Think you know your parachute? Emerging features and added complexity can create a dangerous knowledge gap. This two-part report challenges you to recognize and understand the details of your particular rig and rethink your settings and operating procedures.

MARDs, user-programmable AADs, Collins pigtails, freely handles, wingsuit bridles, stowless bags: What is going on with gear these days? Skydivers earn their USPA A licenses with the ability to pack a generic parachute, service a 3-ring system and change a closing loop, but there’s so much more to equipment than that. They stand facing a phalanx of choices that used to be limited only to, “Seven- or nine-cell?,” “Automatic activation device or not?,” and, “What’s your favorite color?” It’s like going from eating homemade vanilla ice cream on the farm to visiting Ben & Jerry’s on Times Square!

So many possibilities and combinations render virtually every rig or rig-to-be unique. Short of practicing as an active parachute rigger for several years, there’s no way to know the ins-and-outs of all systems well enough to select and choose options for the perfect rig — and even then it’s confusing. Right off the UPS truck, each rig comes with its own quirks, requirements and limitations. And then once you get it airborne, there are the updates, service bulletins and product improvements. This all creates an important responsibility that leaves a skydiver only one viable choice: Know your gear.

Know Your Gear

This age-old skydiving dictum applies not just to newbies looking for their first new or used rigs, but also to seasoned jumpers who already own gear. Because let’s face it: You, like most jumpers, probably asked around before you bought, got some advice, found a rig that fit your general idea of what you wanted, took delivery from your rigger and successfully jumped it. Satisfied, there you stopped. It worked once, and so it should work again — right?

But the fact is, many (if not most) jumpers neglect to study as much as necessary to develop the correct emergency procedures and form inspection and care habits for their particular equipment. It’s an understandable gap: Other jumpers may know barely enough about their own equipment to stay safe, much less provide you accurate advice on yours. As a result, smart, current jumpers who lack the knowledge and training to make important choices populate the incident reports.

Take this fun quiz to see where you fit in. Most of the questions have a single correct answer with little room for debate but generate questions to highlight the importance of often-neglected details. Snarky wrong answers aside, all these perfectly intelligent and reasonable questions actually came from real rig owners within the last year, many with these specific items or features on their gear. And some of the rig owners were Federal Aviation Administration riggers!
Some questions are rig-specific with answers that may be wrong for your rig but right for the rig that you’re (shudder) borrowing. Or maybe you don’t know an answer that does apply to your rig, in which case . . . well, that’s why you’re wise to read this far!

1. **WHAT IS THE PURPOSE OF A FREEBAG?**
   - a. to promote drop zone goodwill and manufacturers’ products at a boogie
   - b. to allow the reserve to continue deploying in the event the reserve pilot chute or bridle gets caught on something
   - c. to contain the packed canopy so the slider can deploy into clean air if the safety stow fails

   **Answer:** b

   The “free” in freebag refers to the fact that the reserve deployment bag is unattached to the top of the reserve canopy. On most systems, the main-canopy deployment bag is attached to the main canopy so you don’t have to go find it after every jump. High-performance canopy pilots sometimes use an RDS (removable deployment system) that employs a main-canopy freebag, but it’s attached by a long line to a quick-release slider so the pilot can reel it all in and stuff it away. A reserve freebag strips off and lands separately. (They should call it a “treebag.”)

2. **WHAT IS A SAFETY STOW?**
   - a. the procedure for putting away the reserve ripcord and cutaway handle after a malfunction
   - b. a secure gear locker at the drop zone
   - c. a cloth-elastic loop used to hold the locking stows on most reserve deployment bags

   **Answer:** c

   A safety stow is a bungee loop that slides freely in a channel on the reserve freebag. Each end of the loop—instead of rubber bands—forms one of the two locking stows for the reserve freebag. In theory, if one side locks for some reason, the safety stow will still release both locking stows and allow the canopy to fully deploy. They wear out over time just from packing and age, and most manufacturers insist on factory replacements. The vast majority of reserve systems use safety stows.

3. **WHAT IS A COLLINS LANYARD?**
   - a. a passage in the reserve static line for the 3-ring-release cable
   - b. the trim device used on the downwind leg
   - c. a line attached to the freebag to retrieve it after deployment

   **Answer:** a

   The Collins lanyard (invented for United Parachute Technologies by Kyle Collins) started as a simple loop or channel added to the reserve static line that the long cable of the 3-ring system passes through. When the RSL-side riser releases, it pulls the opposite 3-ring-release cable so both risers detach before the RSL activates the reserve.

