Parachute Technical Standard 138
Parachute Industry Association Publications
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Main Parachute Packer Blueprint

Revision List

Rev #	Date	Pages	Description	Written By	Verified By
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1. Introduction

This complete course curriculum helps drop zones to train and manage packers under FAA rigger supervision as defined in 14 CFR 105.3: “Direct Supervision” means that a certificated rigger **personally observes a non-certificated person** packing a main parachute to the extent necessary to ensure that it is being done properly, and takes responsibility for that packing.” [emphasis added]

The Parachute Industry Association developed the Main Parachute Packer (MPP) program toward authorization for packers trained and qualified under its standards to pack independently without FAA rigger supervision. The FAA has yet to act on PIA’s formal petition, but this course of instruction establishes an industry standard of what would be expected of an independent packer and helps ease the burden on the supervising rigger.

Unless and until the FAA expands its current limitations on who may pack a main parachute, the FAA rigger remains responsible for any main parachutes packed for another person to jump.

This curriculum is estimated to take place over two full (6-8 hour) days.

If you use this document, PIA requests any and all feedback so it may produce better revisions for you and our industry. Feedback on the text of the document, usability, and technical corrections are all welcome.

Additionally, please provide, voluntarily, statistics of the use of the program including your annual packs, malfunction rate, retrain rate, and change from previous year in malfunction rate.

Please send feedback and statistics to:
riggingchair@pia.com

2. Targeted Knowledge and Skills

a) Competence in packing main parachutes per manufacturer instructions and standard practices.
b) Ability to recognize and report common defects during packing.
c) Knowledge of relevant Code of Federal Regulations (CFRs) on parachute packing and FAA rigger certifications, privileges, and limitations.
d) Familiarity with PIA documents TS-100 (nomenclature) and TS-105 (main parachute system inspection).
e) Passing grade of 70% or greater on MPP exam.
f) Satisfactory performance on inspection and packing demonstrations before course staff on single jumper and tandem equipment

3. Recommended Prerequisites

a) 50 main parachute pack jobs (or equivalent experience) on a range of equipment.
b) Completion of the pre-knowledge survey (included in this document).

Recommended Training Equipment

a) Canopy suspension setup
b) Examples of various main parachute systems
c) Samples of worn sport and tandem parachute fabric and lines
d) Clamp test kit
e) Variety of common connector links with assembly instructions
f) Tandem drogue system(s)
g) Examples of Main Parachute Systems
    - Variety of main risers to demonstrate different toggle/brake stowage systems
    - Examples of main activation and deployment systems, as relevant: collapsible, throw-out, pull-out; spring-loaded, static-line
    - Examples of various line and slider stowage systems
h) Course candidate packet containing
    - FAA 14 CFR 65, Subpart F
    - FAA 14.CFR 105, “Parachute Operations”
    - FAA Advisory Circular 105-2e “Sport Parachuting”
    - PIA Technical Standard 100 “Standardized Nomenclature for Ram-Air Parachutes”
    - PIA Technical Standard 105, “Main Canopy Assembly Inspection Guidelines For the Sport Parachutist”

5. Expanded Knowledge and Skills Requirements

5.1 Review of Pre-Knowledge Survey (2-3 hours)

The course director leads discussions and presentations on each of the topics generated by the survey questions, including hands-on examples and demonstrations.

5.2 General Equipment Knowledge (2 hours)

a) System operation overview (one hour)
   - Demonstration of activation, deployment, and inflation sequence while explaining packing-related malfunctions
   - Nomenclature per TS-100, using example parachute systems; recommend hanging canopy by tail

b) 3-ring canopy release system (15 min): inspection of correct assembly

c) Reserve Static Line (RSL) shackle operation and inspection for correct routing and attachment, including MARD and Collins lanyard (15 mins)

d) Untangling ram-air parachutes: simple and complex entanglements (30 mins)

5.3 Routine System Inspection (2-hours)

A routine inspection performed efficiently and by knowing what to look for should add less than a minute to a pack job. This presentation is meant to expand the packer's knowledge and awareness while providing methods to incorporate the inspection sequence into the pack job. The packer should refer issues to the jumper, equipment manager, or rigger, as appropriate.

a) Main pilot chute and bridle system (20 min): handle attachment, fabric integrity, kill line wear; kill-line length ("lazy-S"/two cm slack), closing pin, results of inner and outer bridle failure.

b) Connector links (15 mins): soft/steel, secure assembly, link protection, tacking as recommended or required

c) Line inspections (10 minutes): Dacron/polyester, Spectra/HDPE (microline), HMA, Vectran; results of broken lines during opening and during maneuvers

d) Brake system (15 minutes): twisted brake lines, settings, stowage; results of premature brake release (“brake fire”)
e) Slider (10 minutes, plus assembly): fabric, stitching, grommets, collapsible/removable systems
f) Line stowage (10-15 minutes): elastic bands, semi-stowless, shock cord, retainer materials
g) Main closing loop (10 minutes): length, wear, washer, knot, installation
h) Harness & container (15 minutes): webbing, fabric, stiffeners, grommets, abrasions
i) Tandem system (20 minutes): drogue system inspection, large 3-ring system and potential for flip through

