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Introduction

This manual is aimed at parachuting instructors and is intended as a starting point in regard to the equipment knowledge that all instructors should possess in order to help maintain safety on the drop zone. Whilst primarily aimed at Category System and Accelerated Freefall System Instructors, the manual also contains valuable information for Tandem Instructors and indeed all categories of parachutist.

It would be beneficial for instructors to have relevant packing certificates for their own and their centre's equipment. This allows them to pack mains and then as Instructors, to test others to that standard. As an Instructor you will also be involved in the following tasks, all of which require an adequate level of equipment knowledge:

- Flight line checking of Students and jumpers
- Packing instruction and packing tests
- Answering questions on the suitability and condition of equipment
- Jumping

This manual is laid out as a series of general points with additional detail on individual items and aspects of equipment. Also included are sample BPA Safety Notice references and further reading.

The manual is an update to the original BPA Rigging Manual written by Tony Knight, to whom much credit is due for his original work and ideas.

NB. The BPA Safety Notice Index is amended through time and the rapid evolution of our sport means this manual will gradually become out-of-date – be sure to keep up with the constant changes in our sport.

The Main Canopy System

Main pilot chute

A much underestimated, misunderstood and abused item of equipment, which only seems to get replaced when it has stopped performing as intended. Since a main parachute system does NOT receive a routine inspection at the same time as the reserve system, jumpers should regularly examine their pilot chute and replace before performance deteriorates.

General inspection points:

- Check that attachment of the handle is secure; deployment will be difficult if the handle comes off.
- Check material for damage and deterioration.
- Check length of the centre line, it should be at least as long as the tapes on the mesh, possibly up to 3 inches longer. If it is shorter than the tapes, or if the edge (hem) of fabric does not sit level, there will be a considerable loss in lifting power. Replace if necessary, they are not expensive. A good deployment will not begin with a poor pilot chute.
- Has the mesh stretched? The reinforcing tapes should be stitched on the diagonal of the weave, if they are on the "block" the mesh can stretch making the drag factor and efficiency much less. (If unsure what this means, get a rigger to show you. Identifying good and bad pilot chutes is useful knowledge.)
- Has the kill line shrunk? (This happens due to friction with the outer bridle) The spectra kill line should be slacker than the centre line tapes.
- Is it the correct size for the spandex pouch? A common issue is a small pilot chute being used in a pouch made for a much bigger pilot chute. These combinations result in the pilot chute being loose in the pocket and able to slide out prematurely in freefall.
- Be sure the kill line system is correctly assembled and attached

Example Safety Notices

(Safety Notice) SN3/94 Pilot Chute Toggle
(Safety Information Bulletin) SI 2/91 Collapsible Pilot chutes

Main bridle

This device attaches your pilot chute to the parachute.

- The effective length of a hand deploy bridle must be at least 5 feet
 - This means:
 - Throwaway bridles should be at least 5 feet from pin to base of pilot chute
 - Pull out bridles should be at least 5 feet from deployment bag to base of pilot chute
- Check entire length for abrasion and cuts.
- Check attachment of the pin carefully. Is the stitching sound? Has the tape holding the pin worn on the eye of the pin? The consequences of the pin separating from the bridle would be dramatic.
- Check effectiveness of any Velcro. Worn Velcro has caused premature openings and horseshoe malfunctions. Don't leave it for 'just one more jump', get it replaced as soon as you notice it has deteriorated.
- Modern bridles for high performance canopies are commonly much longer than the regulation minimum effective length of 5 feet

Example Safety Notice

SI 2/91 Collapsible bridle line

Main deployment bag

- Check the grommet in the bag for distortion or sharp edges.
- Check inside seams for sharp 'hot knifed' edges.
- Hold bag to the light to check condition of fabric. Bags are subjected to considerable wear and tear.
- Check line stow bungies are appropriately sized and effective. Loose stows lead to hard openings and malfunctions through line dump.
- Bags are made to fit the container, be aware of this if swapping kit around.

Bungie selection and use

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Ensure you know that there are different types of elastic band (bungie)

- Different sizes exist to hold different types and thickness of suspension line. Know which one to use and when.
- It should take a force of between 8 and 12lbs to release a line stow from the bag. Any less could result in the lines releasing prematurely (out of sequence/ line dump) during deployment leading to hard openings, injury and damage.
- Always use parachuting specification elastic bands from a reputable source within skydiving. Those ones found at the local market probably aren't designed for the demands of skydiving deployments.

