in freefall.) Then switch your camera to manual focus and set it so if you turn your camera off and on, it will stay on manual focus.
Doing this will ensure your subject stays in focus the entire time and your camera will not be automatically adjusting itself if your changing from near to far shots constantly. This can be a real headache for the novice camera flyer especially if trying to film novice skydivers who tend to spread out a lot in freefall therefore you need to change your distances from them to keep them all in frame. Experimenting with auto focus only may also give you adequate pictures but any radical changes in distance

may cause your camera to blur out of focus while it adjusts to the new distance.
Also, if you manually set your focus on the ground to a set distance then you film in freefall at a much shorter distance, you may find your entire footage is blurred as you were much closer than anticipated.

Steady shot
It's a good idea to find a camera with steady shot as this will allow a smoother less shakier picture once enabled.
A camera that does not have this feature will show a very shaky image and an give unsatisfactory result both for yourself and the people watching your footage.

Fire wire ports
The cameras you can buy today have various ports on them to connect with other cameras, computers and directly to the TV.
You should ensure though that your camera has these features so its important to ask the shop assistant what the camera can plug into, what cables are used and if they are supplied or will you need to purchase them.
You will need at least one cable to download your images either to a DVD recorder or a computer.
You may need an additional cable to plug to a TV so you can watch your footage directly from the camera.

Memory stick port
In my opinion, it is an important feature to have a memory stick port on my camera. Having a memory stick allows you to take still photo images. This may be handy for occasions when a still photo works better than video footage, for example ground shots.
Also, you can capture still images from your video and store them on the stick allowing the collection of images to be burnt to a DVD at a later stage.

Additional battery

When you first purchase your camera you should get a rechargeable battery in the box which needs to be charged before you can use your camera.
It is a good idea to purchase at least another battery that you can have as a back up should your first one run out of juice.
I personally buy larger batteries for my cameras that hold more charge and give me more ‘minutes’ of use in the battery life bar.

The skydive environment is harsh on equipment and especially batteries as I’ve found it doesn’t take long before a battery fails to hold much charge and you constantly need to go to your back up batteries to do the job.
Keep an eye on how worn out your batteries get. You may need to purchase new ones if they fail to hold charge.

Additional features

With modern cameras these days there are many other additional features that come with the camera that can help you produce a better quality image or help you include special effects to your footage.
Once you actually do purchase the unit, I recommend one more step prior to purchasing your camera helmet - *read the owner's manual thoroughly!* Aside from being the best way to find out what buttons do what, it is also the only place you can learn what the different indicators and icons really mean.

CAMERA SUIT/JACKET

Camera flyers use a suit or jacket with wings attached to help provide a bigger range of fall rate to suit different types of jumps and to help hold them in a head up position while filming.

The wings also help provide a stable and steady platform for filming and can enable the camera flyer to film upwards from below a formation or sit almost vertically over the top of one.

The wings are usually made of rip stop nylon which is non porous, in other words, doesn't allow air through the fabric.

This means that the air that the wings catch can only spill out the sides and provides maximum lift for the camera flyer.

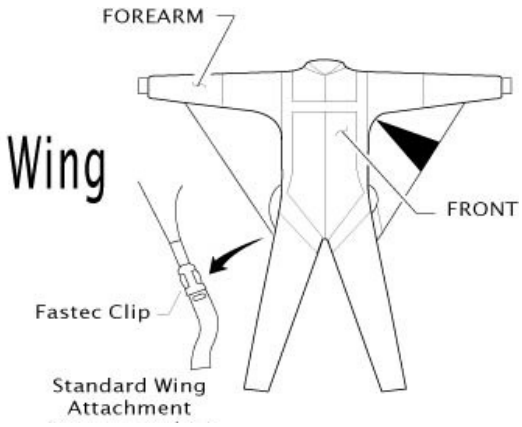
Left: The camera suit is a one piece suit with wings that usually attach at the thigh with clips.

Right: The camera jacket is also popular with camera flyers. The main advantage is that it can be easily removed for comfort without having to take of a complete suit.

The camera suit is a one piece suit that can be either long or short.

Manufacturers differ slightly with their attachment process to the leg or thigh but the idea is basically the same.

Their can be a variety of attachment locations to choose from depending on how much lift you require. Follow the manufacturers recommendations or "try before you buy" if you can to see what style of wing best suits you.

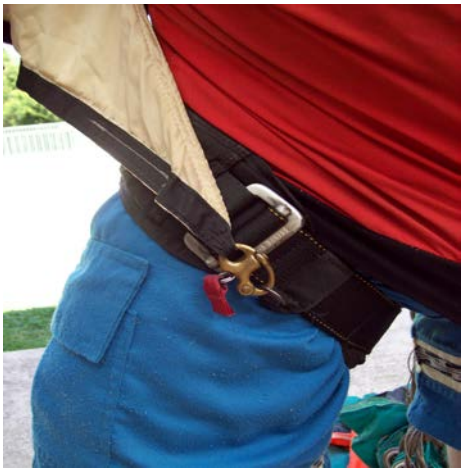


Left: Typical camera suit attachment which is usually sewn to the leg by the customer.

Centre: Camera suit with Velcro attachments to leg. Note the boosters which are optional extras.

Right: Short camera suit used for warmer climates. This suit has short wings that are sewn above the leg straps and lateral straps of a parachute harness.

The camera jacket is either a pullover type or a zip type which can be removed easily for comfort especially in warm climates.
The attachment points at the lower part of the wing can either be by clips going under the leg straps and buckling in front on the belly or by clips that are fixed to the leg straps of the rig.



Left: Camera jacket showing fixed attachment to leg strap using RSL clips.

Right: Typical camera jacket from the rear. Note the clip attachments which are passed under leg straps to buckle at the front.

Camera jacket users tend to use normal freefly pants or shorts over their legs but it is individual preference as to what you would like to wear.
Both the suit and the jacket have swoop cords that are sewn down the length of the arms.
Loops protrude from the wrists where your thumb picks up the loop so tension can be provided to the when it is buckled at the lower part of the wing.
This provides a rigid wing similar to a sail once in free fall allowing the camera flyer to control their fall rate to suit the speed of the formation.

Left: View showing swoop cord looped over the thumb.

Right: Wing at full stretch providing tension between lower attachments and swoop cords for lift.

It comes down to individual preference as to what type of suit or jacket you would like to wear. If you have the opportunity to try both types then you should get a good idea as to which you prefer.
Alterations can usually be made to the distance between the lower attachment and the wrist to improve efficiency and the lower attachments on the suits can usually be moved to a more efficient position with relative ease.
Remember the main purpose of having wings is to provide a good range between fast and slow fall rates.

Camera wings provide excellent range for fall rate when properly adjusted and worn.

CAMERA HELMET

Camera helmets have come a long way also. A good camera helmet is essential to mount your cameras on. These days there are plenty available through skydiving web sites and magazines and it is really up to the individual as to what style they want, what type of skydiving they intend to do and how much they want to spend.

Three typical full face top mount camera helmets.

Note the locking latches at the rear of the helmets.

Three types of open face side mount helmets.
Note the chin cups used to provide a secure fit and stability.

A well fitting camera that keeps everything tucked away is a valuable tool. Choosing the correct one is a personal decision. More than anything it depends on whether you are going to be " taking a camera along for the ride " or

are serious about pursuing camera more professionally.

Full face helmets tend to offer a more stable platform with square areas on the helmet for ease of mounting multiple cameras but can restrict talking and be more bulky which can cause drag and affect control when trying to alter body position while filming.
Open faced helmets tend to be lighter in weight and offer good all round visibility and communication but may not be as stable or firm fitting as a full faced helmet.
Transitioning to different positions while filming can be easier due to the lighter weight and rounder edges of the helmet.

People who go onto work as camera flyers should be thinking about the ability of the helmet to take a stills camera as their experience grows.
Sometimes, setting up your camera helmet will involve you drilling holes, or cutting out sections of the helmet. Ensure that any sharp edges are smoothed off, and any corners are rounded off. With fiberglass or other common helmet materials a jagged edge can encourage cracks to start to form.

Any mount fixings and associated pop rivets, bolts etc must be the correct size and cut short as possible. They should also have padding over the top to protect your head in case of hard openings.

Side mounting

With a side mounted camera you will have the camera in line with your eyes. A side mount is suitable for freeflying ,formation skydiving, AFF and fun jump skydives. However, because of the extra bulk on one side there is an increased chance of riser strikes. Depending on the type of skydives that you want to film, will affect your

camera set up. For example for FS (formation skydiving) or AFF (accelerated free fall) skydives which entail more close up work, you will need a wide angle lens and a different camera angles. Side mounted cameras give a superior field of view for this type of work if they are close to level with your natural eye line about 5 degrees upwards, and angled slightly inwards.

Side mount camera helmets are more popular with freeflyers as there is no large camera on top which can act as a rudder and inhibit transitioning to other positions while filming.

However the tall, narrow camcorder of the past like the SONY PC series and the JVC cameras are no longer being manufactured, in their place are shorter, wider cameras that stick out more when side mounted.

Jvc 'side mount' camcorder.

Sony PC 100

Sony PC 108

This of course means they are a lower profile on the helmet when top mounted. Just one more thing to consider when deciding on the type of helmet to buy.

Top mounting

One of the advantages is that you are less likely to suffer from riser strike with a top mounted camera. The weight of the camera set up will be symmetrical and in line with the rest of your body. However, on an off heading opening they can cause more forces on your neck because the weight is further from your head. Of course you also need to be more careful when exiting the aircraft too.

Be safe! Whatever type of camera, camera helmet or type of mount you choose, a little common sense goes a long way.

Various types of mounting methods are used ,these will be covered later ,but you can use the tripod mount on the camera to bolt it to your helmet and wrap bungee cord around it for extra security.

Don't use gaffer tape, pull up cords etc… this will not be secure and you risk losing your equipment, not to mention the damage that the camera could cause if it struck a person on the ground. Your camera is going to go through all of the opening shock forces that you do, so make sure it is securely fastened. Always go to experienced camera flyers with any questions that you have.

These are the basic things that a camera person will need to get under way and start filming. The costs involved in setting up to start filming have reduced considerably over the years due to the improvements in technology and equipment. It is important to purchase gear that will have the functions you need for this unique environment.

Having two separate methods of capturing the action in freefall requires a good understanding of your equipment and how to set it correctly for the desired result.
It is recommended that for starting out in freefall videography / photography ,one method should be used to begin with.
Generally the novice cameraperson will start with a video camera as it is the easiest to operate. It is also more rewarding as you and your friends can watch your footage straight after jumping. The good and the bad aspects of your technique can then be analyzed and improvements made for your next jump.

SETTING UP THE VIDEO CAMERA

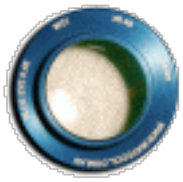
ANCILLERY EQUIPMENT

There are a variety of other tools the cameraperson uses to maximize their performance before, during and after filming.

WIDE ANGLE LENSES

There are a number of wide angle lenses out there which are suited for freefall filming.
As there are many disciplines within the sport itself, certain lenses are more suitable than others depending on the discipline.
Firstly, choose the lens size for the discipline you want to film. for video; .6x to .4x are popular.
The lens allows you to capture all the action and in freefall, you can film from a closer perspective.
They have a better view of the background due to the limited depth of field.

Way cool industries .45x lens.



Typical step ring .This one is 37mm to 34mm.

.6x wide angle lens.

For extreme wide angle,.3x to .2x are used.
When you first purchase your camera, usually a wide angle lens is not included, therefore you need to buy one from a camera store or, a skydiving equipment store which generally have a wide range of lenses to choose from.
As mentioned ,you may also need a step ring or adaptor ring which will marry up the lens with the internal thread on the lens housing of your camera.

When you first screw the lens onto the camera, you should notice the focus change and adapt to the new view.
NOTE : If you have set your focus manually on your camera and install the lens, your focus will not adapt to the lens and therefore you will have to reset your focus. Also if you are switching between lenses you will have to set your focus again.
If your focus is set on automatic then you should not have to touch your focus…but check it to make sure!

CAMERA BATTERIES
It's a good idea to purchase another battery for your camera on top of the one that should be supplied in the box.
Typically, the battery the shop supplies you with is of small size and charge capacity and after constant use you will notice the battery not being able to hold as much charge as it once used to.
In extreme cases, what appears to be a charged battery, can fail not long after the camera has been switched on. This is normally due to constant use and charging and can fool a camera person into thinking they have a charged battery only to find it 'run empty' not long after the camera has been switched on.
So purchasing another battery and keeping it charged should prevent you being caught out if your original one fails.
Some camera flyers will carry their spare battery with them on their jumps which is a good idea, but being aware of how your batteries are performing and getting a new one BEFORE it becomes unreliable is probably the best prevention of problems.
You should also be able to choose from different size batteries which can hold more charge and give you longer use before charging. It may also save you money if you look on line for generic batteries which fit your camera as

usually these are cheaper than what your camera store will sell.
Be aware though that if you purchase a larger capacity battery, they are generally larger in size also so you will need to take that into consideration if you have a camera box on your helmet to protect your camera.

DEFOGGER /LENS CLEANER
In hot or humid climates it's good practice to use defog drops on your lens . This will help prevent your lens fogging over when you are in the plane or during free fall. Sometimes you may jump through particularly wet clouds or even encounter rain if you are unfortunate.
Having a small cloth on you can help with removing some of the moisture from your lens once you are under canopy.

Its important to keep your camera clean as dust and smears can impair the quality of image and cause damage to your lens over time . Try to keep a clean lens cloth in your jump suit and wipe your lens just before you put your helmet on . Putting this practice into your routine will ensure piece of mind that your lens is clean just before you film that all important jump.
Also , try not to use your lens cloth to wipe water droplets or moisture from your camera as this will apply smudges to your lens for future jumps.

POLARIZING FILTERS
When filming during the summer or in very bright sunlight, you may find using a polarizing filter handy to cut down the glare of your film.
The lens mounts directly to your wide angle lens using the internal thread of your lens, and can help prevent the glare from direct sunlight and provide better definition of your subject and the background.

VIDEO LIGHT INDICATOR

Over the years various devices have been used in skydiving to tell the camera person they are recording while wearing their camera helmet and not being able to look through the view finder.

The cam eye range and the hypeye are the new video light indicators which can start and stop your recording and put your camera in standby mode to help save battery power.