5.4 Common Causes of Malfunctions and Damage (1-2 hours)

a) Premature brake release from mis-stowed brakes, weak toggle retention
b) Jumper entanglement with unstowed brake line
c) Lines misplaced away from center
d) Poor slider placement
e) Failure to clear stabilizers
f) Over-rolling the tail
g) Line stowage errors
h) Degraded or damaged stow bands
i) Incorrect closing loop length
j) Incorrect bridle routing
k) Incorrect closing pin orientation (pierced bridle)

5.5 Environmental Factors (1 hour)

a) Sunlight, UV—effects of discoloration and deterioration permeate container fabric to canopies
b) heat and its effects on batteries and rubber (stow bands)
c) Acid, rust, sand, dirt, minerals, salts
d) Sweat, body oils, cosmetic oils
e) Abrasion, agitation
f) water
g) Chemicals (bug spray, detergents, alcohol, petroleum)
h) Animal waste/exposure
i) Rubber bands in contact with brass grommets and harness webbing

5.6 Strength and Limits from Damage and Wear (1 hour)

a) Canopy fabric—fabric clamp test demonstration
b) Harness and container webbing and tapes, strength and durability
c) Stiffener materials
d) Magnets
e) Hardware—strength, buffer strips, and effect of harness webbing interface with plated hardware

Recommended Reading & Viewing

6.1 Main Parachute Packing Manuals

a) At least four brands/models of main parachute systems (including reserve static line)
b) At least one brand/model tandem parachute system (including reserve static line)

6.2 Code of Federal Regulations – 14 CFR Aeronautics and Space (FARs)

a) § 65 Certification: Airmen Other Than Flight Crewmembers
b) § 65 Subpart A General
c) § 65.12 Offenses involving alcohol or drugs
d) § 65.20 Applications, certificates, logbooks, reports, and records: falsification, reproduction, or alteration
e) § 65 Subpart F Parachute Riggers
f) § 65.111 Certificate required
g) § 65.125 Certificates: privileges
h) § 105 Parachute Operations
i) § 105.3 Definitions
j) § 105 Subpart C Parachute Equipment and Packing
k) § 105.43 - 49 Use of systems and foreign parachutists/equipment

6.3 FAA Parachute Rigger Handbook

a) Chapter 1: Introduction to Parachute Rigging
b) Chapter 2: Design and Construction
c) Chapter 3: Materials
d) Chapter 4: Operations

6.4 United States Parachute Association (USPA)

a) “Your Pack is WHACK!” Video (https://www.youtube.com/watch?v=sLM0r9DlXSU)

6.5 Parachute Industry Association (PIA)

a) TS-100 rev-1 Standardize Nomenclature for Ram-Airs (https://www.pia.com/wp-content/uploads/TS-100-Rev1-23-Jan-2019.pdf)
b) TS-105 Main Canopy Assembly Inspection Guidelines for the Sport Parachutist (https://www.pia.com/wp-content/uploads/TS-105.pdf)

MPP Blueprint: Appendix 1
Written Exam

FAA Regulations

1. The main parachute of a single-harness dual-parachute system may be packed
   a) By the owner or a USPA Instructor
   b) By the person making the next jump on it or someone under his or her direct supervision
   c) By the person making the next jump on it, any FAA-certificated parachute rigger, or someone being directly supervised by an FAA-certificated parachute rigger
   d) All of the above

2. Who may pack the main parachute of a tandem system?
   a) The tandem instructor making the next jump on it
   b) The student making the next jump on it if under a rigger's direct supervision
   c) An FAA certificated parachute rigger
   d) All of the above

3. For each skydiving operation (jump), the FAA holds the following persons directly responsible for observing the rules for packing main parachutes:
   a) The pilot of the aircraft and the jumper making that jump on the parachute
   b) The load organizer
   c) The pilot of the aircraft and the packer under direct supervision of an FAA rigger
   d) The DZO and FBO

4. The FAA requires that a main parachute must be packed
   a) Within 180 days before the date of its use
   b) Within 90 days before the date of its use
   c) The FAA doesn't specify a time limit for packing a main parachute before the date of its use

5. A parachute repair is
   a) Restoring a parachute component to an approved airworthy condition
   b) Changing a parachute component to a configuration that wasn't originally approved
   c) All of the above

6. A parachute alteration is
   a) Restoring a parachute component to an approved airworthy condition
   b) Changing a parachute component to a configuration that wasn't originally approved
   c) All of the above

7. The following persons may alter a main parachute:
   a) FAA master rigger only
   b) FAA Master Rigger or the manufacturer of the main parachute
   c) FAA senior rigger only
   d) Owner

8. A main parachute
   a) May be altered by an FAA master rigger with no further approval authority
   b) May be altered by a senior rigger with approval from the manufacturer
   c) May be altered by the owner.