Main canopy

As well as the obvious wear and tear or rips and damage that will be caused by (ab)use, the following items should be considered -

- The main cause of deterioration to a canopy is sunlight, followed by physical abuse and jumping

Visually inspect for damage to the fabric, particularly -

- Check for tears throughout
- The bridle attachment point
- The tail area
- End cells where it comes in frequent contact with the ground
- Slider stops. These prevent canopy fabric getting into the slider grommets. It is important that they are present and not broken or bent.
- Check inside for cell wall separation and the condition of the cross port vents
- Check the slider for damage to the fabric or grommets. Damaged slider grommets will cause damage to the entire length of the line set on every deployment.

Example Safety Notices

SB 7/02 Ninja grounding

SN1/94 Nova grounding

SN 1/91 Pintail canopies

Lines

There are various different materials used for lines - Dacron, Kevlar, Spectra, and Vectran to name a few. Each has its own properties of stretch, elasticity and durability. E.g. Dacron absorbs opening shock and retains its trim; Spectra shrinks with use.

- Suspension lines usually have a tensile strength of 400-800lbs whilst control lines are usually 800lb minimum
- Check the cascade joints and bar tack stitching. Lines breaks often occur around the finger trapping.
- Centre cell A-lines are subject to the greatest opening shock, and failure of such lines can necessitate a cutaway.
- Check the control lines, these are subject to a lot of wear moving through the guide ring and the loss of one on opening could cause more than an inbuilt turn. Certain canopies put a lot of wear on the control lines and their owners should replace them every 200 jumps or so.
- Outside (stabiliser) microlines tend to shrink more than the rest due to slider friction. This will lead to a gradual change in the shape of the canopy.
- Twists build up in control lines as a result of jumpers turning to face their canopy after landing whilst holding one of the control toggles. These generally accumulate more in one side than the other. Such twists shorten and weaken the control lines and increase the chances of tension knot malfunctions. It's a good idea to untwist the control lines regularly.

Line trim

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- Microline/Spectra will eventually lose its proper trim through use, as the line set is subjected to varying amounts of friction from the descending slider. Different lines throughout the canopy will shrink by differing amounts. The result after several hundred jumps will be that the canopy is not flying or opening as well as it should. Eventually the canopy should be relined, to improve flight and deployment characteristics.

- Canopies lined with Vectran or other line types that are not subject to trim degradation will still need routine relining due to wear and tear.

Example Safety Notice

SI 3/94 Bar tacks

The 3 Ring Riser

- Standard risers are made from Type 8 1.75" webbing which has a tensile strength of 4000lb.
- Mini or 1" Risers are made from Type 17 webbing with a tensile strength of 2500lb. If used with an RSL, Type 17 risers must be reinforced at the harness end where the grommet goes through the webbing.
- Large rings give a greater mechanical advantage, and therefore an easier cut-away. This is why these are mandatory on RAPS rigs.
- The position and alignment of the rings and length of the locking loop are all important for correct function.
- Check the steering line guide rings are securely attached.
- Check for velcro damage to the webbing from toggle attachments and riser cover systems
- Check that the 3 ring riser locking loops are secure and not frayed. A cause of fraying loops is splits on the inside of the riser grommets, thus it is important to check these grommets for such damage as part of any general inspection.
- Check rings for indentation from hard openings. (NB if it does that to the metal, what does it do to the rest of the harness? Get advice on packing if required)
- The Relative Workshop, inventors of the 3 Ring release, recommend flexing the riser ring webbing every month, as otherwise the nylon webbing can 'set' causing release problems.
- Check cutaway cable is not kinked or damaged. It should be clean and move freely through the loop and housing.
- Beware of cables made of cheap materials that may look similar but do not perform correctly. Incorrect cable types have prevented riser releases in the past.
- Confirm the correct routing of rings and cutaway housings. This varies from rig to rig. Know the routings for rigs that you check and use; know when to ask about any others.