Cam eye set up showing position of light indicator and stop/start button.

The units are designed to be durable and water resistant And easily plug into the LANC port on your camera.

The stop/start button can be mounted almost anywhere but should be placed in a position that you can access easily and will not project out to far from the side of your helmet.

The light indicator is placed over the front of your eye or mounted to a ring sight post and glows red when recording .The excess cable should be tucked away neatly and cable tied in place.

The whole unit uses power from your camera and picks up indications from the camera such as; standby , record , low battery and low tape or memory.

Once your camera is fixed in your helmet and turned on with the unit plugged in, you should notice the indicator glowing blue or green .That will let you know that your good to go .Just turn your camera on and start recording by pressing the button on your helmet.

If you have finished recording for the moment and want to

save battery power, simply hold your finger down on the button for several seconds until the indicator flashes rapidly and your camera will switch to standby mode. When you depress the button again ,your camera will switch back on and be ready for recording.
Once your under canopy and want to stop recording, you can simply reach up and press the button again.

GAFFER TAPE
You will need tape from time to time just to fix things shut or secure something.
The best tape to use for skydive work is cotton gaffer tape. It is strong and has good adhesive qualities but can be torn easily off the role.
The tape is used to hold open the lens shutter switch ,secure the zoom button ,cover the back light button ,or even to secure the cam eye plug to the port in your camera.
You will have very bad or no footage if your zoom button has inadvertently been pushed or the lens cover has closed!

A DV (digital video) and a HD (high definition) camera showing the proximity of zoom and other function buttons. Ensure these are fixed in place before placing in your helmet box!

MOUNTING THE CAMERA

When deciding how to mount your camera, you should have already decided on what type of helmet you want to wear as this can determine what type of camera is best suited for the helmet.
At first ,you may be only interested in filming a particular style of jumping like freeflying or relative work which means you may decide on a freeflying helmet or full face camera helmet traditionally used for relative work filming. It's a good idea to have an open mind about what you will be filming in the future.

Various types of helmets showing the type of box used to protect the camera.

NOTE: The high profile of the top mounted camera. (bottom right.)

Try to purchase a helmet that you will be happy with to film in multiple disciplines as you may end up working in the industry which means a lot of opportunity for different types of camera jumps.

So now that you know what type of helmet you want and the type of camera best suited for it ,its time to mount the camera.
The key point to remember is SAFETY!
The more low profile and streamlined the complete system is, the safer it should be.
You want to avoid line entanglement ,of any kind ,with your helmet and camera system. Camera flyers in the past have also had their cameras ripped off their helmets when lines catch an edge on deployment.
It is best to make sure that there are no sharp edges on your camera mount, as these could prove a snag point for deploying lines even if you deploy perfectly stable. The ideal solution is to have a helmet that completely encloses your camera if you are going to side mount it.
For top mounts ,boxes can also be made or purchased to suit the helmet.
These boxes offer protection from the elements and any knocks or bumps your helmet encounters during its use.
Remember to make sure you have access to all the necessary buttons you need to use on your camera.

Various methods have been used in the past to mount cameras onto helmets and these days the methods are simple ,sturdy and reliable.
Everything from gaffer tape ,cable ties ,Velcro and bungee cord has been used to mount or fix cameras to the helmet.
As previously discussed ,the tripod mount on your camera was a reliable strong point which could be utilized to fix the camera to the box or helmet.

Side mounts that require holes drilled into the side of the helmet.

Another type of side mount (left) and a top mounted camera. Note the Velcro strap over the front of the camera.

The mounts today are more inclined to have the box easily detachable from the helmet by using quick release brackets.

This eliminates the need to fix the camera to the box.

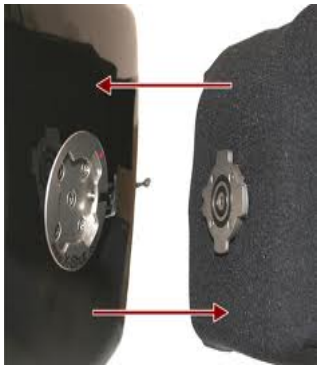
All that is required to stop the camera from moving around inside the box is snug padding or foam which is normally included in the camera box that suits the particular type of camera you are using.

If you require foam or padding ,it can be picked up at any local crafts store.

The quick release brackets are designed to securely hold the box to the helmet.

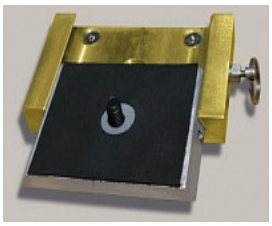
Its best to ask experienced camera flyers what sort of bracket would best suit your camera box for your helmet.

Modern types of camera boxes showing a cage type protective box, an HD camera box and a top mounted camera box.



Views of different types of brackets on the market today.

Note: the go pro camera swivel mount bracket. (top center.)



SIGHTING THE CAMERA

Now that you have your video camera mounted to either the top or side of your helmet ,all that is required to do is to line up your camera with your eyesight.

Freefly camera flyers tend to use very wide angle lenses on their cameras and therefore are able to capture a wider field of view making exact alignment with the eye not so important.

However ,the use of a dot on their goggles using a marker or a paper reinforcement sticker can aid in keeping subjects in frame.

Also the helmets and boxes on the market today as shown in previous photos ,are purpose built with the alignment between the two done for you.

Minor adjustments may be necessary with the use of shims or similar material to alter the angle of the camera to your desired position.

When filming relative work ,especially when during competition ,it is very important to keep your subjects in frame otherwise you may not capture all the points the team is making resulting in a poor score for the team.

There is nothing worse than landing after a hot relative work dive and realizing the camera only captured the feet of the jumpers!

To help us keep a formation in frame ,camera flyers use a sight which lets us film whatever is in the parameters of the sight.

Two types of ring sight mounted to the helmet.
Note: The helmet to the left allows room on the left side only.

The most popular type of sight used today is the Newton cross sight but the concentric ring sight is also popular.

It is easily mounted to the helmet by drilling a small hole to allow a screw to pass through where it is fixed from the inside of the helmet.

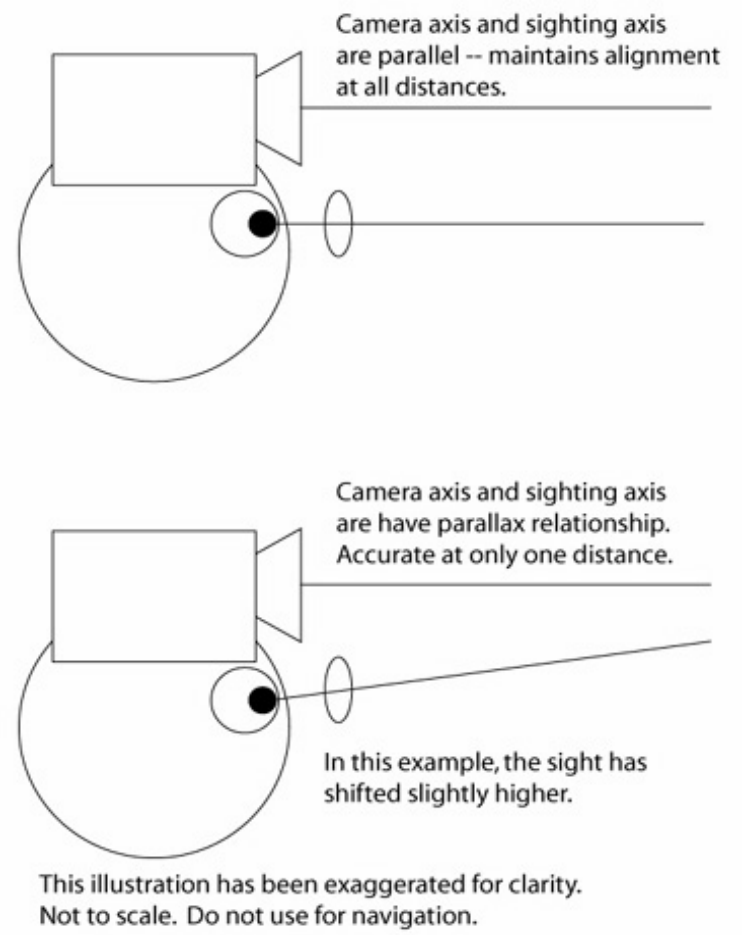
Some helmets may even come with the hole pre cut or you may request it to be done for you.

The Newton Cross Sight (left) and ring sight (right) used by camera flyers who want to keep their subject perfectly framed.

The main advantage of using a Newton sight is that they do not require exact repositioning of the helmet in order to work correctly. The sight and the optics will maintain their orientation whereas if your sight consists of a mark on your goggles ,then every time you put your goggles on, They will position themselves on your face slightly differently.

The distance between the eye and the lens should roughly be about 20cm, that means you will have a parallel offset of 20cm.

At very close distance such as 1m to 1.5m you could find that you will be filming the very top of your subject and not the full frame therefore you must take the parallel offset or parallax into account.



The easiest way to line everything up is to have someone assist you. Then do the following:

1. loosen all the twist locks on your eyesight.
2. Turn on the camera and place on auto focus.
3. Place the helmet on and fasten the chin strap or locking buckles as you would for a jump.
4. Get your assistant to zoom the camera in halfway between widest and tightest view.
5. Then get him to point your head at an object 15 to 20 feet away. He should move your head until the object is centered in the view finder.
6. Then ask him to hold your head steady while you adjust the sight until the same object is centered in your sight system.

7. Next, hold the sight steady with one hand while you tighten the twist locks as tight as you can with the other.
8. Have your friend release the helmet and give your head a gentle shake from side to side to get your head to settle naturally within the form of the helmet.
9. Have your friend zoom the camera back out to its widest position.
10. Now find another object the about the same distance as before and center it in your sight eyepiece. The same object should be centered in the view finder or on the LCD screen. If not, you will have to repeat steps 5,6 and 7.

Its important to remember to firmly tighten the sight locking screws once you are satisfied with the alignment.

If your sight takes a knock, it can easily loose its alignment and you may not even know it till after the jump!

If you intend to constantly film small formations, say, 2 ways and 4 ways, you will only need to be about 10 to 12 feet away from the team, so you could say ‘why not just set the sight to a distance of 10 feet?’

That may be fine if that’s all you ever will film but as you expand your filming skills and gain experience, you will be filming larger and more diverse groups of skydivers.

Setting your camera and sight to about 20 feet will reduce your parallel offset and offer a ‘happy medium’ distance which should allow you to capture all your different types of jumps with relative ease.

SETTING UP THE STILLS CAMERA

When you decide on what type of stills camera you want to use for skydiving, you need to take a few things into consideration.

You will need a camera with an electronic shutter release which, when activated, takes a picture of what you are viewing through your camera sight.

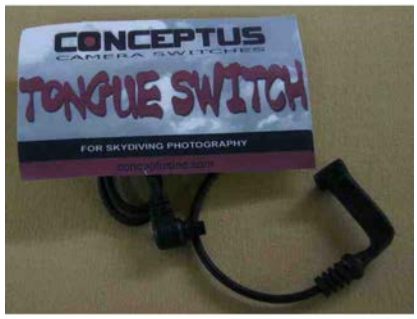
Make sure the shutter release you get is compatible with the type of camera you have. The Canon and Nikon range of digital SLRs are very popular with skydivers and have the features needed to produce quality images.

There are several ways you can activate a shutter release cable, the most popular way is to have a purpose built switch in your mouth and by either biting, pressing with your tongue or blowing it, you will activate the shutter on the camera.

It is personal preference as to which method you would want to use but I personally use a press switch as there is less chance of tearing the protective coating which could allow moisture into the switch and cause a camera malfunction.

Two different types of shutter release switches available today.

In the past camera flyers had to make their shutter release systems themselves from electronic components.



Most if not all DSLRs have a tripod mount on the bottom of the camera. You will need to make sure your camera has this as a bracket from a ‘quick shoe’ needs to be fitted here.

The quick shoe is a 2 part bracket designed to release the camera from a stable platform without having to undo bolts or unscrew anything.

Simply unlock it and press the release button which will allow you to slide the camera out from its housing.

This is a very quick and simple way of attaching and detaching your camera from your helmet.

Two different types of quick shoes available today. The shoe on the right has a pull ring to release the camera while the shoe on the left has a button which is pressed.

There are many different types of quick shoes available today. Choose one to suit your camera system.

You will also need to consider the weight of your stills camera as this will add to the load you are already carrying on your head.

Some cameras are considerably lighter than other models and brands so you will need to check the specifications of the camera you are interested in.

Also, if you are on a budget to purchase your camera, you may need to make sacrifices of weight and functions to get a camera for your jumping.

Lastly, lenses. You will need to consider if you can get a smaller lens(s) for your camera. Most new DSLRs come with an 18mm to 55mm lens which is still ok to use in freefall, but your results will not be as good as with a smaller ‘fish eye’ type lens.

Remember, your video camera has a wide angle lens so a well framed image from your video might result with poorly framed photos from your stills camera.

Both cameras are roughly the same distance from what you are filming so what you want to achieve is whatever frame your video shows, you should try to get the same frame shot for your stills.

Typical wide angle lenses for DSLR camera. The lens to the left is 18mm while the lens to the right is 10mm. Both are made by Sigma which produce generic lenses for SLRs at normally cheaper cost to the consumer.

The two images above show a DSLR shot to the left using an 18mm lens and a mini DV video grab taken using a .3x wide angle lens. Both images are framed well which shows the correct choice of lens size or zoom.

Video grab on the right shows relatively good framing while the DSLR shot on the left shows a poor choice of lens size or excessive zoom of an adjustable lens.

Traditional SLR lenses of 16mm to 24mm were considered to be the optimum size lenses for good quality skydiving photos.

Some of these lenses can be used on modern DSLRs (ask a camera shop professional before you try to fit an older SLR lens onto a new DSLR even if it's the same brand) however, an 18mm lens on a traditional SLR will not offer the equivalent amount of wide angle as the same size lens on a DSLR.

This is due to the sensor size which affects the “focal length multiplier” of the camera.

Many digital SLRs have sensors smaller than the sensitive area of 35mm film. Typically the sensor diagonal is 1.5 times smaller than the diagonal of 35mm film.

Therefore if you use the standard 18-55mm lens, the best you can hope for is the same as a 27mm lens on a conventional camera.

To get a photo the same as a conventional 18mm lens, you will need a 12mm lens for your DSLR.

