



# Parachute Industry Association

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June 13, 2011

FAA National Headquarters  
Attention: Mr. Melvin O. Cintron  
Division Manager, AFS-800  
800 Independence Avenue, SW  
Washington, DC 20591  
email: mel.o.cintron@faa.gov

Dear Sir,

The following are comments concerning AC 105-2D, dated 5-18-11. The Parachute Industry Association (PIA) notes that the AC has not been widely disseminated yet, and we are hopeful that it might be revised with the changes and corrections we think are necessary for us to support it.

### **13.c.(3), Assembly of Major Components.**

For us, this is the most serious issue. The guidance in this section is unworkable, does not contribute to safety, does not promote aviation, and **it has the practical effect of grounding 50-75% of the sport parachute systems currently in service**, including the safest and most modern. In addition, a number of pilot emergency parachutes would also be grounded. This is the text of that section, as published:

13.c.(3) For a single-harness parachute system, the strength of the harness must always be equal to or greater than the maximum force generated by the canopy during certification tests. The rigger who assembles the system should record these limits in a place accessible to the user when he or she dons the assembly. For tandem systems, there may be additional limits for each harness. Some manufacturers may also specify minimum weights or speeds for safe operation.

(a) In the case where the harness is certified under the TSO-C23b "Standard" category, and the canopy is certified under TSO-C23b and TSO-C23d, the system is limited to the performance limitations of the canopy and may be determined by comparing the placarded force generated on the canopy to the 5,000-pound force capability of the harness. If the canopy is placarded at or above the 5,000-pound level, then the system is considered "unlimited."

(b) In the case where the harness is certified under the TSO-C23b "Low Speed" category, and the canopy is certified under TSO-C23b and TSO-C23d, the system is limited to the placarded performance limitations of the canopy or the structural limitation of the harness (3,000 pounds), whichever is lower.

(c) TSO-C23c components may only be used in situations where they are mated with the same components with which they were originally certificated, unless they are retro-placarded by a Service Bulletin (SB) or other notification identifying the maximum forces generated during testing. These forces could then be applied as in TSO-C23c.

(d) TSO-C23d components may be mixed or matched with other TSO-C23d components by comparing the harness forces placard to the canopy force placard and certifying the weight and speed of the lower of the two placards.

With respect to 13.c.(3), The requirement for the harness to be stronger than the canopy appears in AC 105-2C, but nowhere else. There is no particular reason why we should prefer canopy failure to harness failure, and inclusion of this phrase results in operation limitations that do not contribute to safety. And it is, in fact, an unworkable and impractical standard.

There is no way to tell what maximum force was generated during certification under C23b or C23c, as there was no mechanism in place to record it. The TSO strength tests only establish that an article meets some minimum standard, not how much the article exceeds that standard.

With respect to 13.c.(3).(a) and (b), there are no canopies certified simultaneously under C23b and C23d.

C23b harnesses and canopies do not have operational performance limitations in the sense that C23d articles do. C23b articles do not have maximum exit weights, nor do they have maximum deployment speeds, and it follows that they are not required to have placards for weight or speed, either. (Aircraft speed is not the same as deployment speed.) These two subparagraphs confuse strength test requirements with performance limitations, when they are not directly comparable.

Also, as mentioned above, the C23b 3000-pound and 5000-pound forces generated during testing are minimums, not maximums, and it is possible for a test article to be capable of exceeding those minimums by a considerable amount.

For 13.c.(3).(b) specifically, the text as written allows the system to be limited to the canopy limits or the harness limits, whichever is lower. This is a good idea, but it contradicts the “harness must be stronger than the canopy” phrase at the beginning of 13.c.(3).

13.c.(3).(c) is problematic because it requires testing of every combination of C-23c canopies and C-23c harnesses. For example, a Rigging Innovations Talon (C23c) harness/container would need to be tested with a Performance Designs PDR-143 canopy, a PISA Tempo 150, a Precision Raven 150 (all C23c), and depending on the interpretation of this paragraph, with every size C23c reserve canopy produced by the above manufacturers. The FAA has never required such extensive testing, and this AC is not a good choice of a place to announce such a change of policy.

The certification standards for C23c articles did not require identifying the maximum forces generated during testing. Requiring manufacturers to produce such data now will essentially require them to recertify their products.