4. **WHAT IS A COLLINS PIGTAIL?**
   - a. the trademark hairstyle of the inventor of the Collins lanyard
   - b. an update that prevents a malfunction of the Collins lanyard
   - c. the freefly maneuver that won the 2012 World Cup

   **Answer:** b

   After United Parachute Technologies introduced the Skyhook MARD (main-assisted reserve deployment) system, manufacturers began adding a “pigtail” (split) to the Collins lanyard to prevent an unwanted cutaway as the result of a remotely possible, out-of-sequence series of events. Not all early Skyhook rigs have been updated.

5. **WHAT IS A STAGING LOOP?**
   - a. the parking area for manufacturers setting up displays before a boogie
   - b. a type of cutaway handle that uses a steel cable encased in fabric
   - c. a cloth-elastic loop that retards reserve deployment until the pilot chute applies enough force to carry the reserve clear

   **Answer:** c

   On some rigs, the staging loop retains the last two reserve flaps until the reserve pilot chute or MARD pulls hard enough to disengage it. It is essentially a second elastic closing loop locked in place by a finger-shaped fold of the reserve pilot chute bridle instead of a closing pin. This extra step in the sequence keeps the freebag in the container until the pilot chute or MARD applies enough tension to carry it clear. The staging loop addresses a potential for entanglement caused by a reserve-pilot-chute hesitation or an out-of-sequence deployment (e.g., pulling the reserve ripcord prior to cutting away a low-speed malfunction, or an AAD activation during main deployment where the main inflates after the reserve activates but before it has a chance to deploy). Its use is optional, but you must decide whether to install it before a rigger packs the reserve.

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A reserve pilot chute and freebag fall to earth after a successful cutaway and reserve deployment.

This photo shows tension on the RSL (black) causing the Collins-lanyard pigtail (yellow tape) to extract the long, non-RSL-side cutaway cable (yellow cable) before the RSL pulls the reserve ripcord (white) and Skyhook MARD (red). Clear on that?
6. WHAT IS THE DIFFERENCE BETWEEN A MARD (MAIN-ASSISTED RESERVE DEPLOYMENT) DEVICE AND AN RSL (RESERVE STATIC LINE)?
   a. All MARDS are reserve static lines, but not all RSLs provide main-assisted reserve deployment.
   b. MARDS and RSLs are two separate, unrelated systems.
   c. MARD can only occur following an AFF jump.
Answer: a

7. WHICH OF THE FOLLOWING IS TRUE?
   a. If I have a MARD, I should still disconnect the little clip on my riser when confronted with certain open-canopy situations in the same way as I trained for using an RSL.
   b. The training for certain emergencies (tree, power-line, water and building landings; high winds; canopy collisions; two canopies out) is different when using a MARD as opposed to an RSL.
   c. USPA’s incident reports bear out that the complications added by MARDS, RSLs and AADs, especially in combination, have outweighed their overall safety advantages.
Answer: a

8. HOW HIGH DOES MY AUTOMATIC ACTIVATION DEVICE FIRE?
   a. 1500 feet below main-deployment altitude
   b. depends on the default setting(s)
   c. 780 feet MSL
Answer: b

9. HOW HIGH DOES THE AIRCRAFT HAVE TO CLIMB AFTER TAKEOFF BEFORE MY AAD BECOMES EFFECTIVE?
   a. half the activation altitude
   b. to level flight (jump run)
   c. depends on the AAD
Answer: c

10. IS IT POSSIBLE TO PERMANENTLY OR SEMI-PERMANENTLY CHANGE THE DEFAULT ACTIVATION ALTITUDE ON MY AAD (NOT COUNTING A ONE-TIME ADJUSTMENT FOR JUMPING AT A HIGHER OR LOWER FIELD)?
   a. yes
   b. no
   c. maybe
Answer: c

Some AADs provide a way for the user to adjust the default firing altitude to user preference. They caution the user to modify main opening altitudes and decide-and-act altitudes for malfunctions accordingly.

11. DO I HAVE TO SEND IN MY AAD IF THE MANUFACTURER SPECIFIES SERVICE AND MAINTENANCE?
   a. yes
   b. no
   c. maybe – how much does it cost?
Answer: a

In the U.S., the FAA does not require jumpers to install AADs in their gear. However, if one is installed, the FAA requires that all service be performed according to the manufacturer’s directions.
12. **If my AAD fails to cut my reserve closing loop all the way, will pulling my reserve ripcord still initiate deployment?**

- a. yes
- b. no
- c. maybe

**Answer:** c

On pop-top reserves and reserves with completely concealed pilot chutes, partially severing the closing loop can lock the reserve container hopelessly closed. (Yup, game over.) If it happens on a rig that has the AAD cutter mounted on the floor of the reserve container with the ripcord pin above the top flap—typical of reserve containers with partially exposed pilot chutes—pulling the ripcord should result in normal activation and deployment.