9. To perform a repair on a main parachute, the FAA requires
   a) An FAA parachute rigger
   b) Any person, if under supervision of a certificated master parachute rigger
   c) Repairs to main parachutes are not regulated by the FAA
   d) A & B

10. The owner of a parachute may
   a) Pack, alter, and maintain his or her own main parachute.
   b) Pack the main parachute if making the next jump on it and disconnect the parachute from the harness for transportation or storage
   c) Pack the parachute for another user

11. A person under the direct supervision of an FAA senior rigger may
   a) Pack, maintain, or alter a main parachute
   b) Pack a main parachute for anyone to jump
   c) Pack a reserve parachute intended for use.
   d) A & B

12. To pack a main parachute for another person without holding an FAA parachute rigger certificate, the FAA requires
   a) That person holds at minimum a USPA A license
   b) An FAA rigger directly supervising, personally observing, and taking responsibility for the pack.
   c) A & B

13. The following does NOT meet the minimum FAA requirements for a non-certificated person to pack a parachute that will be jumped by another person:
   a) A person under the direct supervision of a rigger
   b) A supervising rigger who is not personally observing the packing taking place
   c) A & B

14. What minimum qualifications does the FAA require for a person providing instruction to someone packing a parachute who is going to make the next jump on that parachute?
   a) The FAA does not regulate instruction for main parachute packing
   b) An FAA parachute rigger certificate
   c) A USPA instructional rating

15. A certificated and appropriately rated FAA parachute rigger
   a) May supervise a person to pack a reserve that is intended for emergency use
   b) May alter a reserve ripcord location with approval of the owner
   c) May directly supervise someone to pack a main parachute that is intended for use
   d) None of the above

PIA TS 100

16. The chamber formed by upper and lower surfaces and two adjacent loadbearing ribs is called a
   a) Cell
   b) Tail
   c) Nose
   d) Cross-port

17. Holes cut in the rib sections between adjacent chambers are called
   a) Cells
   b) Tails
   c) Noses
   d) Cross-ports

18. Control lines
   a) Allow steering
   b) Are attached to the tail of the canopy
   c) Are attached to the toggles
   d) All of the above

19. Suspension lines
   a) Support the majority of the weight of the jumper
   b) Are usually labeled in rows A,B,C… from front to back
   c) Are attached to the toggles
   d) a & b

20. Brake settings are
   a) Used to position the trailing edge for deployment
   b) Used to slow the forward speed of the canopy after deployment
   c) not used during usual full fight operation
   d) All of the above

21. A removable deployment system is a type of
   a) Slider
   b) Pilot chute kill line
   c) Pilot chute replacement tool

PIA TS 105

22. Evidence of a broken plastic stiffener on the main container
   a) May be repaired by the owner
   b) May be addressed by a rigger at the next reserve repack
   c) Should be brought to the attention of a rigger prior to packing the main parachute

23. A nick on the edge of harness webbing
   a) Should be brought to the attention of a rigger prior to making the next jump on the system
   b) May be ignored if less than 10 percent damage is evident
   c) Is considered normal wear and tear on a parachute system

24. A person packing a main parachute should be attentive to suspension line wear, especially
   a) On canopies less than 150 square feet
   b) When the lines are constructed of small diameter material
   c) When the lines are constructed of less than 500lb tensile strength material
   d) B & C

25. A person packing a main parachute should be attentive to suspension line wear, especially
   a) On canopies larger than 190 square feet
   b) Where the lines come in contact with the connector link
   c) When the jumper complains about slow openings

26. The amount of acceptable suspension line wear can be determined by
   a) Consulting the manufacturer's documentation and support literature
   b) Any FAA rigger, with reference to manufacturer's documentation and support literature
   c) The number of jumps made on the canopy divided by its square footage

27. A failure of the brake setting loop during opening may result in
   a) Initiation of an unintended turn possibly resulting in twisted suspension lines
   b) An unintended release of that deployment brake
   c) A and B

28. When packing, steering toggles should be stowed securely on the risers
   a) Only by an FAA rigger
   b) To avoid deployment and/or steering system malfunctions
   c) Only if there is a brake setting
   d) Only when the canopy is packed for a terminal opening

29. When stowing lines, dragging the container across the ground
   a) Is a common and acceptable practice
   b) Should be avoided unless using a mat or other method which protects the container from wear
   c) Is only allowed at the end of the day when fatigued

30. When packing the parachute, care should be taken
   a) To reduce exposure of the equipment to sunlight
   b) To keep all four risers spread apart as wide as possible
   c) To pack in bright sunlight to better identify defects

31. What is the best way to determine the correct closing sequence of a main parachute container?
   a) Bottom-top-right-left is always the correct sequence
   b) Equipment operation (owner's) manual
   c) Packer's discretion

32. A sandy or desert environment has the potential for
   a) Reducing the pack size of a canopy
   b) Accelerating wear on parachute fabric and lines
   c) Heat, causing shrinkage of fabric components

33. Parachute equipment submerged in saltwater should be
   a) Aired and repacked at the first opportunity
   b) Referred immediately to a rigger for thorough fresh water rinsing and air drying
   c) Immediately placed in a commercial dryer on high setting by a USPA Safety & Training Advisor
   d) Monitored for mold contamination

34. After a reported hard opening
   a) A parachute should be inspected for damage
   b) The pilot chute should be measured for correct trim
   c) Brake lines should be inspected for wear

35. What can be used to protect a parachute from damage when packing on a concrete or other rough service?
   a) Nylon conditioning compound
   b) Concrete neutralizing agent
   c) Packing mat

36. What is the possible consequence of a rough surface on a slider grommet?
   a) Wear on the lines
   b) Noisy opening
   c) Damage to the reserve pilot chute