Even if it is not the case that such recertification would be required, the fact is that the majority of sport parachute systems in use today are C23b and C23d harness/container systems assembled with C23c canopies. This subparagraph effectively says that such combinations are not permitted – the systems would be grounded – even though 25 years of experience has shown them to be safe.

The meaning of “These forces could then be applied as in TSO-C23c” is unclear. There is no requirement in C23c to apply any such forces. In any case, what does it mean to apply TSO-C23c standards to TSO-C23c articles?

13.c.(3).(d) allows the harness operational limits to be lower than the canopy operational limits. As with 13.c.(3).(b), this contradicts the “harness must be stronger than the canopy” phrase at the beginning of 13.c.(3).

13.c.(3).(e) – the absence of this paragraph (or equivalent) in the 5/18/11 release means there will be no guidance for components manufactured under the soon to be released TSO-C23e, or subsequent TSO’s.

The goal in establishing compatibility between articles tested and manufactured to different standards must be to determine, “Is it safe enough?” A canopy safe at a particular deployment speed and weight assembled with Harness/Container A is no less safe when assembled with Harness/Container B. Similarly, a particular harness/container system does not become more or less safe when assembled with one of the range of approved canopies, assuming functional compatibility, of course.

The PIA proposal deliberately omitted the phrase “the strength of the harness must always be equal to or greater than the maximum force generated by the canopy during certification tests.” The intention was to remove an obsolete, unsupported, and ambiguous impediment to combining components approved and still manufactured under different standards. The industry has over 25 years of experience with such cross-TSO combinations, and has experienced exactly zero incidents attributed to different certification standards. That is not to say there have not been equipment failures. There have been. In each case, though, the failures have come from operating the equipment outside the designed and certified operating limits.

The key for safe use is knowing the operating limits of the equipment. For C23c and C23d articles (and for subsequent TSOs), the operating limits are on the placards or TSO markings. It is straightforward to determine the lowest maximum operating weight and the lowest maximum operating speed. There is no compromise in safety in combining these components.

To determine the limits of systems that combine C23b components with C23c or C23d (or later) components, the PIA proposal simply works backwards from the tables in NAS-804 to calculate safe operating weights and speeds.

PIA respectfully submits that the language of its April 2010 proposal provides clearer guidance to riggers and users, with no compromise of safety, and allows the continued use of parachute systems that are proven safe, without burdening the industry with re-testing nearly every parachute component currently in use. Without this revision to AC105-2D, dated 5/18/11, users are faced with the choice of no longer using parachute equipment that they have owned and used for years with 100’s or even 1000’s of parachute jumps vs. ignoring the new AC, while riggers are faced with the choice of no longer inspecting and re-packing safe equipment vs. ignoring the new AC. Although the AC is “advisory” and not law, obviously industry does not want to be in the position of recommending to users and riggers that 13.c.(3) should be ignored.

13.c.(3) as proposed by PIA:

(3) For a single-harness parachute system, the maximum operating weight of the system, is the maximum operating weight of the harness or the reserve canopy, whichever is lower. The

maximum pack opening speed of the system, is the maximum pack opening speed of the harness or the reserve canopy, whichever is lower. The rigger who assembles the system should record these limits in a place accessible to the user when he or she dons the assembly. For tandem systems there may be additional limits for each harness. Some manufacturers may also specify minimum weights or speeds for safe operation.

(a) The maximum operating weight and maximum pack opening speed of components manufactured under TSO-C23c or later are marked on the components themselves.

(b) In a case where either the harness or canopy of a single-harness system is manufactured under TSO-C23b, the maximum operating weight and maximum pack opening speed for that component may be derived from the strength test tables in NAS-804.

(i) For the maximum operating weight of the TSO-C23b component, use the highest weight in the table less than or equal to than the maximum operating weight of the other component, and use the corresponding speed in the table as the maximum pack opening speed of the TSO-C23b component; or

(ii) For the maximum pack opening speed of the TSO-C23b component, use the highest speed in the table less than or equal to than the maximum pack opening speed of the other component, and use the corresponding weight in the table as the maximum operating weight of the TSO-C23b component.