MOUNTING THE CAMERA

Mounting the camera is relatively easy as most camera helmets today come with platforms to mount the stills camera on.

Also the front, top and sides of the helmet can be formed flat to allow a platform or bracket to sit squarely on it and aid in the alignment of the camera.

Generally full face helmets will have space for a bracket on the front of the helmet while open face helmets that have a chin cup are able to have a stills camera mounted on the front of the helmet or on top.

This is because the video camera can be mounted to the side of the helmet whereas a full face helmet has its locking brackets and straps on the side making mounting of a video camera to the side of the helmet impractical.

I find that a stills camera mounted on top of a helmet sits very high and is vulnerable to accidental knocks and damage, therefore I prefer to use a full face helmet where the stills camera can be mounted to the front.

It is individual preference as to where you would like to mount your cameras, but as you can appreciate the type of helmet you intend to use and the types of cameras you have, have a direct impact on where you can practically mount them.

An open face and a full face helmet showing the position and space that has been allowed for a stills camera.

Note the open face helmet is operating two video cameras.

To fix the entire stills camera to the helmet, you will first need to mount the male part of the quick shoe to the base of the camera using the correct bolt or screw.

Then fit the female part to the male part of the shoe and sit the camera on the platform.

Centralize the camera on the platform using a ruler and allow room for the camera to slide on and off the quick shoe.

Mark the position of the female part of the quick shoe on the platform and then mark the position of the hole you will need to drill to fix it in place.

Using the appropriate sized nut and bolt, you can then fix the female part to the platform.

The camera should then be able to slide on and off the quick shoe without interfering with your ring sight or other parts of your camera and equipment.

Image to the left shows a top mounted stills camera.

Right: A platform capable of taking two cameras (a stills and a video) in a side by side configuration.

SIGHTING THE CAMERA

As previously mentioned, most camera helmets today come with platforms and molded areas that are conformed and aligned to the average persons line of sight, therefore, little if any adjustment is needed to line the cameras up.

As discussed, this is easily done with a video camera as the framing and alignment can be seen instantaneously but can be more difficult with a stills camera especially a conventional stills as you may not have been able to see through the view finder to frame the subject.

Digital cameras generally have a large LCD screen which can be seen easily even from oblique angles and this can aid in sighting if your vision is restricted behind the camera.

A pentax and canon DSLR showing the size of LCD screens available on cameras today.

With a digital stills camera, similar steps can be followed to sight the camera in as with a video camera.

NOTE: Now that your sight is aligned with your video camera, its important not to adjust your sight as this will cause your video to be misaligned.

Once the camera is mounted, look at an object the same distance apart as when you sighted your video.

Ask a friend to move the STILLS ONLY so the object is framed in the LCD screen. They may need to zoom the lens in to make framing easier.

Remember to keep the object in your sight while the move is happening.

Once the object is framed both in the LCD screen and in your sight, you can tighten the screws so the camera does not move.

A good idea is to place glue from a glue gun around the edges of the quick shoe attachments to keep them in place on the camera and platform.

As moving the camera to frame an object only offers horizontal adjustment, you may need to place shims under the female shoe on your platform if you want vertical adjustment.

Alternately, if your platform is an L shaped bracket, you may be able to bend it slightly to get your required adjustment.

The use of a laser pointer which is fixed parallel to the lens on your camera can also be a good aid in sighting.

Just move the camera until the laser points at the object in your sight. You will need to first line it up horizontally then vertically by fixing the laser pointer under the lens and then making your adjustments.

There are many types of laser pointers available today however the flat types are best to find a parallel line of sight with the lens.

BEGINNING TO FILM

Now that you have your equipment all set up, you are ready to film your first jumps.

Remember, its not just another skydive, you will have a lot of weight on your head and all this can present a lot of wind resistance when free falling or transitioning to different positions.

Try to stretch and warm up your muscles before you get in the plane, especially your neck, as this area can take a lot of strain during canopy deployment.

There are several trains of thought as to how you should hold your head on deployment. Some say to look down and try to place your chin on your chest while others insist on looking straight ahead keeping the spine straight.

I prefer the later method as I believe there could be more chance for injury if your canopy decides to snap open suddenly or your canopy deployments are prone to be rough if you are looking down.

Also, you will be more aware of your surroundings with a head up position offering better stability and less chance of snagging a line on your gear.

It’s a good idea to secure your camera helmet to your harness when sitting in the plane. This will prevent your helmet rolling around the plane as it climbs to height or encounters turbulence.

When exiting, be aware of your camera(s) as you duck your head out the door. Many cameraflyers have smashed lenses or damaged their equipment by hitting the door frame as they climb out.

AIRCRAFT AND EXITS

There are a variety of planes around Australia and the world that DZ operators use, the most popular being the Cessna 182 and 206.

You will also find turbine aircraft such as Cessna 208 caravan, PAC XL 750, twin otter and Skyvan popular at the bigger drop zones.

Most of the time you will be the first person out of the plane as you need to get in position. You will probably be hanging at the rear of the aircraft using a step of some description and hand holds.

The smaller Cessna aircraft are usually piston engine driven and therefore fly slower than the turbines so the airflow past the fuselage is less.

This means climbing out and getting into position is relatively easy and your exit speed is lower once you are in free fall.

Left; two camera flyers showing typical exit positions for 182. The step could be used for support.

Right top; no handhold is present on the roof of this 207 so the door frame is used while you brace against the step using your right leg.

Left; typical camera slot from a Cessna 206, also a very popular jump aircraft. Note the good sized step and hand hold bar.

Right; a Cessna caravan has a big door and good sized steps and float bars.

As you may be unfamiliar with being in the camera flyers position outside the plane, you should try to practice getting into position while you are still on the ground so you can get the technique correct on which hand or foot goes where first so you can get into position with minimal difficulty.

The turbine side door aircraft are usually bigger so you should have more room to maneuver when climbing out.

The hand holds or float bars and foot platforms are usually a lot bigger also so there should be plenty of room however I have had to stretch out far to reach a hand hold or share a very small part of the step with the jumpers on some turbines.
You will generally get a lot more people stacked up outside with a turbine plane so practicing getting into position is vital.

Left; A large step and float bar on this XL750. Note the smaller cameraflyers step to the rear.

Right; a small hand hold is available to the cameraflyer on this twin otter.

A tail gate aircraft is a great novelty aircraft to jump from and can offer some great video footage and photos.

Some camera exits are done by using a rope to hang out of the plane from while bracing with a leg while others are done by the use of a bar on the tailgate itself.

If you are unfamiliar with how to set up for your exit on any type of aircraft, ask the DZSO of the drop zone. They will point you in the right direction for your answers.



Three typical views of tailgate aircraft. Note the bar going the length of the tailgate of the skyvan in the centre photo. The plane on the right is a CASA which also has a bar on its tailgate as well as a ramp.

Once you are hanging out at full arm stretch with one leg floating, watch the exit count and leave just before the “go”.

THE FLOAT EXIT

This is the most common way for a camera flyer to exit as they seem to “float” off the plane but are actually just presenting themselves to the relative wind while making adjustments in flight with their body.

Video will show the complete exit of subjects as they present to the wind and you should also be able to film the plane and other jumpers as they exit providing great action shots of near and far subjects.

The exits I have been describing so far have been in reference to the float exit to avoid confusion with any other type therefore you should have an understanding of what’s required for this exit.

I will refer to a left side exit for the remainder of the exits I am describing. Keep in mind you will need to reverse hand and foot positions for right side exits but how you decide to exit the plane is really up to you and how you practice it.

Once you have climbed out to your camera position, keep your wings tucked in so they are not inflated.

Try to let yourself hang back at full arm stretch once your in position. Keep your chest facing the fuselage and have one leg floating to the rear to anticipate the exit.

The cameraflyer to the left is exiting from a 182 using the strut for hands and wheel for support.

Cameraflyer to the right using small hand and foot hold. Note his chest facing toward fuselage.

Once you are hanging out at full arm stretch with one leg floating, watch the exit count and leave in between the “set” and “go” counts of the exit.

When you leave, push out into the airflow and inflate your wings. Your legs should have a slight bend at this

Left; A cameraflyer is poised to exit with a tandem pair from a LET 400.

Right; Just after exit the cameraflyer keeps his subject in frame. Note his cupped wings for lift.

stage and your head should be up with the jumpers or formation in your camera sight.

You don’t want to be right on top of them nor do you want to be to far away from them when they leave.

Even at this early stage (between 0 and 3 seconds) you can be adjusting your distance and position from the jumpers to keep them well framed.

Do this by tracking “up the hill” on aircraft heading with slightly deflated wings if you need to close distance, or “hugging a beach ball” which will provide your wings with maximum lift if you want to keep your distance or increase it.

Remember your distance depends on the size of the formation but for small groups 10 to 15 feet is ok.

Obviously you will need to practice this and eventually your timing should improve to the point where minimal adjustment to the correct distance is required.

The key point is to know what sort of exit count you should expect from the jumpers you are filming and who is giving it.

Do not expect your subjects to consider you when the exit is happening as they may have little experience and be unfamiliar with having a camera person filming them.

Always plan with the other jumpers and decide on what the exit count is, who is giving it and when.

As I said, the more practice you do, the better you will get. Setting up correctly and paying close attention to the exit count will help you the most in getting that perfect exit shot off the door.

You will find that if you are doing the same type of exit over a period of time with the same jumpers,(i.e. a 4 way or 8 way team) you will be able to anticipate their exit and style as they leave the plane.

THE PEEL EXIT

This is another popular method of leaving the aircraft while keeping your subjects in frame.

It poses less of a risk as there is less chance of a collision with your team if you misjudge the exit.

This exit can also be used to film light weight groups where you need to avoid the risk of going low and also if the jump run is into the sun, you may be blinded if you were to do a float exit.

However you run the risk of increasing the distance between your subjects if you leave too late.

Also, for competition, you may end up on the same plane or angle as your team which provides a very flat perspective for filming which may result in loss of points or a “camera bust”.

Basically, the set up is the same, your outside leg has the step with a slight bend in the knee while your inside leg is floating and you have your right arm up and on the hand hold. Use your left hand to brace on the fuselage and maybe offer a slight push off as you exit. This is for a left door exit. Arm and leg positions are reversed for a right door exit.

As the team give the exit count and leave on “go”, follow them in your ring sight as they slide down the hill.

You will be turning your head and torso to follow them but only for a split second as you will let go and “peel”

off the plane to follow them maintaining your 10 to 15 foot distance.

The point where you peel or let go is between the 8 and 9 o’clock position from aircraft heading (12 o’clock) or slightly over your shoulder as a rule of thumb.

You want to follow the formation with your head (cameras) and let go in one fluid motion as the jumpers slide past you on the hill.

When you leave, present yourself to the relative wind maintaining your team within the camera sight, this will help pivot your body around keeping you in control.

As you and your team slide off the hill and start falling straight down, you should find you only need to do minor adjustments to keep your team in frame.

You should be able to get great video from this type of exit as you are basically over the top of your subjects right from the start.

FRONT FLOAT EXIT

This type of exit is usually done if there is a large amount of jumpers stacking up outside the plane and need to use all the step.

Also if there are multiple camera flyers, there may already be a camera flyer in the rear float position.

Climbing out and moving forward of the door can be challenging especially if there are limited places you can get a grip.

Foot placement is also important if you are able to move out onto the wing. STEP ONLY IN THE PLACES CLEARLY MARKED FOR FRONT FLOATING. Damage to flaps or structure may result if you are careless.

Front float camera flyer about to film a two way.

Using the door frame for foot placement may be the only option if there is no step.

As there will be considerable air flow from the propeller that you will need to overcome to get in position, you will need to use your strength to get out and pull yourself forward.

Once you have pulled yourself as far forward as you need to, swing your body around so you are facing the group you intend to film.

As the exit count is given, be aware not to leave too early as you may end up low or on top of your subjects!

A good rule of thumb is once the last person is physically not touching the aircraft, then you should be going.

Once again, it is a matter of being aware of the exit count and practice.

DIVING EXIT

This type of exit is usually done if the primary camera position(s) is already taken.

When the formation or group is stacked up at the door ready to leave, you should position yourself as close to the group without contact or interference with them.

Watch the exit count, and leave the plane as the last of them are free of it.

There may be several other jumpers before you to exit so be prepared to leave quickly.

The important thing to remember is to duck your head or allow enough room for your cameras to get out as they are sitting high on your head. You don’t want to smash your expensive camera gear on the top of the door frame when exiting!

Diving from a tailgate aircraft is a lot of fun and challenging for a camera flyer.

As you follow your subjects out, you will normally get flicked up vertically in a head down position by the airflow so this makes keeping your subjects in frame difficult.

I recommend practicing your dive exit in a standing position or relaxed sitting position with your arms out, as your body hits the airflow, you will still be able to keep your subjects in frame and as you close distance to your group, you can transition to a belly to earth position.

This requires practice but is a great way to close distance to your subjects quickly while keeping them in frame.

Diving can be a lot of fun but its important to be aware of your camera gear and the size of the door you are exiting from.

HELICOPTORS, BALLOONS AND OTHER AIRCRAFT

These types of aircraft are great fun to exit from but extra care and precautions should be taken.

Its important to talk to the pilot about your intentions for climbing out and exiting. Don't forget to mention if there are going to be a lot of jumpers to one side as this will affect COG (center of gravity) and balance of the aircraft.

Chopper jumps are great fun and provide great shots when hanging from the skid.

Be sure about what you can grab and stand on to climb out especially on hot air balloons as things can be very hot above your head!

The best type of filming can be done by looking up at the aircraft so prior positioning is important.

Don't try to do anything on the exit except fall away as there will be little to no air to work with. Try to get your subjects to swan dive after you. You should be able to get great shots doing it this way.

Setting up for a novelty camera jump can be tricky. Don't rush and be sure of your hand and foot placement. You should be able to hear an exit count from a balloon.

Novelty jumps are great fun but you must always pay attention to the pilots requests and avoid gripping or holding anything that doesn't resemble a hand hold.

If in any doubt, ***ask!***

FORMATION FILMING

2 AND 3 WAYS

When first starting to film skydivers it is a lot easier to start small to gain experience and perfect your technique on exits and proximity by offering to film a 2 or 3 way.

You will generally have to pay your own slot on the plane as the quality of camera work may not be that good and you intend to gain experience and practice from the jump.

Offering to film their jump for free is a great way to build a relationship with other jumpers and gives you a no pressure situation for practice and trying new things.