37. A worn closing loop that breaks could result in
   a) An out of sequence deployment
   b) A long sniveling opening
   c) Container lock

38. A soft link is primarily constructed of
   a) A series of interlocking rings retained by a single fabric loop
   b) Fabric cord looped and locked with a metal ring or folded tape button
   c) Specially folded harness binding integrated with the suspension cascade

39. Rapide™ links should be inspected every pack job for
   a) Barrel tightness
   b) Nicks or metal damage
   c) A & B
   d) Secondary retention

40. Why is the main flap closing sequence of a harness and container system specific to that equipment?
   a) That's how it was tested and approved
   b) To reduce packer fatigue
   c) To prevent patent violations

41. When replacing a lost closing loop on a main container, the loop should be measured as follows before making any necessary adjustments
   a) To produce a 15 N force to extract the closing pin
   b) According to the manufacturer's instructions.
   c) 2-3/8"

42. The retaining loop on a 3-ring canopy release system
   a) Should be replaced at every reserve repack
   b) Must pass over only the smallest of the three rings
   c) Is held in position by the RSL

43. When reconnecting an RSL that has been disconnected under canopy by the jumper, it is important to
   a) Verify that the RSL has a clear path to the reserve ripcord or pin
   b) Connect the RSL to only the center ring of the 3-ring canopy release system
   c) Have a rigger supervise and re-seal the RSL with special seal thread

44. The outer bridle of a kill-line collapsible pilot chute must be anchored securely to the deployment bag, or the following may result:
   a) Pilot chute remains inflated after deployment
   b) Pilot chute entanglement
   c) Pilot-chute-in-tow malfunction

45. If the inner bridle of a kill-line collapsible pilot chute fails during deployment, the following will result:
   a) The pilot chute will disconnect from the system
   b) The pilot chute will not collapse after deployment and remain inflated
   c) Pilot-chute-in-tow malfunction

46. What is the consequence of not resetting the kill-line in a collapsible pilot chute when packing a main parachute system?
   a) Hard opening
   b) Slow opening
   c) Pilot chute in tow malfunction.

47. Why does the center line in a kill-line collapsible pilot chute shrink during use?
   a) To compensate for shrinkage of the outer bridle
   b) Friction with the bridle
   c) To allow the pilot chute to be deployed in the event of an out-of-sequence deployment

48. How can the packer confirm that the collapsible pilot chute has been fully re-set during packing?
   a) Drop the pilot chute to the floor and see if it lands flat
   b) Ensure that the internal pilot chute limiter tapes are slightly longer than the kill line.
   c) Ensure that the kill line is slightly longer than the internal pilot chute limiter tapes.

49. Where do bridles commonly wear out on a collapsible pilot chute?
   a) Where the bridle passes through/attaches to the deployment bag.
   b) At the closing pin
   c) At the connector link

50. Why should metal Rapide™ links be covered with cloth or rubber bumpers?
   a) To prevent damage to slider grommets and suspension lines.
   b) To prevent the slider from dislodging toggles.
   c) All of the above.

51. What is the result of jumping a parachute with damaged slider grommets?
   a) Line twist
   b) Hard opening
   c) Accelerated line wear

52. When folding a hand-deployed pilot chute into a BOC container pouch, care should be taken that
   a) The pilot chute is folded into exact thirds.
   b) The pilot chute may be extracted from the bridle end without bunching in the pouch and preventing its removal in the event of an out-of-sequence deployment.
   c) No mesh is in contact with any part of the pouch or main container.

53. If a main closing loop is too loose this could result in

a) A container lock
b) A long sniveling opening
c) An out of sequence deployment

MPP Blueprint: Appendix 2
Written Exam Answer Key

FAA Regulations	TS-105
1. c	22. c
2. d	23. a
3. a	24. d
4. a	25. b
5. a	26. b
6. b	27. c
7. b	28. b
8. a	29. b
9. d	30. a
10. b	31. b
11. d	32. b
12. b	33. b
13. b	34. a
14. a	35. c
15. c	36. a
TS-100	37. a
16. a	38. b
17. d	39. c
18. d	40. a
19. d	41. b
20. d	42. b
21. a	43. a
	44. c
	45. b
	46. c
	47. b
	48. c
	49. a
	50. c
	51. c
	52. b
	53. c

MPP Blueprint: Appendix 3
Oral & Practical Test Standards

Introduction

The course director and staff may use this framework to evaluate the ability of each candidate.

- identify common damage and deficiencies
- prepare the main parachute for packing
- present the system packed and ready for the user's pre-jump inspection

The MPP exam is structured in four Areas of Operation. These AAO's mirror those in the FAA Rigger Practical Test Standards for FAA rigger exams.

1. AOO I, II, and IV include practical tasks and oral questions
2. AOO III includes only packing.

Oral Questions

Oral questions are to determine the candidate's understanding of the rules on parachute packing, the privileges and limitations of the supervised packer, the privileges and limitations of the FAA senior and master parachute rigger, the authority of the FAA. Questions also address content commonly found in parachute operation and packing manuals.