Example Safety Notices

SN2/97 Reversed risers

SI 2/97 Ring slap

SN3/94 Type 17 grommets

SI 1/94 guide rings

SI 5/93 RSL

SN2/84 Large ring

Connector links

There are different designs of connector links, the most common are known as "Rapide links". Do not use cheap copies - without 'Maillon Rapide' and the tensile strength stamped on them

- Check they are closed and tightened correctly and are not showing signs of corrosion. Over-tightening can split the barrel or damage the threads. Under-tightening could allow the barrel to move and the link to distort or break. Normally these links are tightened correctly at 'finger tight plus a quarter turn of the barrel'
- Bumper covers are the plastic covers on connector links, which keep them from damaging the slider grommets – which would then damage the lines on every descent of the slider. Also, bumpers orientate the connector links in the correct direction, important since Rapide links are not designed to take a side loading.
- Ensure bumpers are present, in good condition and tacked in place to prevent them from sliding up or trapping the lines.
- Stainless steel links are far stronger than their alloy equivalents and different types

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different types of canopies

Soft Links

The original soft link design needs to be made and fitted by a rigger and is made from 800lb Dacron line
Several manufacturers now produce a re-usable connector link, ensure you follow directions carefully when installing.

Example Safety Notices

SI 2/95 Jammed Control line

SN1/88 Soft links

The Container and Harness

Grommets

Grommets are the metal reinforcements around holes cut in the fabric on your parachute system. They are made of either brass, nickel plated brass or stainless steel.

- Stainless steel grommets are extremely hard wearing, brass grommets are easier to replace.
- Grommets can get damaged or be improperly set. Be sure to look out for loose or worn parts. Worn grommets can have sharp edges, which can lead to further problems, such as damaged closing loops or canopy suspension lines.

Example Safety Notices

SN 10/82 Riser grommets split

SN 3/97 grommets Type 17 risers

SB 2/00 Reflex grommets

Steering Toggles

- Check the line is securely attached to the toggle.
- Check the tongue of the toggle moves freely in the half brake loop. Beware the toggle and grommet being inserted too far into the brake loop. This is a particular problem on microline where a toggle inserted too far can be trapped by the loaded brake line in flight preventing release of the toggle
- Check any Velcro or securing tuck is effective in holding the toggle in place during deployment. Velcro-less toggle systems can become less effective through time - ensure they continue to do their job by checking the toggle keepers stay tight
- The various methods of stowing the excess brake line each have their own small idiosyncrasies; including the system of not stowing it at all - ensure you are familiar with the different problems and that you know how to avoid them.
- Ensure the method used to attach a particular steering line type and toggle type is compatible. There are various methods, be sure you use the correct one. Your rigger can advise.