As per all of your jumps, you and your subjects should have a plan that everyone on the skydive knows.

Included in your plan is the climb out, exit count, formation coming off the plane, formations that follow, who is base, break of height and landing pattern.

Try to practice your float exit and get comfortable with it as this is the most common type of exit you will do.

Left: A front float exit filming a free fly 2 way.

Right: 3 way just after exit. Note the artistic shot with aircraft in back ground, however the camera flyer is almost on the same plane as the jumpers making judging of points difficult.

If you have misjudged the exit by leaving to late or to early, use your wings and flying skills to fix the problem quickly. If your intent is to get video quality acceptable enough to judge points from, try to recover as quick as you can and get in your optimum position for quality filming.

If the formation funnels at any time, its important to know who is the base as the other jumpers will try to reform on that person. You will need to chase the base person as they recover from the funnel.

Try to maintain a 15 to 20 foot gap above the base and stay on heading as the other jumpers will be coming in from outside your vision.

As you gain experience and confidence you should be able to tighten up your framing so only the subjects you are filming fill the screen.

You need to be predictable if you know jumpers are swooping in from behind you.

DO NOT move sideways or down as you may collide with a jumper trying to reform.

Movement up is ok as you will need to increase your distance as they reform anyway but remember to be predictable with no radical movements.

The space above the formation is yours so there should be no one there. All rejoining should be done from the sides.

Another way to film a funneled formation is to “get big” (slow down) by using your wings to keep the jumpers in frame as they are spat out from a funnel.

As they come back together and reform, you can close in on them until you reach your desired height above allowing you to keep all the jumpers in frame throughout the entire event.

Its important not to go too big otherwise they will look like ants in your video!

This is a good training method not only for yourself but for the jumpers as they can see where every one is from the funnel to the rejoin.

Remember, your vision is somewhat diminished due to the helmet you are wearing and possibly a sight as well so you may not be aware of other jumpers as much as you would be without camera gear.

Use your peripheral vision to be aware of others and spaces that you can move safely into as you don't want to be moving your head around as this will cause unsteady and poor quality video.

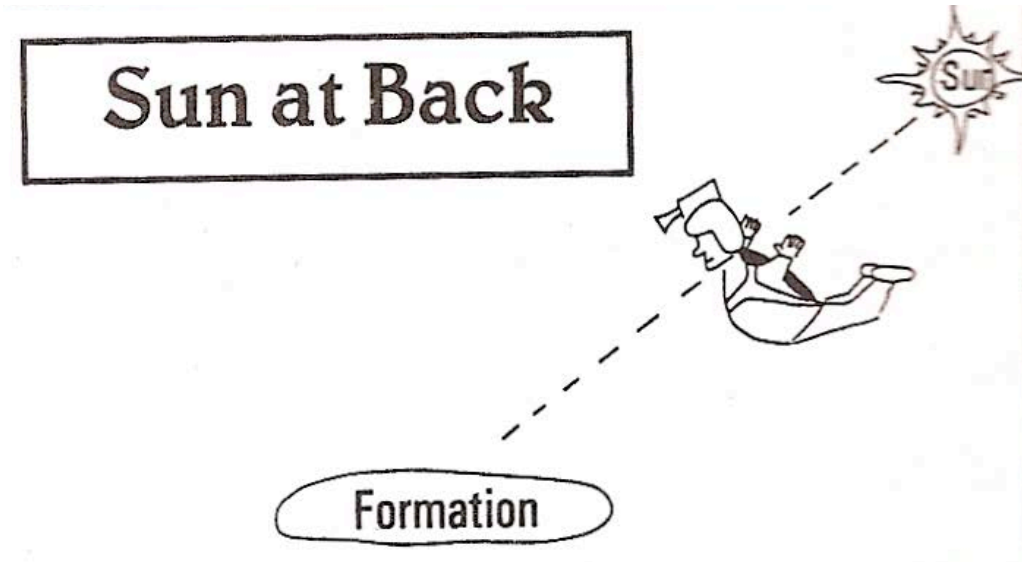
It takes a lot of practice to stop from moving your head to look in a direction. **Concentrate on keeping your head steady and your subjects in the ring sight.**

During early and late hours of the day, you need to be aware of the suns position on jump run as it will be low in the sky and may impair your vision on exit.

As discussed earlier, you can anticipate this and set up for a different exit so as not to get blinded by the sun.

Once you have left the plane, regardless of what type of exit you did, you need to maneuver yourself so you have the sun behind you as you are filming.

This minimizes the chances of getting sun spots and glare through your lens and provides good light on your jumpers.



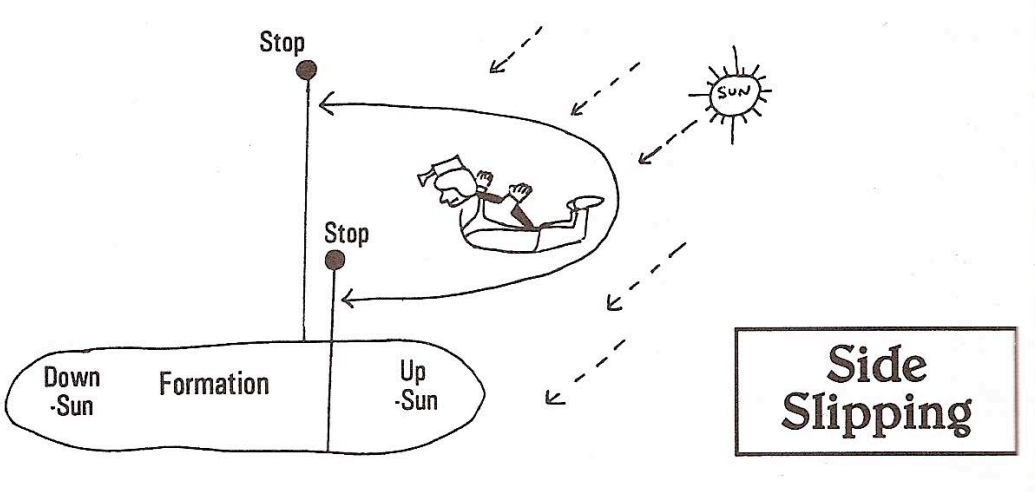
Try not to change your heading. Do this by picking a reference in the distance and staying lined up with it.

If the formation is turning or moving when it shouldn't, then it will show in the video providing a good training aid for the jumpers.

If you do need to change heading to follow the formation, try to keep the sun behind you and no more than 90 degrees of your left or right shoulder.

This is called side slipping and can be a useful maneuver when the formation becomes long and you need to keep it in frame, when you want to film something or someone in the background, or when you want to focus your video on one side or one jumper in the formation.

This will lessen the chance of glare through the lens and silhouetting.



As you are nearing the end of the dive, break off should begin between 2500ft and 3500ft for a 3 way formation.

You would have already discussed what your break off height will be before boarding the plane so there should be no surprises once its time to go.

If you have not jumped with the group before you should be extra weary as to what is happening on break off.

As the camera flyer, you should be over the formation at

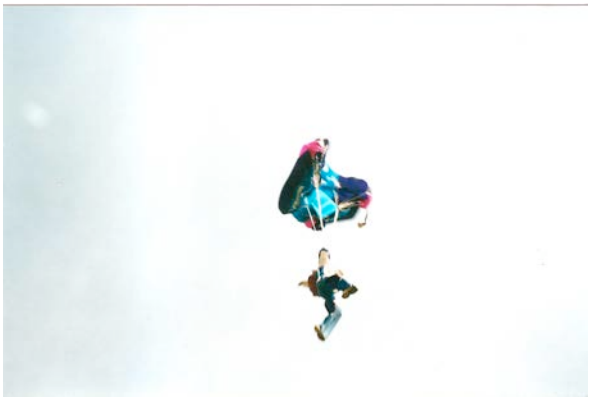
break off height and commencing parachute deployment procedure.

You do not need to track. This is the general rule for camera flyers filming formations unless it has been fully discussed and planned with the other jumpers.

If you are on a free fly jump then **it is** common practice to track at break off.

This is because there should be no camera flyers above the formation as everyone should be at the same level or close to on break off.

The important thing to remember no matter what sort of jump you are doing is for everyone to know the plan at break off time.



The camera flyer does not want to see part of the group he was filming opening so close to him after a poor track!

It is very important to emphasise a good break off procedure.

The members in the group should all turn 180 and track for at least 5 seconds to gain adequate separation from the other jumpers before opening.

As they begin their turn to track, you should begin your opening sequence. This will allow vertical separation between you and the others.

If you delay your opening, you run the risk of being open at the same level as your group and it only takes 1 canopy to have an off heading opening and be heading straight for you, before a disaster occurs.

I have made it a practice to be extra alert and vigilant when jumping with unfamiliar people especially around break off for anyone who does not track or is not good at it.

4 WAYS

4 ways are probably the most common of all relative work dives and is the smallest formation skydive event held at most national and international competitions.

Once you have gained some skill at filming smaller groups, you may be asked to film for a team that is preparing for competition.

Be sure to ask the team what they expect of you in your filming and what they will cover in costs i.e. your slot in the plane, pack jobs etc.

Normally a 4 way team will pay the slot in the plane for the camera flyer but you may have to negotiate other costs involved.

The team also needs to know what level of camera work you do as some teams will demand perfection while others are prepared to work with a novice camera flyer.

It is common for the skill level of a 4 way team to be compatible with the skill of the camera flyer, this way no one should feel like they are having to perform more or less than what their experience will allow.

So its very important that once a 4 way team decides to use you as their camera flyer, make sure you all know what is expected of each other and what the costs are.

Flying for a team is a very rewarding experience and as you do each jump with them, you will get to know their habits and routines in the air.

Your performance and skill level will increase as you are jumping with the same people continuously and therefore you are able to anticipate their exits and maneuvers as they perform them.

4 way exit from a skyvan.

Note the well framed team showing all the points as a result of the camera flyer anticipating the exit.

Jumping consistently with the same team can produce excellent results.

As with any skydive you are doing with others, you need to know the plan.

A good camera flyer will watch the dirt dive of their team to understand what type of exit they will take off the plane and the points that follow.

Some formations are quite long so you will need to anticipate the formation possibly going out of frame if you are not ready for it.
With competition skydiving, the formations will need to be completed in the sequence they are drawn so some exits may be difficult to frame.

What wins competition is points and points need to be filmed, so ensuring you film the points is vital to your job as the teams camera flyer.

As the team are dirt diving, keep an ear out for your load over the manifest P.A.

Teams always appreciate a thoughtful camera flyer who can warn them of their load.

While on the ground, go over your gear. Ensure you have enough tape and battery power for the jump and that your camera settings are where they should be.

Also make sure nothing is loose or broken like a clip on your camera wing. This could be disastrous if you are minutes away from jumping and discover a broken clip or loose helmet buckle.

Also, check the pack jobs on all the rigs are done.

There is nothing worse than one of the team finding their unpacked rig as they are being called for their load.

So basically the less stress and outside problems the team has to deal with, the better their jumping and well being will be. And for you too!

You should have already established a routine for yourself once in the aircraft.

When you are nearing exit time, go through your routine; gear check, cameras check, goggles on, helmet on, camera to standby, swoop cords on, etc.

Now, you should be ready to film!

Setting up for the exit is no different from a smaller formation. Watch for the “shake, down, go” and carry out your exit.
As you leave the plane, follow the team in your sight and start to get to your comfortable distance for filming.

Use your wings and legs for horizontal and vertical adjustment and fly naturally with the relative air flow.

When you start to come off the hill, you can adjust yourself over the top of the team and fine tune your distance.
Remember to keep both eyes open and use your peripheral vision to frame the team and keep the sun at your back.

Good shot of a 4 way team just after exit.

Note the horizon in the background indicating the team AND the camera flyer are still on the hill.

As you gain experience and confidence, try to get steeper or more vertical over the formation and closer.

You may notice turbulence coming off the team as they go from point to point. This is called burble and is a nightmare for a camera flyer if caught in it.

Be cautious of getting to close to any burble as the dead air will suck you in and possible lead to a collision with the team.

You can encounter burble during the entire skydive with the team but extra caution should be taken during the exit.

If you try to stay on heading, any unintentional rotations or movement sideways can be picked up in the debrief by the coach and team.

Left: Camera flyers view of formation. Note a long formation that's framed well.

Right: Camera flyer keeping a comfortable distance over top of team while staying out of the burble.

At break off, follow the plan that you discussed with the team. Go through your opening sequence as they turn to track and take note of how well or poorly they do.

This is so you are aware of any potential problems or danger you can see due to a persons break off routine.

As your canopy opens, try to look straight ahead so your neck and spine are aligned so injury from any unwelcome jolts or sudden snaps are kept to a minimum.
You could try to sit up in your harness to ease opening stresses and move your hands to the risers just in case you need to kick out of any line twists.

In my opinion, this is the best way to minimize strain to my neck by keeping my head, back and neck straight.

This may not work for you so developing an opening routine that works for you is vital.

Once your canopy is open, you should be well above the rest of your team mates therefore reducing the risk of canopy collision.

It’s a good idea to let your team mates land first as spiraling down to their level and attempting to land amongst them could be potentially fatal and at the least reckless.

Remember, you have reduced visibility with your camera helmet on so the less canopies around you, the safer you all will be.

A good practice is to **let the low man have right of way.**

This “rule” should be understood by your team mates and in fact everyone at your drop zone.

Flying your canopy can be a lot of fun and some great shots can be obtained by video when swooping other jumpers or objects, however extreme care must be taken as the reduced visibility because of you helmet and ring sight may mean you fail to see hazards around you!

This means the lowest canopy should have a clear approach to land while the higher canopies that have vertical separation, hold off their approach until the low man has landed.

Canopy pilots should avoid being at the same height below 1000 ft so they don’t do simultaneous landing approaches which could result in collision.

Having good height separation should avoid all that and allow for staggered landing approaches.

If for some reason you find yourself amongst other canopies when you are preparing to land, be extremely aware of their positions and approaches.
If at all possible, try to land in a less used part of the DZ so as to avoid the chance of collisions.

Being consistent in your opening heights and landing procedures will develop a good trust between your team mates and other jumpers and will promote safe and controlled landings.

LARGE FORMATIONS

This type of filming is very challenging as the cameraflyer needs to consider a lot more than with a smaller formation. The trick to capturing a large formation is the exit.