13. **To prevent the main-canopy curved closing pin from piercing my main bridle and causing a pilot chute in tow, I should always pack my main closing pin—**

- a. so it looks like a smiley face
- b. so it looks like a frowny face
- c. according to the manufacturer’s current instructions

**Answer:** c

People still don’t completely understand the problem of the main pin piercing the bridle, so it often gets ignored ... sort of like global warming. Some have suspicions regarding design and material. Some manufacturers have changed their preferred bridle routing, provided an alternate routing, reoriented the pin attachment, reinforced the piercing area or a combination of all of these things. However, discussion and instructions on how to prevent the pierced-bridle, pilot-chute-in-tow malfunction remain conspicuously absent from packing manuals.

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**How Did You Score, Really?**

Some of these questions apply to every rig, some to most rigs, some to one brand and some to one model within a brand. So if you got all the questions right, you should quit your regular job, take up rigging and run for office in the Parachute Industry Association. If you had to guess or finished somewhere down in the middle, you may be in trouble depending on which questions you missed.

**Next month:** Navigating the choices and the details of a modern parachute system.

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**About the Author**

Kevin Gibson, D-6943, operates Rahlmo’s Rigging in the loft at Skydive Orange in Virginia. He is a former editor of *Parachutist*, has more than 10,000 skydives and spearheaded the development of the USPA Coach rating, USPA Tandem ratings and the Integrated Student Program.
Last month, Parachutist readers got to play with 13 questions and answers adapted from actual questions rig owners asked. The quiz was meant to generate awareness of how important it has become to understand the growing array of rig features and functions. Parachutes have become so individualized that decision altitudes and even basic operating procedures can vary.

SAME OR DIFFERENT?

It’s amazing: Two jumpers can own rigs that fit the same, have sequential serial numbers and are from the same manufacturer, but jumping each other’s rigs could still be unsafe. This depends on a variety of choices the owners made when they ordered. Here are a few examples:

**Freefly or conventional (hacky, etc.) main-pilot-chute handle?**

Some jumpers want the extra security of a low-profile, tab locked main-deployment handle, while others have trouble finding, grasping and pulling those – which is not a fun surprise in mid-air.

A steel-loop reserve handle (left photo) can dislodge and “float.” However, a soft reserve handle (right photo) can be difficult to grasp and pull without practice.
What container shape and configuration?

Some rigs address one body type so specifically that they can range from uncomfortable to dangerous on a person with a significantly different body type, even though the rig is made by the same manufacturer and the harness technically fits both jumpers. The problem may not reveal itself during practice touches of the main deployment handle from a standing position. Before you jump a rig, try throwing the pilot chute while lying face down and arching.

Soft-pillow or steel-loop reserve-ripcord handle?

Again, some go for the low profile of a soft-pillow reserve handle, which can be difficult to find and pull if the jumper has not adequately trained. It can be even harder to pull when the harness is under a load. Conversely, the risk of a steel loop is that it may snag or pop out and “float.”

RSL, MARD or neither?

Big question. It’s hard to argue with a reserve static line (RSL), a class that includes MARD (main-activated-reserve-deployment) devices. USPA can report only one solo-jumper fatality in the last decade to which the RSL contributed: The jumper back-flipped into his RSL-deployed reserve bridle after cutting away. In the same period, RSL or MARD systems could have changed the outcome in 18 fatalities and undoubtedly influenced the outcome in countless other instances. RSLs never get credit for the lives they save.

Granted, the two devices—so different, they’re hard to classify together—add complexity. Updates to several of the systems address certain problems but add further complications of their own. New MARD and RSL configurations with limited use in the field are coming out, and updates will likely follow. All RSL jumpers need to keep an ear to the railroad track.

The good news for the jumper is that, when changing from an RSL-only system to a MARD system, there appears to be no reason so far to change emergency procedures once the parachute is open (collisions, landing obstacles, high winds, etc.). However, going from no RSL to any kind of RSL requires study and practice. A lot changes!

AAD or no AAD, and what brand?

Automatic activation devices have become virtually universal, and more and more drop zones are beginning to require them, so most jumpers choose to install one regardless of cost. However, AADs have begun to differentiate themselves, and some jumpers will find certain features to be of greater importance than others. Comparing their relative costs matters very little, since we’re talking only two or three lift tickets difference in actual annual operation costs.