References include:

a) 14 CFR 65.111 - 65.133
b) 14 CFR 105.3, 105.43 - 105.49
c) AC 105-2E
d) FAA Parachute Rigger Handbook
e) PIA TS 100 "Standardized Nomenclature for Ram-Airs"
f) PIA TS 105 "Main Canopy Assembly Inspection Guidelines for the Sport Parachutist"
g) The Parachute Manual: A Technical Treatise on Aerodynamic Decelerators, which combines:
    1. Dan Poynter's Parachute Manual Vol I, 3rd Edition
    2. Dan Poynter's Parachute Manual Vol. II
h) Various manufacturer manuals and websites

Examiner Instructions for Oral Questions

1. Oral questions are provided by PIA and are to be asked verbatim, as written.
2. A minimum of four and a maximum of seven randomized oral questions are to be included related to the subject of each Area of Operation (except AOO III).
3. At least one question should be asked on each point listed in the Task objectives.
4. The candidate must answer at least 70 percent of the questions in each Area of Operation to pass the examination.
5. The examiner may explain the question and emphasize certain words or phrases to clarify the intent. At the examiner's discretion, questions may be asked during the practical portion, separately, or both.
6. Report to PIA any questions that appear to be poorly worded or confusing to a majority of candidates.

Testing and Scoring the MPP Applicant

Each AOO may have one or more tasks. Some tasks are required, and some are selected at random by the examiner.

Candidates must successfully complete any required task.
The candidate must successfully complete a minimum of 70 percent of the tasks in each AOO.

Optional tasks may be added to obtain a passing score.

The practical tasks are formatted to facilitate integration into the FAA document 8081.25 Practical Test Standards. MPP Practical Test Tasks are to be selected as follows:

I. Area of Operation: Certification. [oral questions]
Select Task A and Task E, Objective 2.

II. Area of Operation II: Privileges, Limitations, and Operating Rules. [oral questions]
Select Task A, and F as applicable to a Main Parachute Packer applicant.

III. Area of Operation: Packing Parachutes. [no oral questions for score]
Select Task H. and I. Use informal oral questions to establish understanding of routine, cursory inspection and packing operations.

IV. Area of Operation: Parachute Operation and Care. [oral questions and practical tasks] Select Task C and at least two other tasks applicable to a Main Parachute Packer applicant.

I. Area of Operation: Certification [Oral Questions]

Select Task A and Task E, Objective 2. [oral questions]

A. Task: Parachute Packing and Maintenance Rules and Privileges

Reference: 14 CFR Part 65, 105, AC 105-2e.

Objective. Exhibit knowledge of the regulations with regards to who may pack, maintain, or alter any main parachute of a dual parachute system by describing:

1. Certificate requirements.
2. Who would require supervision and the requirements of the supervisor.
3. The provisions for packing for personal usage.
4. The provisions for packing for tandem operations.

Oral Question Pool

1. Q. Chelsea and Amy are not FAA riggers. May Chelsea supervise Amy to pack a parachute that Chelsea plans to jump?
   A. No
   Reference: 14 CFR § 105.43(a)

2. Q. Who may pack a main parachute for any user to make a skydive on that parachute?
   A. FAA Rigger, person under the supervision of an FAA Rigger
   Reference: 14 CFR § 105.43(a)

3. Q. May a rig owner reattach a main parachute that has been released (cut away) without rigger supervision?
   A. Yes
   Reference: AC 105-2E § 13(f)

4. Q. May a skydiver (non-rigger) reattach a main pilot chute and deployment bag when assembling a main parachute to a harness and container system if no complex operation is involved?
   A. Yes
   Reference: [pending exemption]: AC 105-2E § 13(f)

5. Q. Within how many days prior to jumping does a main canopy need to be packed?
   A. 180 days
   Reference: 14 CFR § 105.43(a) and § 105.45(b)(1)

6. Q. May a rigger supervise someone to pack a reserve parachute that is to be returned to service?
   A. no
   Reference: 14 CFR § 105.43(b)

7. Q. Is it OK for an experienced parachute packer to teach someone how to pack a main parachute for that person's own use?
   A. yes
   Reference: 14 CFR § 105.43(a)

8. Q. May someone who is not a rigger make minor repairs to a main parachute without supervision of an FAA Rigger?
   A. no
   Reference: 14 CFR § 65.125(b)(2)

9. Q. May an FAA Senior Rigger alter a main parachute?
   A. no
   Reference: 14 CFR § 65.111(c); 14 CFR § 65.125(b), § 65.125(c), § 65.129(e); AC 105-2E § 13

10. Q. May an FAA Master Rigger alter the FAA-approved portions of a parachute without approval by the manufacturer or the FAA Administrator?
    A. no
    Reference: 14 CFR § 65.129(e)

11. Q. Who may repair damage to a chest strap?
    A. FAA-certificated master parachute rigger
    Reference: FAA Parachute Rigger Handbook, Chapter 7

E. Task: 14 CFR PART 105 Parachute Equipment and Packing Requirements

Reference: 14 CFR 105 § 105.43 and § 105.45; AC 105-2E

Objective. Exhibit knowledge of Title 14 CFR § 105 with regards to the use of single-harness, dual parachute systems and tandem parachute systems by describing the:

1. Required configuration for parachute systems used for intentional jumping.
2. Main parachute packing requirements.
3. Reserve parachute packing requirements.