A rear float position is optimal as you should be able to capture the bulk of the formation or “base” and also the swoopers as they exit from the plane.

Ensure they give a good head count so you can time your exit precisely.

Once they have left the plane, assume an upwards tracking position so you can gradually move to a position above the formation keeping your back to the sun to avoid sun spots.

If you are filming competition 8 way, the points are critical so you should know if your teams first point is long like a Zipper or wagga wagga.

Anticipate the exit and ensure you back off enough to get the whole formation in frame.

Above; just after exit the team hits the relative wind which should allow a good shot of the teams 1st point.

Above; an 8 way team transitioning between points. Note the angle of the cameraflyer which is a little flat. The cameraflyer will need to get above the formation if the next point is to be seen clearly.

As you leave the plane, you should see the group present to the relative wind and be almost vertical in your camera sight.

As you fall, the group will flatten out so you need to float to a position above them all the while capturing the points as they go.

As you can tell, it doesn't sound all that different to filming a smaller formation. The concept is the same however more people can create more problems.

Once you are above the formation, account for all jumpers before you move in or around the formation.
With non competition formations, you can use your artistic skills to look for good shots and capture specific events during the skydive.

The formation doesn't have to be complete yet, just be sure you aren't between it and the closing jumpers.
They will be coming in hot and probably wont be looking out for you.

A good idea is to float high on the formation to capture closing jumpers. Then as they close and join on the formation, you can sink on it so by the time the last person docks, you are filling the formation in your camera sight.

This is a good shot of a base formation just after exit. Note the cameraflyer, formation and swoopers are still on the hill. It will take a few seconds for the formation to level out and the cameraflyer to get above it.

An 8 way with a successful open accordion point. This is a long formation and the cameraflyer has done well to capture this shot along the widest part of his cameras view.

Once you are over the top of your formation and filming, try to keep your movements to a minimum. Too much movement distracts from the tape, smooth fluid movements can enhance the quality. As you gain experience in filming large formations, experimenting with different angles can be very rewarding.

Above; a jumper opens from the middle of the formation. Make sure you are aware of all events that are going to take place on the skydive. You don't want to be over the top of this!

Above; filming from below can offer some great shots and a different perspective. Make sure you don't compromise what you should be capturing for the jumpers by filming in this position.

When filming free fly formations, its important for the cameraflyer to be aware of others docking.
To avoid colliding with them, try to remain level with the formation and covered off someone.
Hopefully you would have fully dirt dived the jump so everyone knows exactly where they, and others, should be.
When its time to break off, the center of the formation usually initiates this by wagging their legs in a scissor motion. This lets everyone know to track off with the outside flyers going first.

The cameraflyer(s) capturing the formation should track first followed by the next outer ring of the formation. This will allow staggered and controlled openings with horizontal and vertical separation of the jumpers.

Above: Free flyers in a tight, controlled formation. Note the cameraflyer is on the same level as the formation.

Above: This 3 way free fly formation has an outside cameraflyer filming from the front as well as the one capturing this shot. Note how they are all on the same level.

Its very important every jumper on your jump knows your deployment plans. Larger formations plan breakoff higher than normal, so you should plan on opening higher than you normally do.

For safety, plan on a short flat track to the middle of the formation and an immediate opening.

This gives you good horizontal separation as jumpers track away from you, as you are open higher, you will have good vertical separation as well.

If you know you are landing with canopies above you, be predictable on your approach so any near by canopies you may not be aware of have time to avoid you and set up their approach for landing.

FILMING WITH MULTIPLE CAMERAFLYERS

As you gain experience and skills, you will probably have the opportunity to be part of a formation with more than one cameraflyer.

With multiple cameras on the jump, you will be able to specialize in different areas of the dive, and capture the exit and initial base set up from different perspectives.

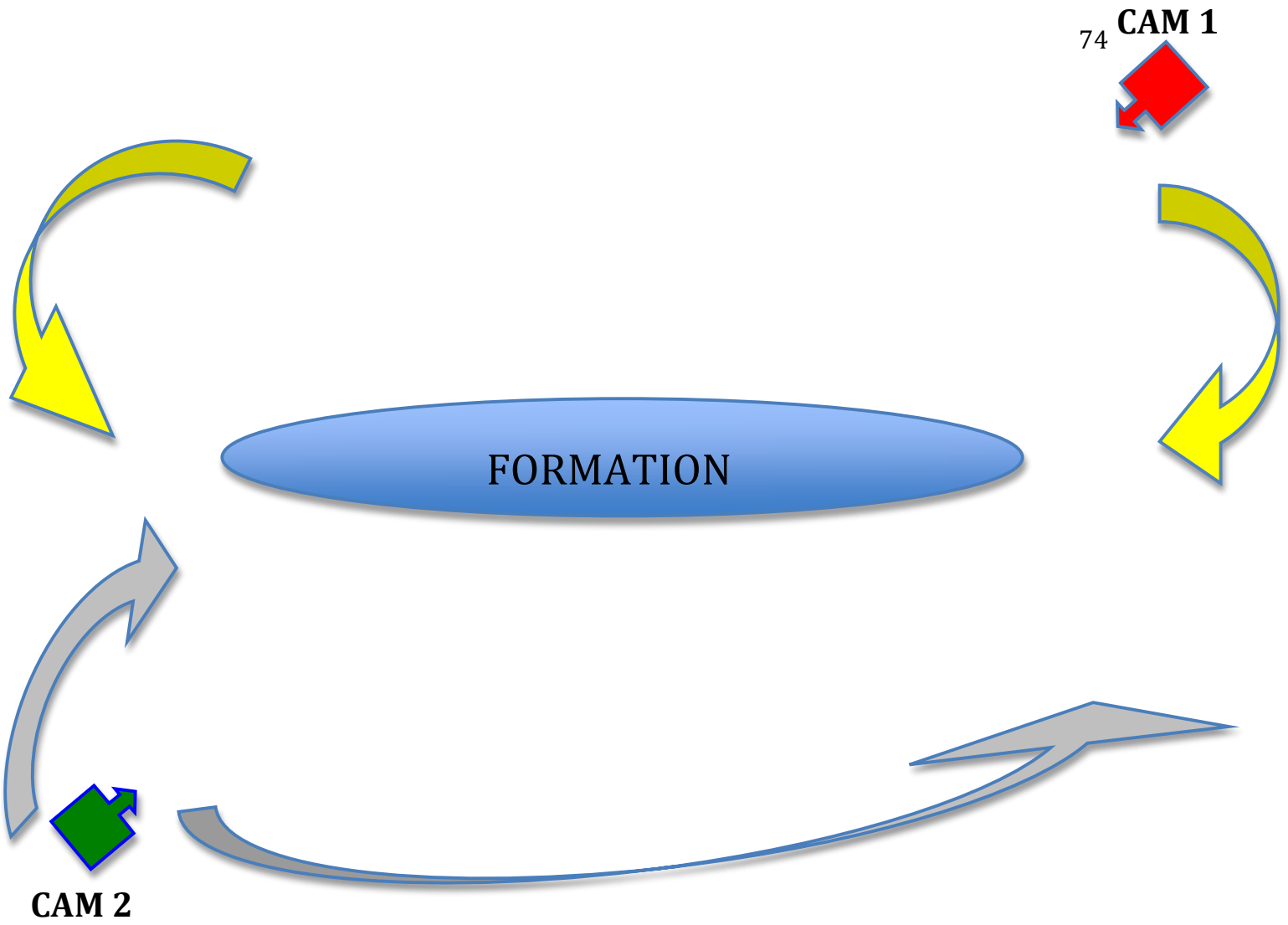
As with any skydive, planning is important. Always talk to the other cameraflyers and “dirt dive” the camera plan so you will know where you will be on the dive in relation to the other cameraflyers.

Usually one camera will go rear float in the normal cameraflyers position while the second camera dives out last in the formation.

Above; formation showing one cameraflyer filming from above while one captures the shot from below.

Right; freefly formation with dedicated cameraflyer in the foreground.

The last cameraflyer will usually be the “high” camera while the rear floater is the “low” camera.



The diagram above shows a typical set up of two cameraflyers which will show the formation building from above and below plus the transitions the jumpers do.

The lower cameraflyer can offer a new perspective on the jump and both can move freely around the formation to capture the best angle and action.

Once the footage is dubbed together, the jumpers should enjoy and appreciate the quality video and different views.

Sometimes formation organizers are looking for a particular angle or view in which case, you should be open to accommodate their wishes. it may be that you don't get the prized camera position, but work together with the other camera flyers and jump organizers, stick to the plan,

and eventually your skills and expertise will be recognized allowing you to have a go at the prime positions.

Along with planning the jump and who goes where during the skydive, it is also essential to plan the opening procedure when its time to break off.

With multiple cameraflyers, the rule is to keep it simple and not to complicate things any more than they need be.

The highest cameraflyer should open first at the first indication of break off. If there is more than one high camera, it's a good idea to be opposite each other at break off and turn 180 degrees before dumping.

The low camera should either turn and track with the formation attempting to out track the jumpers, open above them or fly to formation center and open. This depends if you are filming from below at break off or on a slightly lower angle above the formation but below a high cameraflyer.

A group of jumpers track away from the centre of a formation. There may have been a higher cameraflyer that is out of frame. The air above a formation at break off is the cameraflyers domain. Jumpers need to track well to avoid opening near a cameraflyer.

When a formation funnels or doesn't go as planned and there are lots of jumpers wanting to reform, ensure you and the other cameraflyers have a plan to deal with the situation. This may mean floating by fully extending your wings and D-arching gaining vertical separation on the

jumpers especially if it looks like they wont get the formation back together.

A good rule of thumb is if they are not back together by 6,000ft, they probably wont be.

Remember, be predictable and ensure no one is above you when you open!

FILMING CANOPY RELATIVE WORK

Unlike your skydiving camera work, your flying skills cant help you here.

Before attempting to film CRW, it's a good idea to be proficient at flying in formation with other canopies. You don't have to be an expert, but even a few CRW jumps will give you a good understanding of what it's all about and how you might film it.

You will need the appropriate safety gear such as an easily accessible hook knife and wrist altimeter which you can view at any time without taking your camera off the formation.

If you have a Reserve Static Line (RSL), you will need to disconnect it. You may not actually be involved in the formation but during a wrap, funnel or bad approach you might find yourself struck by one of the CRW pilots.

Two jumpers involved in a canopy wrap attempt to disentangle themselves. Having reduced visibility and things on your helmet for lines to snag can be more hazardous for a camera flyer.

A camera flyer flies in close formation to another canopy. Being close to other canopies requires extreme caution and subtle toggle input. Be wary of the unexpected.

CRW filming requires planning and briefing the same as any other skydive. Let the canopy pilots know where you will be, your canopy colors and where you will approach from.

Depending on if it's competition filming or filming CRW for fun, the exit will be an important part of capturing good video and photos.

Normally, you would exit first and open as soon as possible so you can focus on the CRW team exiting after you. If your filming for fun, you don't need to concentrate on getting the "points" that they make but no doubt you will be filming their docks and their approaches.

If you are filming competition, you need to get the points that the canopy pilots make so you need to have a good idea of the formations they are attempting so you can position yourself in the correct spot to capture the point and not be in the teams way.

A fun CRW jump with cameraflyer above and another jumper docked underneath. Its always easier for the cameraflyer to hold heading while others dock.

A four way CRW team completes a formation. Capturing the action from behind and slightly above the team is generally the optimal position.

Its important to capture the base CRW jumper opening for review if he begins to fly off heading. This can chew up valuable time if the other jumpers have to fly further to dock for the first point.

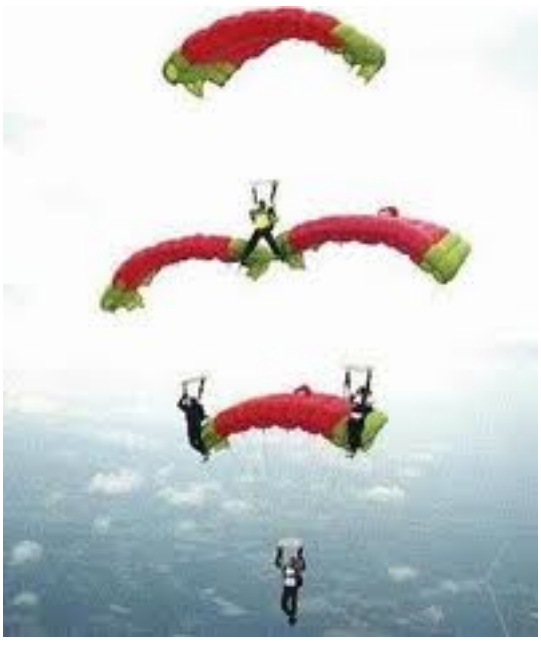
You will need to keep the CRW jumper in your sight during the whole deployment sequence. This shouldn't be to difficult but you may have a tendency to look up at your deploying parachute through force of habit.

A proficient cameraflyer should be able to deploy, un stow brakes and begin flying all without taking the camera off the building canopy formation.

If you are all flying similar canopies, staying with the team shouldn't be too difficult. If you are on vastly different canopies, attempting to dock will be more difficult and filming the formation no easier!

Keeping slightly high and to the rear of the formation will give you the best chance to capture the action and allow you a buffer if you start to sink out on them.

Avoid getting low on the formation as you may not be able to recover from this position. You will also be looking up at them instead of seeing what is directly in front of you which can be extremely hazardous if there are a number of canopies around wanting to join the formation.



A four way diamond formation captured from the front. The cameraflyer did a "fly by" to get this shot from the front. These photos are great for capturing the detail but the constant manoeuvring and positioning means you should not be trying to video for judging purposes as well.

As you gain skills and experience in free fall camera work, you will begin filming closer to your subjects allowing for detailed footage of them.

The same applies for CRW as you will be attempting to film in close proximity to the formation. If you are too far away, you may not capture the points which will make it difficult for the judges. So as with free fall, you will need to judge the distance you can film from safely.

Try to make sure the formation is inside your ring sight but not too small in it. If the formation extends beyond the edges of your sight, you are too close!

The formation should be touching the inside edges of your sight.

Above: this is the correct view you should have in your ring sight with the formation touching the inside edges.

This image shows the formation is to small therefore the camera flyer needs to get closer to pick up the detail required for judging.

The size of the formation can also be a deciding factor in your canopy flying.

As the size increases, it produces more drag, and therefore descends faster.