The debate runs about 50-50 over whether it’s better to have an AAD that requires periodic service (at a cost) or one that a jumper can use without service until he decides it’s been too long. The requirement for periodic service is brand-specific.

An emerging trend, now that USPA has raised the minimum deployment altitude for all jumpers to 2,500 feet, is for jumpers to raise their AADs’ designated firing altitudes and all the emergency procedures and trigger altitudes that go along with that.

Other considerations with AADs have more to do with the choice of container system. All AADs in use today activate the reserve by cutting the closing loop. Some AADs have a better history of doing so than others, which is the subject of several product bulletins. On some rigs, if the AAD partially cuts the loop, the reserve container will be impossible to open. It depends on the design of the reserve container. On other containers—those with the cutter mounted below the deployment bag on the floor of the reserve container and the ripcord pin above the top flap—the jumper will be able to deploy the reserve manually. These are typically rigs with a partially exposed pilot chute. However, the window of opportunity to override this unlikely scenario is so slim that it’s best to whittle the debate down to whether or not the AAD will work (i.e., cut the loop). Incidentally, that window—to override manually in the event the AAD fails to cut all the way through the loop—expands slightly with a higher AAD activation altitude. But even better, plan and execute your skydive so the AAD never enters the picture.

A second major argument for raising your AAD’s activation altitude is the possibility of a delayed reserve deployment. The parachute industry continues to wrestle with the question of what causes a slow extraction of the freebag from the container, whether manually or automatically activated, and the current answer is to simply raise the AAD activation altitude. Most AADs allow the jumper to adjust this, but some provide a changeable default setting so it goes there every time it powers up. You can find this information only in the manual for the specific AAD model. You can’t say, “All such-and-such-brand AADs fire at X altitude and can be adjusted to Y.” It depends on when they were made or last serviced and what user options each model provides … and it’s evolving.

Conventional or semi-stowless main deployment bag?

The answer to this question is, “Which rig are we talking about?” Semi-stowless deployment bags are all relatively new and their designs are different. Some allow the jumper to go with either conventional stow bands or with a semi-stowless configuration with the bulk of the lines snaked into a pouch. You can switch between these options at any time. However, at least one jumper has made a number of jumps without understanding the instructions for his semi-stowless system and used it in a manner that promoted a horseshoe malfunction. Make sure to read the instructions and know the risks.
NEW DESIGNS PRESENT NEW CHALLENGES

It’s not only the end user who may lack understanding of his optioned-out rig and parachutes. It’s a challenge for equipment professionals to keep up with every new item coming down the pike. As new designs emerge to meet jumpers’ demands for safety and compatibility with various styles of jumping, inevitable conflicts occur along with the technological advances. Rigs are undergoing changes now for new MARD designs, wingsuit accommodations, canopies with super-small pack-volumes, XRW (mixed canopy and wingsuit flight) and more changes just on the horizon. Each new aspect of the sport sparks equipment changes. It always has and always will.

Not every new option works well for every application, and sometimes jumpers discover this only after the innovation is in the field and on the job. Incompatibilities will also emerge as a result of old features facing new styles of jumping, each with demands that the designers never envisioned at the time of development. For example, some really clever and well-proven brake systems and connector links won’t accommodate the heavier polyester lines that may still be a good idea for students and jumpers who require super-soft openings. Also, there are a number of container systems in use that are not suitable for freeflying or—for different reasons—wingsuiting.

NO, YOU GO FIRST

Any RSL-equipped rig is subject to tighter specifications on the length of the cutaway cable. The relative measurement of the two cables from the white retaining loops to the free ends of the cable needs to take into account which side cuts away first. You’ll want the RSL side to release either simultaneously with or slightly later than the other side, but not before.

Neglecting this detail can have dangerous consequences if the RSL deploys the reserve before a complete cutaway. Riggers are supposed to stay abreast of the many updates about cutaway cable lengths, but they too often miss this detail. Not only are industry specifications for this important aspect of RSL installation not standard, different manual editions for the same rig may include conflicting measurements, or specifications may be hard to find or even unpublished.

New designs and product improvements can conflict or become a factor in unforeseen scenarios once placed into universal use. Some rigs have a Collins lanyard (a simple passage in the RSL to route the longer cutaway cable through) integrated into the RSL system. After a cutaway, the Collins lanyard assures that both risers release before reserve activation. Once the Skyhook MARD system incorporated this simple and clever design, riggers discovered a conflict during certain out-of-the-ordinary deployments. Manufacturers added a pigtail (split) to address this issue, but there are a lot of rigs out there without this valuable product update.