Oral Questions

1. Q. What major components of a tandem parachute system require FAA approval under TSO C-23?
   A. harness and container, reserve parachute, and tandem passenger harness
   Reference: AC 105-2E § 13

2. Q. Does the main parachute of a tandem parachute system require FAA approval?
   A. no
   Reference: AC 105-2E § 13

3. Q. What determines which parts of a parachute system, for intentional individual or tandem parachute jumps, do not require approval under FAA TSO C-23?
   A. The AAD, and any components that are jettisoned in the event of a main parachute malfunction (except for the Reserve Static Line)
   Reference: AC 105-2E § 13

4. Q. Describe the major components of a parachute system that may be used by a person for intentional jumping.
   A. main parachute, approved reserve parachute, and an approved harness and container system
   Reference: 14 CFR § 105.43

5. Q. May a tandem main parachute be packed by the person riding in the front harness on the next jump who is not an FAA-certificated parachute rigger?

A. no
Reference: 14 CFR § 105.45(b)(1)

6. Q. Who may pack a tandem main parachute for someone else to conduct a tandem skydive on that parachute?
A. FAA Rigger, person under the supervision of an FAA Rigger
Reference: 14 CFR § 105.45(b)(1); exemption (pending)

7. Q. May a tandem main parachute packed by a tandem instructor who is not an FAA rigger be jumped by another tandem instructor?
A. no
Reference: 14 CFR § 105.45(b)(1)

8. Q. May an experienced packer provide packing instruction to a tandem parachutist-in-command who is making the next jump on that tandem parachute?
A. yes
Reference: 14 CFR § 105.45(b)(1)

9. Q. What part of a parachute system approved for intentional jumping is not required to have TSO approval?
A. the main parachute
Reference: 14 CFR § 105.43

II. Area of Operation: Privileges, Limitations, And Operating Rules

Select Task A and F. [oral questions]

A. Task: Senior Parachute Rigger Certificate Privileges and Limitations [oral questions]

Reference: 14 CFR § 65 and § 105; AC 105-2E

Objective. Exhibit knowledge of Senior Parachute Rigger Certificate and Main Parachute Packer authorization privileges and limitations by describing:

1. Which parachute types may be packed.
2. Which parachute types may be maintained.
3. What repairs may be accomplished.
4. Whom the senior rigger may supervise.
5. What the supervised person may accomplish.

Oral Questions

1. Q. Who may supervise packing of a reserve parachute (not for use) for a person towards qualifications for the FAA Parachute Rigger Certificate?
A. FAA rigger holding a type rating for that parachute type
Reference: 14 CFR § 65.115

2. Q. May a Main Parachute Packer perform maintenance to a main parachute under the supervision of an FAA-certificated Master Parachute Rigger?
A. yes
Reference: 14 CFR § 65.125(b)(2)

3. Q. May an FAA Rigger with a chest-type rating supervise a non-certificated person to pack a main parachute on a back-type parachute?
A. yes
Reference: 14 CFR § 105.43(a)

4. Q. May an FAA Rigger with a chest-type rating perform maintenance on the main parachute container of a back-type parachute?
A. no
Reference: 14 CFR § 65.111(a); AC105-2E § 13

5. Q. May an FAA master rigger perform an alteration to main parachute risers without manufacturer or FAA approval?
A. yes
Reference: 14 CFR § 65.125(b), § 65.125(c), § 65.129(e); AC 105-2E § 13

6. Q. Is an FAA Master Parachute Rigger required to have manufacturer or FAA approval to alter the main parachute container of a dual parachute system?
A. yes
Reference: 14 CFR § 65.125(b), § 65.125(c), § 65.129(e), AC 105-2E § 13

7. Q. May an FAA senior rigger perform maintenance and repairs to main parachute risers?
A. yes
Reference: 14 § CFR 65.125(a)

8. Q. Who may alter a main parachute, for example, sewing a row of pockets on a slider to change the opening characteristics?
   A. An FAA master rigger
   Reference: 14 CFR § 65.111(c); 14 CFR § 65.125(b), § 65.125(c), § 65.129(e); AC 105-2E § 13

9. Q. If a customer asks to adjust their control lines by shorting them 2", who would be able to do that?
   A. Any FAA rigger
   Reference: 14 CFR § 65.111(c); 14 CFR § 65.125(b), § 65.125(c), § 65.129(e); AC 105-2E § 13

F. Task: Manufacturer's Packing Instructions

NOTE: This Task may be demonstrated simultaneously with any packing Task from Area of Operation III.
References: Parachute Manufacturer's Instructions; 14 CFR § 65.133; PIA TS100; PPM

Objective. To determine that the applicant knowledge of common manufacturer's packing instructions on—

1. Layout and straightening of the complete canopy, container, and harness assembly.
2. Inspecting the main parachute assembly and identifying contrived deficiencies.
3. Flaking/folding the canopy.
4. Canopy and line stowage.
5. Closing the container and stowing the pilot chute.