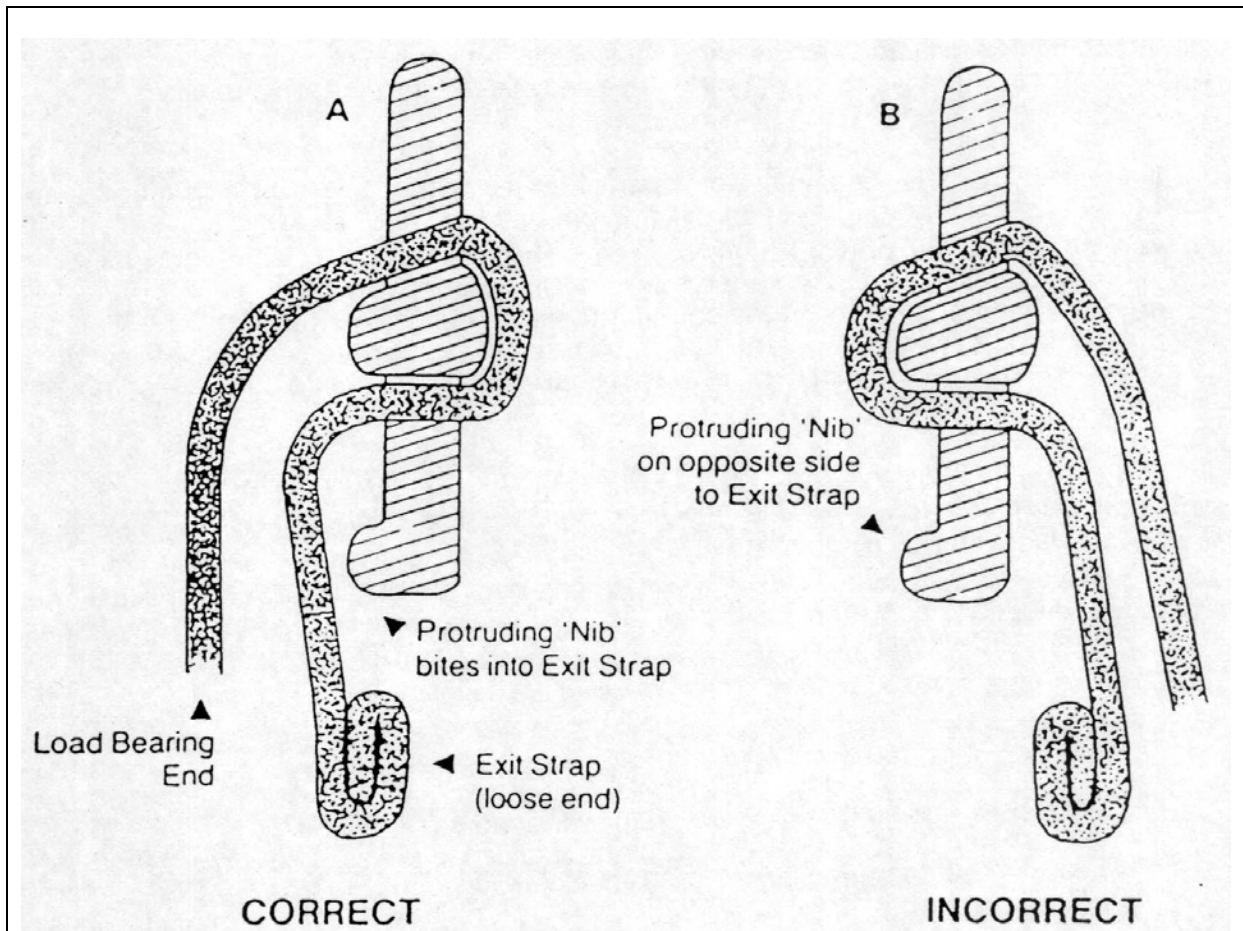
Example Safety Notices

SB 7/97 Rigging Innovations Velcro less toggles

TB 12/96 P de F mini riser toggles

Harness and Hardware

- It is usual to use Type 7 (6000lb) or doubled Type 8 (4000lb) webbing for the harness.
- Check all exposed parts of the harness for fraying or cuts. If any webbing is damaged it must be repaired or replaced. Page 5, Feb 2004
- Broken harness stitching must be repaired. Remember there is no 'reserve' harness – the harness must work every time.
- Dark webbing exposed to acid damage often goes red in colour
- Velcro rash on webbing can reduce its strength by up to a third
- Parachute Hardware is made of forged and plated metal parts
- Leg strap buckles are rated to at least 2500lbs, but chest strap buckles have a tensile strength of as little as 500lbs.
- Hardware and webbing must be correctly routed. Take particular note of the following diagram, bearing in mind that some hardware can be disassembled, and therefore re-assembled incorrectly. Brand new rigs have been known to leave the factory with the wrong routing.
- ***If in doubt ask. A harness that fails will result in a fatality.***



Example Safety Notices

SB 6/95 Missing stitching
 SI 1/89 Vector Stitching

Cable Housings

- Cable housings help protect the inner cable from being damaged or operated prematurely. They must be secured to the rig in such a way that any snagging or movement of the housing cannot operate the internal cable.
- Check that ripcord and cutaway housings are securely tacked to the container as per the manufacturer's instructions.
- Check for sharp edges on the inside of the housing.
- Reserve ripcord housings are usually tacked at both ends and fixed in position.
- Cutaway housings usually have a degree of 'float', whereby a housing end is able to move a **Page 6, Feb 2004** moves in normal use, without restricting it.

Example Safety Notices

PSB 9/98 Loose Amp fittings – Vector
 SI 3/93 Rough edges
 SI 3/91 P de F Housings

Deployment Systems

There are various different methods of deployment of a main parachute e.g. BOC – Leg Strap – ripcord – pull out. An Instructor should know the issues and concepts associated with each system, and be able to pack and teach each one accordingly.

- Spandex pouches wear out – check it does its job in retaining the pilot chute securely until it is required to be extracted from the pouch. Extraction should be smooth.
- Misrouted bridles can have disastrous consequences
- Velcro on bridles and pullout pads needs to be effective
- Spring loaded pilot chutes have to be positioned correctly
- Ripcords have to extract smoothly and easily

Example Safety Notices

SI 3/95 AFF secondary handle

Closing flaps

These are important since if they don't open when needed, neither does your parachute.