You will probably need to rely on heavy front risers which will help you sink your canopy but may give more penetration also.

Another way to loose height and stay with your formation is to sashay your canopy from side to side.

This may be distracting on tape and can cause unsteady footage. Also the burble from the CRW formation can be so bumpy it interferes with your filming.

Some great CRW photos can be taken by doing “fly bys” past the formation to get head on shots.

Another way of doing this is to fly in the same direction and by holding your risers, swing around and snap some good photos of the formation.

Always be aware of the formations plan so you don’t get surprised by anything unexpected.

In wrap situations, be aware of any canopies that are chopped as if you are directly behind the wrap, any released canopy will fly back and up towards any unsuspecting camera flyer! Not a good place to be at a time like that so try being off to the side at all times when filming.

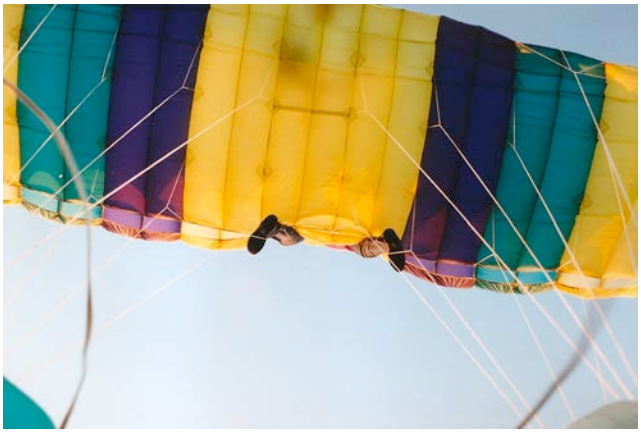
For break off and landing, unless you all have a specific landing pattern, the “low man has right of way” rule should apply.

Maintain good separation between the other canopies and follow the same landing pattern as the others.

I try to either land first or last. That way I know I should have no interference from other canopies. This depends on your wing loading, how far away from the DZ you are and how well you can fly your canopy!

Filming CRW is a lot of fun and can be a drastic change of pace for the camera flyer. You may even decide to leave your video behind and focus on taking quality photos instead.

CRW filming is very challenging but rewarding also.



Cameraflyer docked with another CRW jumper. Lots of fun can be had filming CRW.

A quality photo of CRW in progress. The camera flyer is positioned perfectly to get a great sunset/silhouette shot on the same plane as the CRW workers.

FREEFLY AND SKYSURF FILMING

Filming these two types of disciplines can be very challenging.

Skysurfers vary their fall rates dramatically so staying with them can be quite difficult, but with practice and knowing their routine, you can anticipate the changes and keep the skysurfer in frame.

Freeflyers tend not to change their fall rate so much but can move around a lot on the horizontal plane making it difficult for all the subjects to be in frame.

That’s why freefly camera flyers like to use wide angle lenses as discussed earlier in equipment.

In competition, as per formation skydiving, the cameraflyers video quality contributes to the overall score of the team so its vital that the cameraflyer has the skills required and knows the routine of what the team is performing.

Preparation is everything, so having the correct jumpsuit, lenses and mental picture of the jump will help you in producing a quality product that your team mate(s) will expect of you.

When first learning to film these disciplines, you may also be filming novice freeflyers and skysurfers so it is very important to talk with them about exactly what they are going to do and what to expect.

Its not uncommon for beginner freeflyers to “zoom” around the sky at high speed or get bumped by someone resulting in them loosing body position and “floating” high at speed.

Problems for skysurfers can result in them loosing control and having to jettison their board or for them to skate

quickly toward you if they aren't aware of the boards influence through the sky.

These things you must be aware of when filming beginners to these disciplines.

Some tips to help you avoid situations are to;

Be aware of an individuals skills if you have jumped with them before.

Don't be afraid to suggest a change to the plan if it means you are concerned about something.

Stay out wide if you notice someone zooming around the formation to quickly.

Don't get above the formation in case someone looses control and pops up.

Try to be predictable in your own movements especially if you know others are moving toward the base.

When filming the skysurfer, spins and horizontal movement is common. Anticipate rapid closing speeds when they occur and be prepared to avoid collision.

Do not spend lengthy periods over the top of the skysurfer.

Vertical loops over the skysurfer look fantastic in the routine but lots of practice and excellent flying skills on both parts must be achieved.

Have a baggy jumpsuit with swoop cords (somewhere in between a freefly suit and camera suit is desirable.)

As the rapid changes in fall rate with skysurfing can catch the unwary cameraflyer out.

Top left; a great shot of freeflyers in head down and sitting with the inside cameraflyer in front of the formation. Notice all are on the same horizontal plane.

Top right; a linked freefly formation just after exit. Notice they are still on the hill and and are maintaining good control.

Practice is key to success when filming these disciplines.

Many of the moves and flying techniques may seem unfamiliar to you at first but rehearsing the routine and practicing your flying techniques will dramatically improve the quality of your footage and improve your individual skills over all.

Flying inverted, backward, upside down and vertically are just some of the skills that will be demanded of you.

Remember, your skilled videography contributes to a large amount of your teams score!

Left; skysurfer and cameraflyer working together about to go through an anti-clockwise vertical loop. The potential for collision is high so you must ***know the routine.***

Right; another vertical move routine. Note the close proximity of the cameraflyer and the wings on his camera suit common in F.S. camera suits.

FILMING TANDEMS, AFF AND STUDENTS

Drop zone chief instructors in Australia should not allow cameraflyers to film tandems, AFF student stages or B rel students unless the cameraflyer has a minimum of a D license according to the Australian Parachute Federations Operational Regulations.

This is a safety regulation imposed to ensure that cameraflyers are at a standard required by drop zones to be able to film their clients safely and with some expertise.

If you are filming customers of the drop zone, then you would expect to be getting paid (after initial trials) for your efforts either as a full time employee of the drop zone or as a contractor.

Therefore this section is not aimed so much at the beginner cameraflyer, but more to the beginner employee cameraflyer of a drop zone.

ACCELERATED FREEFALL FILMING

Unlike most of your work, when filming AFF students you will be of secondary importance. Most important of course, will be the successful and safe skydive of the student.

Your job will literally be to “stay out of the way”.

Try rear floating for a good exit, paying particular attention to the exit count as “anything goes” with student so you need to be prepared for it.

As you, the jump masters and student come off the plane, keep level with them and fly around in front to film the awareness of the student and start to capture photos.

DO NOT reach in for the student or distract the student as this could have disastrous results. Keep a safe distance and capture quality video and photos. Sometimes

students are aware enough to wave so be ready on your shutter switch to capture it!

Top left; a good AFF exit from a side door aircraft.

Students are unpredictable so be prepared for anything!

Top right; a student getting ready to deploy. Notice how the cameraflyer is low and in front ready to capture the deployment.

Bottom left; a good shot of pilot chute as deployment commences. Jumpmasters will use your video for the debrief.

As there are different stages to AFF, you will be required to fly differently on some of them to capture the action up close. Know what is required of the student for each stage so you are able to anticipate their actions. Remember, they are the one being assessed and will be following the jumpmasters prompts. You are there to capture the action and offer as little distraction as possible.

But if the action you capture is good, you will quickly gain a reputation and the respect of your fellow co workers.

As with all students, they should be opening higher than what you might be used to, so it's a good idea to talk with the jumpmasters on your opening procedures so as to

avoid confusion. A general rule of thumb is for JM 1 to open just after the student while JM 2 tracks away allowing you to track in the opposite direction and open.

At the conclusion of the jump you would normally land at the student landing area so you can capture their landing also. Remember, they are paying good money for your quality video and photos so you should try to deliver to the best of your ability. If they are not happy with your product, they may complain!

The video you produce can also be used as a debrief tool by the jumpmasters. This can allow the jumpmasters to point out aspects of the skydive to the student and refresh the students memory if they are unable to recall events.

Filming AFF is a lot of fun and rewarding when the student does well and is relaxed and aware.

But stay alert and aware especially on exits as anything can happen during the skydive.

Always film your student in a safe and professional manner.

TANDEM FILMING

Outside or traditional camera for tandems is still popular at drop zones around the world despite the rise in popularity of hand cam to film the students.
If you are lucky enough to have the opportunity to film tandems at a drop zone, you must be prepared for a wide range of flying styles from the tandem instructor.

Some instructors will fall slow while some will fall fast. Others will backslide and skate around the sky when they turn while others will delay their drogue throw or have little interaction with yourself.

The type of tandem rig can play a part to as I have found the STRONG container with a larger drogue will fall slower than a VECTOR container with a smaller drogue.
That is why it is very important to have a good set of wings on your jumpsuit or jacket.
Some cameraflyers can get away with using a freefly suit to film tandems but I have found it is usually the person with a lighter body type that can do this. However they run the risk of going low on a slow falling tandem or not capturing an adequate shot by being to flat and not filming from below.

Top left; a good position for the cameraflyer as he films his client. Note the wings inflated allowing the cameraflyer to "get under" the tandem pair.

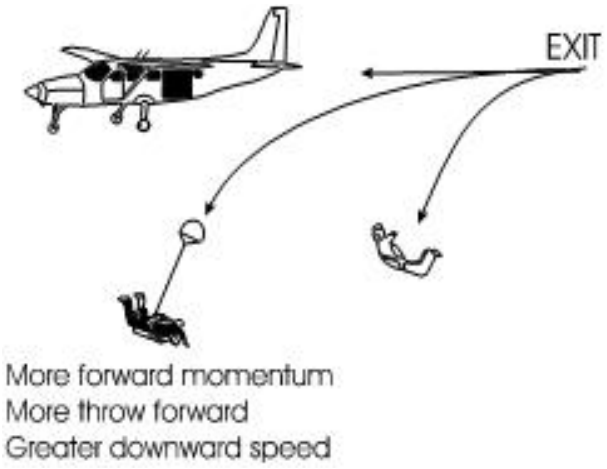
Top right; Cameraflyer with a freefly suit. Note his relatively flat position resulting in the camera filming the top of the passengers head.

Bottom left; An ideal shot from below showing a full view of the tandem student and their enjoyment.

You will need to be prepared also to dive fast if there is a delay in drogue throw. Keep an eye on the instructors hands so you can transition back to a belly to earth position when he does throw the drogue.

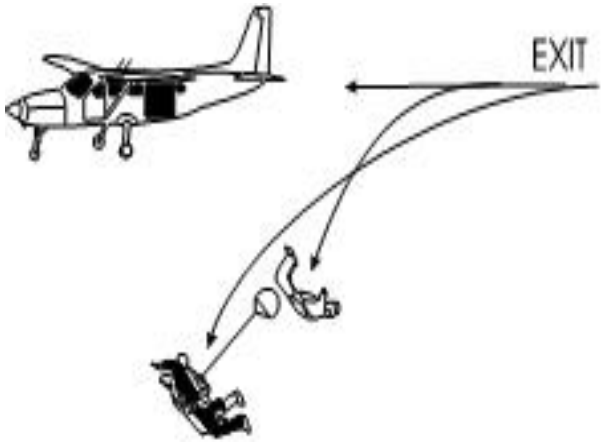
The trick is to level off with them and not to overshoot. If you are directly over them, try stopping level with the drogue. That way you can drop down at a safe controlled speed and it will save you if you go low by overshooting.

If you do go low, spread as much wing as possible to rise up to them. This is made more difficult by the fact you need to keep looking up at the tandem pair to film them.



Cameraflyers and other parachutists, by exiting from the rear of the doors that the tandem is “chasing” them from, do not run the risk of the tandem pair falling below and consequently need not worry about the drogue.

In fact to remain close to the tandem, the cameraflyer will have to initiate the chase immediately after the exit.



If the cameaflyer follows the tandem pair, there is a far greater chance of the tandem pair being thrown forward under them.

This results in either the TM having to delay the drogue throw until the cameraflyer is clear or risk throwing the drogue close to them.

Once again, the sun plays an important factor in capturing good images.

Always try to keep the sun at your back so the tandem pair are lit up and there is no glare in your lens.

Cloud is another problem for tandem filming as great shots can be obtained from below, except if there is a white cloud background, the tandem pair will be silhouetted in black.

You must anticipate the type of shot you may get that is relative to your position in the sky. You may need to stay a little flatter and get a little closer to avoid light saturation through your lens.

This is a great shot of a sunset tandem also showing how the light from the sun can "black out" your subject and make for bad video/photos if not rectified.

This cameraflyer is in an ideal position being low to capture the passanger and having his back to the sun.

Interaction with the tandem pair can be a lot of fun and, done professionally, can provide a quality video for the tandem passenger. Remember, **they are paying you for the product you produce** so make them the “star of the show” when filming them.

When its time for the TM to wave off, there should be no one directly over the pair allowing for a safe, clean deployment.

When filming the opening shot, experimentation is a good idea and will give you an understanding of what works for you.

Try popping up just before deployment, this will allow you to capture the whole deployment which looks great on video.

Alternately, you could transition to a sitting position as deployment commences. This will allow you to film from a low position where the tandem passenger can see you. You should be able to capture their expressions throughout the canopy deployment.

As tandems open at a higher altitude, you will have plenty of time to roll over and commence your own canopy deployment.

Be aware of the spot though, a contentious TM will open higher if he thinks you may have difficulty in getting back to the drop zone while others may not consider it.

*Top left; great shot of RW with the cameraflyer and tandem passenger. Ensure **any** RW with a tandem is done safely and according to OP regs.*

Top right; another excellent method of filming tandems. This allows for great shots of the passengers face and reactions.

FILMING STUDENTS AND B RELS

The filming of students fresh off their AFF training and students conducting their B rel training provides a great opportunity for the student to look at their flying techniques and have a video to show their friends where they feel the pressure of AFF training is off them.

At times you may be approached by a student who is willing to pay your slot in the aircraft if you will go up with them and film/photograph their skydive.

This is great and helps provide interaction between the experienced skydiver and beginner and can allow the student to see flying from the cameraflyer that they may not have seen before.

The main problem students and B rels tend to have when being accompanied by their own cameraflyer is that they become focused on the camera and posing for the great photo for their wall at home.

This can mean the student looses height awareness and can result in their AAD or FXC firing, in which case if you are still filming them, you may be low also and suffer the same fate with your AAD firing.

Height awareness is one of the main things you must emphasise to the student before you board the plane.