Oral Questions

1. Q. What are the likely negative results of locking the brake between the guide ring and the toggle keeper above the ring?
   A. Unintentional brake release ("brake fire"), damage to the toggle keeper, and possible partial malfunction.
   Reference: common to manufacturer's manuals

2. Q. What is the likely cause of damage to the toggle keeper following an unintentional brake release during deployment?
A. Locking the brake between the steering control guide ring and the toggle keeper above the ring
Reference: common to manufacturer's manuals

3. Q. What negative consequence may result if the bridle is routed incorrectly in relationship to the curved locking pin?
A. The curved pin may pierce or lock into the bridle, which may cause a pilot-chute-in-tow malfunction.
Reference: common to manufacturer's manuals

4. Q. What may result if the main pilot chute bridle is routed contrary to instructions found in the operating (owner's) manual?
A. Pilot-chute-in-tow malfunction
Reference: common to manufacturer's manuals

5. Q. On a throw-out pilot chute system (for example, BOC), why should the pilot chute be folded in a manner so that it may be extracted by pulling on the bridle as well as the handle?
A. In the event of a premature container opening, the pilot chute will be extracted from the pouch.
Reference: common to manufacturer's manuals

6. Q. What is the possible result of a toggle that becomes dislodged during opening?
A. unintentional brake release ("brake fire")
Reference: common to manufacturer's manuals

7. Q. Are the steering toggles of the main parachute matched to the canopy or the risers?
A. risers
Reference: common to manufacturer's manuals

8. Q. What is the likely result of not securing the end of the outer bridle of the main pilot chute to the deployment bag?
A. pilot-chute-in-tow malfunction or slow deployment
Reference: common to manufacturer's manuals

9. Q. What would be the result of packing a main parachute with the slider in a collapsed configuration?
A. hard opening
Reference: common to manufacturer's manuals

10. Q. What would be the result of packing a main parachute without seating the grommets of the slider against the slider stops?
A. hard or erratic opening
Reference: common to manufacturer's manuals

11. Q. What could be the possible result of neglecting to quarter the slider?
A. hard or erratic opening
Reference: common to manufacturer's manuals

12. Q. What could be the possible result of neglecting to clear the stabilizers
A. erratic opening; damage to the canopy
Reference: common to manufacturer's manuals

13. Q. What could be the possible result of deployment bag closing stows that are too short?
A. premature canopy release from the deployment bag prior to line stretch (line-dump)
Reference: common to manufacturer's manuals

14. Q. How many "A" lines are on a 7 Cell Canopy?
A. 8
Reference: common to manufacturer's manuals

15. Q. For what purpose are holes cut in most internal ribs of a canopy and what are they called?
A. cross ports; holes cut in the rib sections to balance the air pressure between adjacent chambers
Reference: PIA TS100; PPM Glossary

16. Q. When flaking a canopy, you notice that your left-side control lines are farther down than your right-side control lines. Your suspension lines are all parallel. What do you believe is the cause?
A. one brake not set
Reference: common to manufacturer's manuals

17. Q. What are the small tabs on a canopy called where lines connect to your canopy?
A. Attachment Point
Reference: PIA TS100

18. Q. What is the small ring on the rear risers that the control line(s) pass through called?
A. guide ring
Reference: PIA TS100

19. Q. What is the name for the flexible loop constructed primarily of fabric, cord, or tape, used to connect suspension lines to the harness risers?
A. soft link
Reference: PIA TS100

20. Q. Why is a band of color applied to the kill line in the area of the closing pin?
A. Indicates that the collapsible pilot chute is cocked
Reference: common to manufacturer's manuals

III. Area of Operation: Packing Parachutes [no oral questions]

For Main Parachute Packer, select Task H and I.

H. Task: Packing Main Parachute

Reference: Manufacturer's Instructions.

Objective. Applicant demonstrates the procedure for packing a main parachute in a single-harness, dual parachute system for intentional parachute jumping in common use in accordance with the manufacturer's instructions by:

1. Layout and straightening of the complete canopy, container, and harness assembly.
2. Inspecting the main parachute assembly and identifying contrived deficiencies
3. Flaking/folding the canopy.
4. Canopy and line stowage.
5. Closing the container and stowing the pilot chute.

I. Task: Packing Tandem Main Parachute

Reference: Manufacturer's Instructions.

Objective. Applicant demonstrates the procedure for packing a main parachute in a dual-harness, dual parachute system in common use for tandem parachute jumping in accordance with the manufacturer's instructions by:

1. Layout and straightening of the complete canopy, container, and harness assembly.
2. Inspecting the main parachute assembly and identifying contrived deficiencies
3. Flaking/folding the canopy.
4. Canopy and line stowage.
5. Closing the container and connecting/stowing the drogue.

IV. Area of Operation: Parachute Operation and Care

Select task C and at least two other tasks.

A. Task: Parachute Storage [oral questions and practical tasks]

References: 14 CFR § 65; AC 105-2E; PPM, FAA Rigger Handbook

Objective.

1. Applicant prepares a parachute for extended storage by:
   a) Unpacking the parachute.
   b) Roll packing the canopy.
   c) Positioning slider if installed.
   d) Daisy chaining lines.
   e) Removing rubber bands from assembly.
   f) Separating canopy assembly from container, if necessary.
   g) Placing assembly in storage carton (canopy on the bottom, lines, pack, and harness on top).
2. Determine that candidate has knowledge of environmental conditions and substances harmful to parachutes.