### **15.c Major or Minor Repair Determination**

15.c.(2) contains a false statement. It is not true that all repairs to approved canopies are major repairs. 14 CFR 65.125(a) specifically permits senior riggers to make minor repairs to the types of parachutes for which they are rated. Poynter's *Parachute Manual*, the FAA and industry standard reference since 1971, includes a number of repairs that senior riggers are permitted to do, ergo, the repairs are minor repairs. Performance Designs, a major manufacturer for the sport parachute industry, says that senior riggers may patch reserve canopy holes up to 8 inches in length under some circumstances.

The larger issue is what repairs a senior parachute rigger may make to main parachutes, and for this, 15.c is woefully inadequate. Because main parachutes are not approved, they are not required to come with operator or repair manuals, or any other instructions. Simply directing senior riggers to "manufacturer instructions" is no guidance at all. What is a senior rigger to do?

The easiest solution is to include Poynter's *Parachute Manual*, and the FAA's *Parachute Rigger Handbook* as resources, to 15.c as suggested by PIA in the April 2010 proposal:

**c. Major or Minor Repair Determination.** When there is a question about whether a particular repair is major or minor, follow the manufacturer's instructions. In the absence of manufacturer's instructions, use Poynter's *Parachute Manual Vol 1 or 2*, or the *Parachute Rigger Handbook* as a guide.

As written, 15.c.(2) does not conform to common English usage. It also restricts its argument to TSO'd canopies, instead of talking about components in general. A better version would be something similar to that as previously proposed by PIA, such as:

(2) While some repairs to TSO'd components are major repairs, similar repairs to main canopies may be considered minor. For example, replacement of a suspension line on a reserve canopy is a major repair, while replacement of a suspension line on a main canopy is generally considered a minor repair, even if the identical technique is required for both replacements.

#### **14.a.(1) [Packing] Reserve Parachutes.**

The issue is who may pack a reserve or emergency parachute that will be placed in service. 105.43(b) says it must be packed by a rigger (without provision for someone under the supervision of a rigger), however 65.125(a)(s) and (b)(2) list supervision of packing as a rigger privilege. For some riggers, there is an apparent conflict, which the current language does not resolve:

(1) The reserve parachute must be packed by a certificated and appropriately rated parachute rigger (see § 105.43(b).) See part 65, § 65.125(a)(2) and (b)(2) for supervision of other persons.

It is unclear what "See part 65 ... for supervision of other persons" means.

PIA recommended, and still recommends the following:

(1) The reserve parachute must be packed by a certificated and appropriately rated parachute rigger. The rigger need not personally perform each packing step, but is responsible for the process (see "supervision" in 65.125(a)(2) and (b)(2)) and is responsible for the airworthiness of the completed pack.

#### **13.e. Instructions for Maintenance, Repair, or Alteration of Specific Parachutes.**

PIA is concerned about the deletion of references to Poynter's *Parachute Manual* and FAA-H-8083-17 *Parachute Rigger Handbook* (PRH). While they do have some errors, they have been the standard industry and FAA guides for decades. The AC says "[Maintenance, repair, and alteration] instructions may be available by contacting manufacturers," but leaves out what to do when such instructions are not available.

Furthermore, the FAA already recognizes Poynter and the PRH as references in its rigger knowledge tests, and the Rigger Practical Test Standards.

PIA recommended, and still recommends the following:

**e. Instructions for Maintenance, Repair, or Alteration of Specific Parachutes.** These instructions may be available by contacting manufacturers. Many manufacturers provide their manuals online through their websites. The PIA website, <http://www.pia.com>, provides a good starting point for searches. When such instructions are not available, *The Parachute Manual, Volumes 1 and 2* (Poynter, 1991) and *The Parachute Rigger Handbook* (FAA-H-8083-17, 2005) set out commonly accepted repair practices. *The Parachute Manual* and *The Parachute Rigger Handbook* may be purchased from commercial booksellers, *The Parachute Rigger Handbook* is also available for download at <http://www.faa.gov>.

PIA has invested considerable time and energy in developing its contribution to this Advisory Circular, and we remain committed to working with the FAA on this project.

It is our hope that the AC can be rapidly revised, rather than the possibly longer process of being withdrawn and re-released.

Please let us know if there are any questions, or if further clarification or background to any of the above is required.

Best regards,

A handwritten signature in black ink, reading "Cliff Schmucker". The signature is written in a cursive style with a long, sweeping underline.

Cliff Schmucker  
President, PIA