- Check plastic stiffeners are not cracked or broken.
- Check grommets are secure.
- Check for any sharp edges that may fray loops. Get repaired if necessary.
- Not all rigs are secure enough for the demands of all kinds of jumps - many older rigs were designed before freeflying and are not suitable for such.

Example Safety Notices

SN 1/00 Atom flap

SB 2/00 Grommets Reflex

Closing loops

- These are cheap, if not free, components - never accept frayed loops. Do not leave it for 'just one more jump'. Premature openings are extremely dangerous to everyone – whether in the aircraft, on exit or in freefall.
- Check the loop is of the right length to hold the pin firmly and adjust if necessary.
- The consequences of a worn loop can range from destroying an aircraft in flight, to serious injury or death due to premature deployments.
- Closing loops are simple to make, but also easy to make *incorrectly*. Ensure the correct material and techniques are used.

Example Safety Notices

SB 1/00 Javelin Closing loop attachment

PB 12/97 Mirage closing loop attachment

SB 8/94 Atom closing loop

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Velcro

Velcro is still extensively used in parachuting applications and the following points are worth noting.

- It wears out, and where it serves a critical function (such as positioning a throwaway bridle) it should be inspected regularly and replaced when its adhesive qualities decline. The pile (soft side) generally deteriorates first.
- When Velcro is wet its adhesive qualities can be substantially impaired.
- When Velcro is wet and frozen its adhesive qualities can be embarrassingly improved (for example when you've dragged your bridle cord through wet grass on a repack, gone to 12,000 feet where it freezes and then prevents your bridle cord pulling away...).

Leg strap retainer elastics

- Another inexpensive component, which can prevent you pulling on a loose leg strap when it is time to open. They also prevent your legstraps from slowly loosening prior to deployment.
- Replace or fit as necessary. These are a mandatory component according to BPA regulations.

Example Safety Notices

SI 5/90

Container Sizing

Matching of canopies with containers is a great potential source of danger.

- Loose main containers have been prematurely opened simply by the drag on a loose pilot chute bridle.
- Loose reserve containers can allow reserve pilot chutes too much movement within the container, which can cause the spring to deform, or to extend and therefore lose its launching power.
- Placing high bulk canopies in containers intended for smaller ones can result in split or broken stiffeners, excessive strain on container fabric and alterations in the intended positions of flaps and housings etc.
- Closing loop sizes are also important and should suit the canopy/container relationship.

Example Safety Notices

SI 4/83

The Reserve Canopy System

Reserve Deployment Systems

This is a basic introduction, but feel free to find out more after having read this section. Reserve systems are the territory of specially trained packers and Riggers. It nonetheless is helpful to understand some of the concepts involved.

Reserve Static Lines (RSLs)

These devices allow the main canopy's risers to activate the reserve deployment sequence upon cutaway. The range of RSL systems and rigs on the market today make it inappropriate to list this information here. It is up to you to seek out the answers by reading the owners' manuals for the relevant equipment and asking your rigger or club instructors.

Some general points:

- RSLs are specific to each container and reserve system. You should be familiar with any you regularly use or perform flight line checks on. Familiarity with lanyard routings and shackle positions is important.
- If routed incorrectly then the system may not deploy the reserve after a cutaway, or may even prevent the malfunctioned main from releasing. Be familiar with the potential problems with the RSL system you are flight-line checking.
- For those instances where jumpers choose to disconnect an RSL shackle, be sure that the shac safely stowed away where it cannot be accidentally activated and where its stowage will not c issues.

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Freebags

Freebags are the deployment bags used on almost all ram air reserve systems nowadays.

- The bag is not attached to the canopy and is intended to float down freely after the reserve has been deployed.
- The idea of the freebag is that in the event of the pilot chute becoming entangled, if the bag can at least manage to get to the end of the lines and open the mouthlock stows, then the reserve canopy has a good chance of inflating. This safety feature has saved numerous lives.
- The need for the bag to get to the end of the lines is the reason why the freebag bridle is so long – to allow the lines to all pay out.

Inspections

During a reserve repack a full system inspection is carried out on the reserve and container system, whether the reserve has been deployed or not. This ensures the airworthiness of the system and allows repairs to be carried

out before the system is packed again. This inspection is a fundamental part of the process - a repack achieves very little without the inspection.