Ensure that the student checks their alti during the skydive and prompt them if necessary. Lack of height awareness on **either** part can result in premature main and/or reserve deployment.

Apart from ensuring you and the student check the height regularly, it’s a good idea to wear an audible altimeter on these types of jumps.

More often than not, the student wont have an audible alti as yet so never assume that they do.

As the student is new to using their body in the air, understand what they are comfortable to do during the skydive. As with any jump, a plan should be worked out so that you both know what sort of exit is to be done, what activities during the skydive, what the opening plan is and where each other is landing.

If you have doubts about what is to be conducted, get advice from an AFF jumpmaster or the DZSO. They will point you in the right direction for what should be attempted by the student.

If you are not a qualified AFF jumpmaster, you should run the plan by one so they can amend or approve of what the student wants to do. As they do not have their A license yet and are still on a student license, you as the cameraflyer, have to be a minimum of a D license holder to film them.

If you are asked to film a B rel, the jumpmaster will be coordinating the plan with the student. Ensure they are both aware of your plan to film but as per the AFF stages, the student is under some pressure to perform and complete the stage.

Avoid distracting or interfering with the student during the skydive as this can put them off and interrupt their thought.

Just like AFF, you are there to capture the action and provide quality video and photos that the student is paying for.

Another thing to avoid as a cameraflyer is to try to do two jobs at once.

Some cameraflyers are AFF qualified as well and although probably capable, should avoid being jumpmaster **and** cameraflyer at the same time. Doing this can mean you are spending more time trying to get quality video than looking at your alti and being height aware.

Know your limits and what is safe to do, this will make it a more relaxed skydive and enable better results from both jumpers.

Left; sometimes a B rel will go unstable. This can test your flying and camera skills!

Right; student going through B rel exercises.

SAFETY, TIPS AND TRICKS

Cameraflying is a rewarding and exciting way to improve flying skills and the enjoyment of skydiving through quality video and photos but is challenging and potentially hazardous if safety concerns and procedures are ignored.

I am including this list of safety advice and awareness tips in an effort to help educate the beginner cameraflyer to the dangers of this discipline and at least, make them aware of some of the things to consider before skydiving with a camera.

1.PACK JOB

If you are packing for yourself, you should have a good idea of how to pack your rig accordingly to get a comfortable canopy deployment.

If you are letting others pack your rig, ensure they have at least a packer B rating or are a recognised packer for the organisation.

Make them aware you are jumping camera and prefer a slower opening to lessen the strain on your neck.

Packers generally do a good job and are familiar with a wide variety of rigs, they will usually point out to you if there is a problem with your gear or notice worn components.

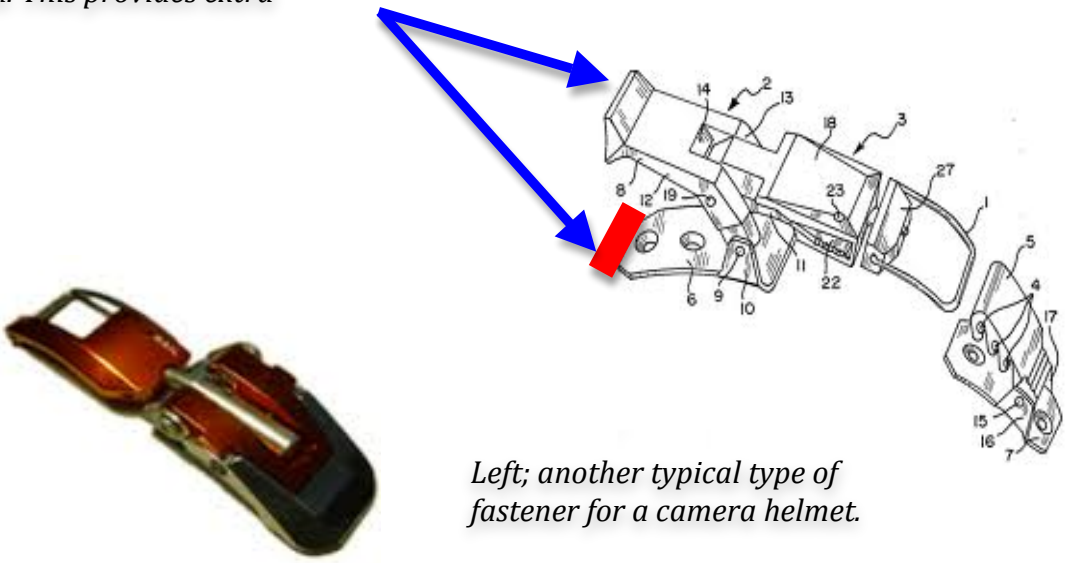
2.HELMET LOCKS

The last thing a cameraflyer needs is for their helmet to fly off their head when the canopy opens or for the chin strap or locks to fail on them in freefall.

Although this happens rarely, it still happens. To avoid this, check your helmet straps or securing system what it works properly and locks in place.

A ski boot buckle system is usually used to cinch up the helmet by means of a ratchet. Some buckles can lock down for extra security but it’s a good idea to secure the buckle down with a Velcro strap to stop the buckle flicking open if struck by a riser on canopy deployment.

Some buckles can lock in place when closed. This provides extra security.



Left; another typical type of fastener for a camera helmet.

3.PLANNING AND PREPARATION

When preparing to do a jump, ensure your equipment is good to go.

Make sure you have enough battery power and you have the right lens(s) on. Make sure your tape or SD cards have plenty of space left on them and all cables and switches are serviceable and at the right setting.

Check your camera helmets buckles and straps and make sure they are in good order and secure properly. check your jumpsuits wings and swoop cords for wear or damage and check that your zip is working and serviceable.

Check that you have an audible alti with good batteries in your helmet. Set it to the height you want it to go off and test it before you insert it into your helmet.

You may want to take a cloth to wipe your lens with and don’t forget your hook knife!

Discuss the plan with your fellow jumpers and practice on the ground before you go up. Dirt diving is free and lets you iron out any problems that may be encountered.

5.IN FLIGHT

During the ride to height, ensure your gear is secure and not rolling around on the floor. Any filming that you do on the way to height should be done without changing the settings on your camera. If you do this, you may forget to change them back before you exit!

Make sure you are not moving your rig around unnecessarily as you may accidently pop a pin on your main or reserve.

Allow plenty of time to put your helmet on and test your camera before you exit and don’t forget your swoop cords!

6.EXITS

before you exit the aircraft, get a gear check from an experienced jumper on the plane. Make sure everything is done up and secure and you are recording.

When exiting, locate the float bar with your hand and swing out as per the practice you would have done on the ground.

Don’t make contact with the top of the door frame with your rig as this could dislodge a pin.

Once outside, manoeuvre into your position carefully and set yourself for the exit count from the team.

7.FREEFALL

Be aware of entering the teams burble just after exit. Always try to avoid being over the top of them at this point as you are all still on the hill with the relative wind changing.

You will notice burble as rough or disturbed air that offers little resistance to your body. You will probably feel it as turbulence on your extremities if you are on the edge of it.

Because it offers little or no resistance, it can suck you into it where there is no air to fly with at all.

If you find yourself in the teams burble, go “big” and try to backslide out of it as quickly as possible or tilt your body to move off to the side.

If you are to slow or are unable to manoeuvre, you may collide with a fellow skydiver resulting in them loosing control.

You will also have some explaining to do once on the ground!

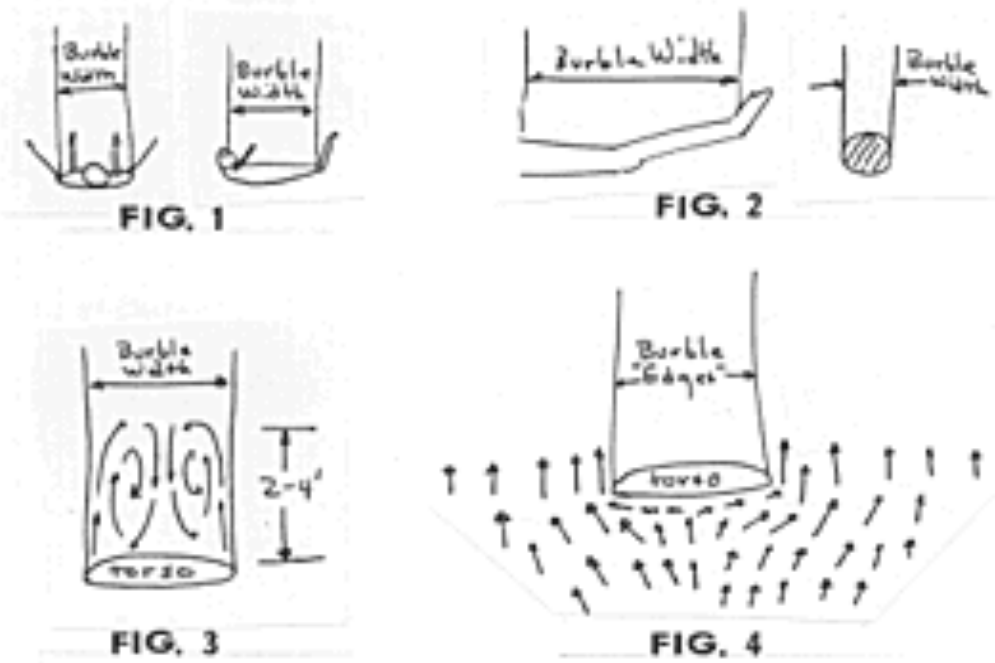


Diagram explaining how burble works and the effects of relative wind over the body and behind it.

If the formation funnels at any point, you may need to fast fall down to the skydivers and wait until the base reforms.

Do not zoom around them at this point as there may be other jumpers out of your view trying to move back to the base and link up.

Try to maintain your distance above them and close to your desired filming distance once all the jumpers have re-formed.

If you go low on your camera jump, you need to get as “big” as possible to rise back up to your subjects.

You will probably loose sight of them but looking sideways rather than trying to keep them in frame by looking up, will help you recover more quickly.

If you are a capable flyer, you may want to transition to a sitting position to film the remainder of the jump. Be aware however, this will change the break off and opening plan so you may need to track before you deploy.

If you are in your normal filming position at break off, follow the plan which will usually be to open straight away as the others track off.

Keep an eye on any skydiver that tracks poorly so you can point it out to them after the jump. Formation skydivers must be competent in tracking so they avoid cameraflyers and other skydivers before they deploy their parachute.

8.MALFUNCTIONS

If you find yourself under a malfunction, check your height, look down and cut away. Don’t try to film or photograph it as this can waste valuable time. Just go through your emergency procedures.

It’s a good idea to carry a large hook knife to cut lines if they become entangled with your equipment.

9.LANDING

As the cameraflyer, you will probably be at a relatively higher altitude compared to the other skydivers you were filming which will allow you to loiter in the sky while the others land.

Stick to the landing pattern and know where the others in your group are so you can avoid them and stay at a safe distance.

If you find your self amongst other skydivers, try to get enough height separation between you and the next person to land.

Remember, **be predictable** so jumpers above you can read your intentions and maintain height separation from you.

If you are in any doubt about the safety of the landing area due to congestion, land in an alternative area. It may mean a longer walk back to the club house, but it should be safer.

Generally though, you should find yourself being the first one to deploy so you should try to be the last one to land. This means you will have clear airspace and allow for a trouble free landing.

INTERVIEWS

Interviews were conducted and received from prominent skydive cameraflyers from around the world.

The subjects commented on were;

SAFETY
TECHNIQUE
EQUIPMENT
GENERAL

The participants were;

WENDY SMITH **WS**

SHANE SPARKES **SS**

JOE JENNINGS **JJ**

DARLENE KELLNER **DK**

PAUL LAWRANCE **PL**

SAFETY

WHEN FILMING A FORMATION WITH UNFAMILIAR JUMPERS, DO YOU SHARE YOUR SAFETY CONCERNS AND WHAT DO YOU CONSIDER IMPORTANT INFO TO PASS ON?

DK Yes I always participate in the dive plan and get an understanding of what's to occur. I emphasize the break off and landing procedure so everyone is aware of what's going to happen.

PL Yes I do. The cameraflyer is part of the team. I always remind the team that they need to give a nice strong track and not open in place. Parachutes are not designed to have cameraflyers go through them!

SS Yes.
Firstly, most important to be part of their dirt dive.
Make them incorporate a good turn track wave look open for all in their dirt dive
Size up their abilities, their gear. their eye contact...etc ..more than just the dive. Establish heights, break off etc...
Contribute the obvious...let them know you are there, where you intend to be. your track / opening time position.
Let them know your procedure in a plan b, eg... 'if their dive turns to poo, what you're gonna do'
If you are to be filming un familiar take a step back in the air. This will give you a little space and margin you may need.
As much as possible stick to your plan.
ALWAYS, consider yourself invisible, that is, do not expect to be remembered or seen by the jumpers

DO YOU THINK IT'S A GOOD IDEA TO WEAR A HOOK KNIFE? DO YOU AND WHAT TYPE?

WS YES it can save your life. know how to get it out of the pouch without looking.

SS ABSOLUTELY.
Yes, depending on the parachuting to be undertaken determines what type, size and how many.

They should be well attached of course. They should be maintained / replaced as the blade can rust and become less effective.
Their use should be regularly rehearsed; similar to a cut away procedure. it is an emergency procedure after all.

Best mounting point is where many manufactures have them, under lift web cover. Visible and easily accessible.

PL I like to think of a hook knife as condom theory. I would rather have one and not need it than not have one.I wear two. One on my right leg and one on the left chest of my rig. One is metal and the other is a long strong plastic one.

YOU HAVE DEPLOYED YOUR PARACHUTE AFTER FILMING A 16 WAY, AT WHAT POINT DO YOU TRY TO LAND? WHAT ARE SOME OF THE CONSIDERATIONS YOU NEED TO BE AWARE OF WHEN PILOTING A CANOPY?

DK If ive been filming a big way, I try to be the last one on the ground. I don't have a super small canopy so I can stay up a lot easier. Im always looking for that stray canopy at my level when im nearing the ground. You never know if there's one there who doesn't see you especially when there are a lot of canopies in the air.

JJ AT 4000 OR 5000 FEET, WE BREAK OFF THE DIVE AND FLY AWAY FROM EACH OTHER TO GET CLEAR SPACE TO DEPLOY. WE HAVE TO LOOK OUT FOR EACH OTHER AS WE APPROACH THE LANDING AREA. WE ALSO FOLLOW SIMILAR PATTERNS, JUST LIKE AIRPLANES, TO AVOID COLLISIONS.