In another example of a great solution to one problem causing another, the Collins lanyard can make it a challenge to install the cutaway cable with the reserve packed. In one case, it’s disturbingly easy to route the cable through the reserve steering toggle. It’s not a problem that someone would pick up during an ordinary pre-jump check.

HEY, THAT DEPLOYMENT WAS STAGED

Some reserve containers feature unique or nearly unique systems that demand your alertness and may alter your response to certain situations. For example, if you jump a reserve system with the optional staging loop, you need to understand what that does. The staging loop retains the freebag in the container after reserve deployment is initiated (manually or by AAD) until the pilot chute produces enough drag to resume an orderly deployment. This can be especially helpful if you want to keep a bigger reserve from falling out of a loose-fitting container before you’re ready for it.

In a rare scenario, you may need to manually override the staging loop. For example, if your main is suddenly rendered too dangerous to land and you pull the reserve ripcord because you’re too low to cut away first, the staging loop may halt deployment due to your low airspeed. In this case, grab the bridle and yank that sucker out! You’ve already decided you want your reserve, so you need to do everything necessary to put it to work. A similar situation—an unwanted reserve that has hesitated as a...
result of the staging loop doing its job—can occur after a simultaneous deployment due to a low main opening that sets off the AAD. You need a plan to address that or opt out of having the staging loop installed at all. Decisions, decisions …

RIGGERS: STUDY UP

Judging from issues discovered during routine reserve repacks, some of the new systems clearly baffle some riggers. To a lesser extent, certain older configurations are new to riggers trained only on gear made in the last 10 years. More than ever, riggers must follow assembly and rigging instructions to the letter each time they assemble and pack a reserve, as well as refer to the instructions on new main parachute systems. Typically, MARD systems add about a dozen illustrated pages to the rigging section of the owner’s manual!

While things have improved from the days of a corner-stapled sheaf of over-photocopied, under-illustrated packing instructions, some manufacturers still document better than others. Even for full-time riggers, gone are the days of universal techniques and packing from memory. No rigger is exempt from consulting the manufacturer’s website regularly for updates and to review details. And no rigger should be shy about calling with a question, especially when cloudy instructions generate one.

Likewise, no rig owner should be shy about verifying that the rigger has the latest documentation for that piece of equipment and its special options. To show you’re serious, do the research, download it and hand it over with your rig in hard copy or digital form when you present your rig for its routine inspection and repack.

NEITHER A BORROWER NOR A LENDER BE

After the first commandment—know your gear—another age-old dictum keeps plenty of jumpers out of trouble: Don’t jump borrowed gear. Now that you have researched, considered and practiced everything you need to know about your super-customized, perfectly integrated parachute system, how can you possibly throw yourself to the wolves with another jumper’s rig? Will the other jumper know all the details about his own equipment and remember to go over every one of them with you?

Some jumpers must rent gear, which is exactly the same as borrowing with money. Just because a rig is on the rack—and supposedly generic enough for general use—you still need a thorough briefing from the owner or the instructors who deal with the rental rigs. Did they bump the

Extra-secure “freefly” handles can be hard to locate and pull without training.

AAD altitude up (thereby requiring you to raise your decide-and-act altitudes and hard deck)? Does the AAD use a “student” setting that will fire in a spiral at 1,000 feet? Is the RSL a MARD? Do you have to review your handle protection for a steel-loop reserve handle? Is the RSL clip on the right or left? What kind of main-pilot-chute handle does it have? Some look like regular hacky handles but have freefly-friendly tuck tabs that are not so friendly to jumpers who haven’t trained for the more difficult pull. Some look like freefly handles but have no hidden security tab.

Along those same lines, are you really comfortable sending one of your friends off with your rig, knowing that a gap may exist between what you know about it and what your friend does?

MAKING GREAT EQUIPMENT WORK FOR YOU

It is the best of times; it is the worst of times. Not since the days of the first piggybacks, early hand deployment, a half-dozen cutaway systems and skydiving’s cowboy frontier has there been such a difference from one rig to another. The latest skydiving systems offer more built-in safety than ever before, but don’t be lulled into thinking of a parachute like a car: “I’ve got a license; I can drive it.”

Give your own personalized rig the forethought and consideration it demands, develop sensible procedures that integrate with your equipment and style of skydiving, and then go with great confidence that you’re getting every dollar’s worth of safety and security out of the rig you choose and train to use.

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