Paperwork

It is important that the paperwork is completely in order on a piece of equipment, just as a jumper's personal paperwork should be in order. Be sure you know what to look for.

Equipment packed within the BPA system will have at least the following:

- Reserve packing card - detailing the packer, their rating, and the date of repack. This document is kept throughout the life of the equipment as a record of the number of repacks, deployments, any maintenance work carried out and safety notice compliance.
- Inspection Sheet - Tick sheet of specific items with record of any work done to the system at that repack. Must accompany the reserve-packing card and have details of the inspector and their rating. This should be the same person as the name on the reserve packing card. This is discarded when the next repack is carried out.

Automatic Activation Devices (AAD's)

As with the RSL section, it is left up to you to seek out the answers by reading the owners' manuals for the relevant equipment or asking your rigger or club instructors.

Consider

- Each rig and Automatic Activation Device type combination can be very different.
- Familiarity with cable routings, ripcord pins and routine operation is important.

Be sure you are aware of the following for each AAD system you use or check:

- Operating parameters – e.g. deployment speeds and activation heights
- When / how to disarm in the event of aircraft descent.
- It is extremely dangerous to switch an AAD on in the aircraft
- How to alter or set activation heights when necessary.
- How to calibrate with respect to changes in barometric pressure
- How to calibrate if being used at a different landing area from the enplaning point
- All other information provided in the specific owners manual

In particular, note the following:

- FXC 12000 AAD calibration height is at the discretion of the CCI. Be sure you know what applies at your DZ
- FXC 12000 AAD calibration height should be AT LEAST 1500 feet below the intended main Page 9, Feb 2004 height
- The FXC 12000 AAD should be switched off in the aircraft prior to descent if the jump is aborted
- Spiralling of canopies, even student canopies, can activate some AAD's due to increased descent rate. Be sure to teach accordingly at your DZ.
- The manufacturers recommend the STUDENT Cypres is switched off in the aircraft prior to descent if the jump is aborted

Opening heights and speeds for Cypres and FXC 12000 AAD's

AAD	Activation Speed	Activation Height
Expert Cypres	78 mph/114 fps or higher	750 feet down to 130 feet above ground level when set correctly
Tandem Cypres	78 mph/114 fps or higher	1900 feet down to 130 feet above ground level when set correctly
Student Cypres	<u>SPLIT ACTIVATION ALTITUDE AND SPEEDS:</u> For freefall speed, activation is 750 feet down to 130 feet above ground level when set correctly For speed greater than 29 mph/42 fps but slower than freefall speed, activation speed is 1000 feet above ground level when set correctly	

FXC 12000J	Intended not to fire at descent rate of 27 mph/40 fps or slower; Intended to fire at 44mph / 65 feet per second and faster	Calibrated by User, varies between DZ's, height is determined by CCI for student equipment, but should be AT LEAST 1500 feet below the intended main opening height
<i>NB See each Manufacturers' manual for full information Info for Cypres applies to both original Cypres and the newer Cypres 2 models</i>		

Student Equipment including Tandem

Student equipment has some special considerations, just touched upon here.

STATIC LINE

Static line overview

- The static line is usually made from Tubular nylon material with a tensile strength of 4000lb
- The static line must be continuous from Aircraft attachment to the bag (no knotting lengths together)
- The static line must be the correct length for the aircraft concerned. It should be of adequate length but no longer than 2 inches short of the tail
- Some static line systems utilise a centre base tie with single strand of cord holding the bag closed until line stretch when it breaks. The idea of this is to keep the bag and canopy below the aircraft. It is obviously important to use only one strand of the correct break tie material tied correctly

RAPS and AFF

AFF/RAPS student equipment overview -

- Large 3 ring system mandatory on RAPS kit
- RSL
- AAD
- Toggle colour should be standard at a centre
- Cutaway pad colour should contrast to the jump-suits used
- Beware use of wrong materials for ripcord cables, which can prevent activation

ROUND / "TRADITIONAL

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Round student equipment overview -

- Toggle colour should be standard at a centre
- Front mount reserves must have a centrally located handle
- Front mount reserves should have a cross connector connecting the two risers (inside the reserve pack)

Example Safety Notices

SI 1/01	FXC Calibration
SI 3/97	Equipment used by Student Parachutists
SI 2/96	3 Ring System
SI 1/96	RSL
SI 3/95	AFF Secondary handle
SI 8/91	Capewell malfunction

TANDEM

(Tandem) Instructors should be aware that Tandem equipment is very specialised equipment. There are many factors affecting their reliability. Tandem is especially sensitive to packing, but with due regard to this malfunctions can be avoided.