WS Last
Being in the right place - I always make my circuit to the landing zone……
What height you opened, how weighted up are you, how many people are under open canopies at the same time, eyes open for anything unusual.

WHEN YOUR DEPLOYING YOUR PILOT CHUTE, HOW CAN YOU AVOID PILOT CHUTE HESITATION AND/OR LINE TWISTS?

JJ GOOD PACK JOB, GOOD BODY POSITION. ALSO, SOME CHUTES ARE MORE RELIABLE THAN OTHERS.

WHEN JUMPING WITH MULTIPLE CAMERAFLYERS, DO YOU TALK AMONGST EACH OTHER ABOUT YOUR INTENTIONS? WHAT DO YOU CONSIDER THE MOST IMPORTANT FACTORS WHEN JUMPING WITH MULTIPLE CAMERAFLYERS?

JJ WE DO TALK. ONE PERSON IS THE MAIN CAMERA FLYER AND THE OTHERS HAVE TO KEEP THEIR EYES OPEN TO AVOID RUNNING INTO HIM OR HER. WE TEND TO FIXATE ON OUR TARGET, SO WE HAVE TO PLAN TO AVOID COLLISIONS. WE ALSO TALK ABOUT ANGLES THAT COMPLIMENT EACH OTHER, AND ABOUT HOW TO AVOID GETTING INTO EACH OTHER'S SHOT.

WS YES this is the most important point of communication for safety and team work.
Don't be anywhere you said you would not be – stick to the plan

DK Yes we talk about the plan like who is the main camera, who is outside camera, or who is filming from below. We also practice the stack up on the plane so we know where everyone will be and if we all will fit on the step! I consider the most important thing is knowing where you are to deploy and when to avoid being in someone else's space.

HOW CAN YOU AVOID BEING TRAPPED IN A FORMATIONS BURBLE AND ONCE IN, HOW DO YOU ESCAPE?
SS
Of course to be **trapped** in a formations burble means a collision is most likely.
First thing to say is if a collision is going to happen, avoid heads, yours or theirs.
Go for the path of least resistance; ie, if you were to fall from 7 to 10 feet above a formation,
a hand forward to push off at the point of collision gives some control as to where and how hard you hit and
may assist you with going between jumpers, hitting legs.
Avoidance is best.

DK I find the best way to avoid the burble is to pay very close attention to the exit count. If you miss time the count, you are more likely to end up in the burble particularly if you're a bit slow.

Also pay close attention to the type of formation coming off the plane. In freefall, use your peripheral vision to see swoopers under you trying to join the formation. Keep your distance until all the jumpers have joined. To escape the burble, going big and backsliding out usually works.

PL Watch the dirt dives, it will give you a picture of where the formation is moving from and to.

Feel for the burble of the formation and if caught, I go as big as I can and backslide or track out of the way.

TECHNIQUE

WHAT POSITION DO YOU PREFER TO KEEP YOUR HEAD IN DURING PARACHUTE DEPLOYMENT AND FOR HOW LONG?

WS Looking straight forward – using my whole upper torso as a tripod…..

JJ I TEND TO LOOK UP AT MY CANOPY AS ITS OPENING. MOST CAMERA FLYERS TRY TO LOOK FORWARD.

SS This will vary to some point for me considering equipment. After a quick look / check above, on deployment, as i pitch, my head is looking UP, to the next picture which is the bag appearing.
This avoids leverage possible, from head weight, plus additional weight of camera equipment if you were for example looking down at the ground.

PL I check that whomever I am filming is clear of me and vice versa. I generally pitch whilst holding my chin bracing my neck with my arm against my chest. In case of a hard opening.

WHAT DO YOU CONSIDER THE MOST CHALLENGING TYPES OF EXITS AND THE MOST CHALLENGING TYPES OF AIRCRAFT TO EXIT FROM?

WS C-130 faster run in - big way blasting exits.

SS One challenging exit of note is from outer edge of the ramp of a c 130.
The aircraft speed is usually above 115 knots. The wind on your feet is enough the trip you up. Sure footing required. There is really nothing to hang on to.
Unless you go out to the very edge and hang on to the hydraulic arm. You then place yourself in an extremely high wind area. Because of the aircraft speed, the timing is critical. a teeny bit early and you are too far away by lots..
Other difficult aircraft are the non jump aircraft with no steps handles etc... with low experience non jump pilots..

PL Rear exiting aircraft I find can still catch you out if you open your wings too early. Side exits can catch you out if you don't leave at the right time.

WHEN FILMING COMPETION F.S. WHAT DO YOU CONSIDER THE MOST IMPORTANT PARTS OF YOUR JOB?

JJ FOR SKYSURFING, WE'RE A TEAM AND OUR MOVES ARE CHOREOGRAPHED TOGETHER. I BELIEVE I WROTE AN ARTICLE ABOUT IT. FOR ME, ITS ABOUT FLYING AGGRESSIVELY WHILE HOLDING A SMOOTH AND WELL FRAMED ANGLE.

DK Capturing the exit is vital as points depend on it. After that, so long as you know the formations being done, just try to stay close to capture every point. But not so close that they are hard to see. "Practice makes perfect."

WHEN BEGINNING TO USE YOUR CAMERA,FOOTAGE TENDS TO BE VERY DISTANT.HOW CAN A NEW CAMERA FLYER IMPROVE THEIR FOOTAGE AND WHAT SHOULD THEY AIM FOR?

DK Gradually getting closer on each jump will improve your picture quality and confidence. Once you are familiar with the distance you need to be at, you will be able to achieve it more quickly and with less effort. Use the ring sight and keep your head steady if you need to look around.

WS Learn to fly first and be in the place you plan to be – in any position – then put a camera on…….

SS
Many camera persons are often shooting pictures that are not 'close' enough for a number of reasons.
Lets say that perhaps the most outstanding reason is that their in experience and any associated fears of tghe un known or failure keeps them back.
Knowledge, confidence and experience will always drew them closer to their subjects.
Take the example of any 4 way fs team that is starting out, with a camera person of little experience. This is most often the beginnings of champion teams.
Training; practice, familiarity and experience solve most of the problems of a subject too far away at exit, too small in frame during the jump.

PL Ask questions and practice, practice, practice.
Aim to be where the judge can see the formation better, or where a tandem or AFF can see themselves and their surroundings better.

EQUIPMENT

DO YOU USE AN OPEN FACE OR FULL FACE HELMET & WHAT ARE SOME CONSIDERATIONS WHEN CHOOSING A HELMET?

DK I use an open face helmet with a firm fitting chin strap.

WS Open face – fitting very firmly

DO YOU USE A CAM EYE FOR YOUR CAMCORDER & WHAT OTHER ANCILLERY EQUIPMENT DO YOU CONSIDER HELPFULL WHEN USING YOUR CAMERA GEAR?

JJ FOR THE MOST PART, I USE A RING SITE TO MAKE SURE MY CAMERAS ARE POINTED IN THE RIGHT DIRECTION.

WHAT SIZE LENSES DO YOU USE ON YOUR CAMCORDER FOR LARGE/SMALL FORMATIONS & DO YOU CHANGE LENSES IF PREPARING TO FILM A FREEFLY JUMP?

DK I prefer to use a .45 lens for most of my filming and a 24mm lens for my stills camera. I find both lenses complement each other well as the shots are wide but not to wide. I use wider lenses when the situation calls for it.

WS Different jobs require different shooting frames - know your frame (ie: what's coming into your camera lens)

JJ I HAVE LOTS OF LENSES. MOST OF THE TIME I PREFER TO SHOOT WIDE, BUT THE LONGER LENSES ARE GOOD TOO. THEY PUT THE VIEWER RIGHT INTO THE ACTION.

WHAT SORT OF SHUTTER RELEASE SWITCH DO YOU USE (I.E. BITE,PRESS,BLOW ETC) AND SOME OF THE ADVANTAGES?

DK I use a bite switch in my helmet. I find it easy to use and reliable.

JJ FOR STILLS I USE A BITE SWITCH. FOR MOTION PICTURE, I USE A HAND SWITCH.

YOU WANT TO TAKE SOME QUALITY PHOTOS. WHAT ARE SOME OF THE CONSIDERATIONS WITH EQUIPMENT YOU NEED TO THINK ABOUT. i.e. SIZE OF LENS, TYPE OF CAMERA AND FEATURES YOU NEED ON IT?

PL I use a digital camera with a standard lens. I feel a DSLR is the best type of camera for the job.

SS Consider the objective of the pictures and choose equipment to accommodate the requirements to meet that objective.
How wide is the Wide Angle Lens ?
Reliability and Simplicity in shooting are important.
Image Quality as much as you can get with what you have got

A camera with a WIDE ANGLE LENS, that is , the one on the camera and not an additional attachment lens is preferable as the wider the more versatile. If it is too wide, it can be zoomed in a little as required. If you want something super wide, there are many attachment lenses of various angles and qualities available.
The card cameras of today are so small that I do not consider weight and size to be much if a consideration, although a small Sony CX type camera is often considered too big and cumbersome to use when one can get a 'go pro' or 'contour' type camera. But really, they are all so small.

DO YOU CONSIDER COLD TEMPS TO BE A FACTOR ON EQUIPMENT FUNCTION & HOW CAN YOU PREVENT CAMERA MALFUNCTIONS?

PL I generally find my DSLR lens has no problem. Video lenses can get a ring of condensation dependant upon the lens type, but I found using a hair dryer on the lens and camera helps dry the air that is going to be sealed inside once the lens is screwed on.

You may have to do this a few times as the threads aren't air tight and will eventually allow moisture in the video between the lens and camera again.

GENERAL

MOST SKYDIVERS WHO WANT TO GET INTO CAMERA ARE UNAWARE OF WHAT THEY MIGHT BE GETTING INTO. WHAT DO YOU CONSIDER THE MOST IMPORTANT THINGS THEY SHOULD KNOW WHEN WANTING TO BE A CAMERA FLYER?

SS Firstly, one of the most important points is to know; What is your motivation is to take up camera?
If you are to do it well you must love what you are doing.
In past days, often camera people were motivated by their lack of skills in the air. Their belief that there was no need to be so good in the air as you were always on the outer, no taking grips. WRONG. One soon realizes at all levels, it is much harder to be somewhat 'chasing' an aerial subject, the same and sometimes greater degree of anticipation, timing, observation is required; the skilled and capable camera person needs to be able 'out fly' the subjects covering distance quickly, stopping non contact at a point, reacting to change.
Lastly.....regardless of all, **give it a go**, Take lots of pictures do it as well as you can. Enjoy it and appreciate what you produce. Remember, of the billions of photographers on earth, so so very few will ever take something as spectacular as your first aerial shot.

WS Know how to fly to be in the right place
Know how to set up a safe camera system
Realize how to be considerate about what you want to do.

JJ LOTS OF PEOPLE WANT TO SKYDIVE AND SHOOT VIDEO. THAT'S TOTALLY GREAT AND THE CAMERAS ARE SMALL AND EASY TO USE. TO BRING DOWN QUALITY VIDEO, THEY SHOULD FOCUS ON FRAMING AND STABILITY. STABLE AND WELL FRAMED VIDEOS ARE FAR EASIER TO WATCH THAN SHAKEY VIDEOS.

PL I ask other experienced cameraflyers about their experiences such as don't put swoop cords on under your gloves in case you need to remove them in an emergency. Learn to fly your wings and camera. I am a 65kg male and find the wings and helmet need different techniques for flying and opening.

YOUR GOING TO FILM A FOUR WAY. WHAT ARE SOME OF YOUR CONSIDERATIONS BEFORE YOU GET ON THE PLANE?

WS Exit Position
Shot required for debrief
Break height

PL Experience. i.e. will they track well, will they remember you are there, who do you watch for the exit count…

JJ PROPER EQUIPMENT, EXPERIENCE OF THE TEAM, HOW TO AVOID PARACHUTE COLLISIONS, FRAMING AND STABILITY.

WHAT DO YOU CONSIDER THE MOST REWARDING TYPES OF CAMERA FLYING AND IS THERE SOMETHING THAT YOU WOULD WISH TO FILM OR PHOTO IN THE FUTURE?

WS Rewarding flights are "recorded, safe and you bring back beautiful images to earth to share with others"

DK Jumps that are unique and have great visuals like balloons, choppers and sunsets. Also jumps with friends. Jumps that are safe.

WHAT GOALS SHOULD A NEW CAMERA FLYER SET FOR THEMSELVES?

JJ AT FIRST, JUST GO FOR IT. OVER TIME SKILLS IMPROVE. WORK ON BASIC TECHNIQUES AND GOOD STABILITY. DON'T FIXATE TOO MUCH ON THINGS, YOU STILL HAVE TO LOOK AROUND SOMETIMES TO SEE WHATS GOING ON AROUND YOU.

DO YOU PREFER A CAMERA JACKET OR SUIT AND WHEN CHOOSING, WHAT ARE SOME OF THE CONSIDERATIONS?

DK I use a camera suit as I prefer a full body suit when I jump.

I take into account the length of swoop cord I need for the wings to work effectively and where I connect them and how. For me, my wings are sewn to the suit and are not really that big.

CLOSING

Learning the art of cameraflying is not an easy task and is a very demanding activity which can be exceedingly difficult to learn and is something that requires years of practice to achieve an acceptable standard set by your peers and yourself.

Many jumps with the camera will not turn out as you have planned in regards to the quality you are looking for, but with understanding the fundamentals of camera work, you should be able to set yourself up to get the results that you are happy with the majority of the time.

Individual skill as a skydiver is one of the key elements of producing good camera work. If you have good skills in the air, you can fly the camera to where you want it to be faster and smoother than if you are still learning how your body works in the air.

As stated, this work is not to teach you to skydive, but rather introduce you to the world of the cameraflyer and provide you with the knowledge and options available to you when starting out in camera work.

A good cameraflyer is a valuable part of any dropzone.

As well as your skydiving gear to look after, you have all your camera equipment to maintain and set up for the right jumps. You have the responsibility of watching out for others in the air, maybe checking the spot, landing safely and providing a quality product that others will admire and use accordingly.

This all adds up to making cameraflying one of the most demanding and challenging activities of skydiving yet one of the most rewarding.

I hope this guide has been of benefit to the beginner cameraflyer and you are able to apply the principles of this work to achieve excellent results.