Tandem equipment overview -

- RSL

- AAD (Tandem specific)
- Tandem equipment is highly regulated and classified separately in the BPA Operations Manual
- Tandem equipment takes a lot of wear and tear and regularly needs repair and maintenance between routine reserve repacks.
- Separate components (reserves, mains, drogues, line sets) are 'lifer' and Tandem Instructors should be familiar with this and with common problems that are encountered. The lifing varies from rig manufacturer to rig manufacturer and component to component.
- Tandem rigs have a special BPA inspection sheet as part of their reserve packing documentation.
- BPA Tandem system modification approved by the BPA Riggers Committee are listed on BPA Form 212 and also on the internet at <http://members.aol.com/tandemmods/>
- Tandem rigs use specific, stronger main closing loops. Most tandem systems require a specific, stronger elastic band for the line stows also.

Example Safety Notices

SI 1/89 harness stitching

PSB 3/98 Vector Drogue release loop

PSB 2/97 Strong Service life

General Topics

Packing Instruction

Whilst it is impossible to cover this practical and vast subject in the pages of this manual consider the following:

- Teaching of packing should be consistent with what everyone teaches at a centre. Variation causes confusion with students and encourages their experimentation.
- Have a clear and standard method for removal and recognition of tangles. Students can easily be confused by messy tangles, but once the techniques and basics are learnt, all becomes clear. It is vital that a student can recognise and remove tangles. Skipping this subject could lead to tangles going unrecognised and getting into the sky due to a lack of knowledge.
- A methodical approach to packing, including the signing of checks is very important.
- Packing is not difficult and should be encouraged as it is the basis for understanding equipment

Further Reading and Information

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You should be prepared to learn more by delving into the following resources

- Your local rigger
- Other instructors at your centre
- Manufacturers and owners manuals and packing instructions
- Internet:
Manufacturers websites for product, technical skydiving, packing and rigging information.
- Dan Poynter's "The Parachute Manual" Volume 1 and 2
- Regular Publications with equipment articles in the skydiving press such as :
BPA "Skydive Mag", USPA "Parachutist" and the US "Skydiving" newspaper.

Packing Glider equipment/ non sport equipment

A word is worth mentioning here about glider and pilot rigs. If you pack one of these for a pilot you are not doing him any favours. If you do pack one and it was to go wrong you would probably be blamed by the manufacturers as an unauthorised packer. If you change it in anyway using your experience as a sport jumper and it was to go wrong (for even an unconnected reason) the manufacturers would probably blame you for carrying out modifications which they had not approved. Without regular servicing carried out by the manufacturers these rigs are potentially unsafe and sport parachutists are advised not to work on them. They are very different and work to a different set of safety and operating parameters.

Additionally, the BPA Insurance does not cover you in anyway for packing non-sport equipment. In the event of an accident and a possible lawsuit, you would be unprotected in court.

STC Previous Recommendations

The following equipment or systems have been previously banned or strongly recommended not to be used:

1. Silk stitched reserves.
2. Net-vented pilot chutes on front mounted reserves.
3. Speed links on reserves.
4. Blast handles.
5. Non-stainless steel ripcord pins.
6. All plastic reserve ripcord handles. Nylon ripcord handles that do not incorporate the wire passage through a broad centre post.
7. Ripcord stops.
8. Irvin 2706 sliding snap hook.
9. "One-shot "Capewells on student equipment.
10. (Non quarterbag type) Deployment bags on traditional student free fall equipment.
11. Pilot chute assisted sleeve deployed static line systems.
12. Peripheral hem width of less than 6" on canopy modifications.
13. Side-pull reserves unless used in conjunction with AAD's.
14. Nylon loops recommended to replace steel cones.
15. Deeply waisted reserve handles.
16. The use of twin bridle cords.

These are listed to remind us that many problems have already been encountered in the sport, with drastic consequences. Be aware that changing existing practices without due care and attention might revisit other issues have already taught us valuable lessons.