Oral Questions

1. Q. What are the possible negative results of packing a parachute that has been immersed in water?
   A. slow, unpredictable opening; possible mildew
   Reference: common to manufacturer's manuals

2. Q. Why must a parachute that has landed in salt water be rinsed in fresh water?
A. salt crystallization will damage the fabric
Reference: FAA Rigger Handbook Chapter 7

3. Q. What is a likely cause of gray or yellow, irregularly shaped spots on a canopy or harness?
A. acid damage
Reference: FAA Rigger Handbook Chapter 7

4. Q. Are rust stains harmful to nylon webbing?
A. yes
Reference: PPM Vol. I, Chapter 9.3

5. Q. Are motor oil or grease stains harmful to nylon webbing?
A. no
Reference: FAA Rigger Handbook Chapter 7

6. Q. Why is sweat harmful to parachute fabric?
A. salt contamination
Reference: common to manufacturer's manuals

7. Q. Why is it best practice to pack parachutes in a shaded area?
A. To reduce UV damage to nylon
Reference: PPM Vol. I, Chapter 9.3

8. Q. What may occur if a parachute is hung to dry unevenly
A. Asymmetrical shrinkage, resulting in a built-in turn
Reference: FAA Parachute Rigger Handbook, Chapter 7

C. Task: Parachute Assembly Inspection

References: PPM Vol.; Canopy Manufacturer's Manual; Container Manufacturer's Manual, PIA TS105; FAA Parachute Rigger Handbook

Objective. To determine that the applicant demonstrates parachute assembly inspection by:

1. Layout and straightening of the complete canopy, container, and harness assembly.
2. Ensuring all components are assembled correctly and free from significant damage and wear, candidate demonstrates inspection of the following components:
   a) pilot chute
   b) pilot chute bridle
   c) deployment device (bag, diaper, etc.)
   d) lines (suspension-steering)
   e) risers and links
   f) harness
   g) container
   h) ripcord or drogue release, as applicable.

Oral Questions

1. Q. On most nine-cell canopies, how many suspension lines are connected to each riser?
   A. Five
   Reference: common to manufacturer's manuals

2. Q. Are the steering toggles of the main parachute matched to the canopy or the risers?
   A. The risers
   Reference: common to manufacturer's manuals

3. Q. After assembly, what is the correct position of the fabric knob or metal ring used as a button on some soft links?
   A. hidden inside the riser end loop
   Reference: common to manufacturer's manuals

4. Q. What can occur if the fabric knob used as a button on some soft links is exposed outside the riser end loop?
   A. damage to the link and/or unintentional release
   Reference: common to manufacturer's manuals

5. Q. How can the packer make sure the fabric knob used as a button on some soft links is not exposed to the slider grommets?
A. turn the link so the button is inside the riser end loop
Reference: common to manufacturer's manuals

6. Q. What is the likely result of not appropriately securing the outer bridle of a collapsible main pilot chute to the deployment bag?
A. pilot chute-in-tow malfunction or a slow deployment
Reference: common to manufacturer's manuals

7. Q. What is the importance of slider stops on the stabilizers?
A. to prevent a slider grommet from riding up over the stabilizer material and damaging the stabilizers or the slider, and to prevent the slider from descending
Reference: PIA TS100

8. Q. What is the most common reason canopies using Microline/Spectra will require routine line replacement?
A. uneven shrinkage of the lines which affects opening, flying, and landing characteristics
Reference: common to manufacturer's manuals

9. Q. What is the purpose of cloth, soft plastic, or silicone covers, when used on steel connector links?
A. To prevent contact between the links and slider grommets
Reference: common to manufacturer's manuals

10. Q. Why must protective covers installed over steel connector links be secured to the links or risers?
A. To prevent the covers from riding up the lines and interfering with the slider
Reference: common to manufacturer's manuals

11. Q. What must be done to prevent steel connector links from causing damage to slider grommets?
A. protective covers
Reference: common to manufacturer's manuals

12. Q. In addition to correct assembly, what should be done to soft links that use metal rings?
A. Tack rings in place on the risers
Reference: common to manufacturer's manuals

13. Q. What is the purpose of tacking the metal rings used on some soft links inside the riser end loops
A. prevent the rings from contact with the slider
Reference: common to manufacturer's manuals

14. Q. What are the two sides of fastener tape (Velcro) called?
A. hook and pile
Reference: FAA Parachute Rigger Handbook, Chapter 3

15. Q. When a steel connector link is installed, why is it important that a soft protective cover be installed, kept in the correct position, and maintained or replaced when worn
A. prevent damage to the slider grommets from contact with the links
Reference: common to manufacturer's manuals

16. Q. Where can the most accurate information and instructions for packing a ram-air parachute into a piggyback container be found?
A. manufacturer-supplied (owner/operation) manual
Reference: common to manufacturer's manuals

17. Q. Does the smell of mold or mildew raise concern about the strength of parachute fabric
A. yes
Reference: PPM Vol. I, Chapter 9.3

18. Q. What is the most likely cause of mold or mildew on parachute fabric?
A. packing when wet or very damp
Reference: common to manufacturer's manuals

19. Q. What hazard is created by a loose grommet on the main deployment device (i.e., deployment bag)?
A. Line can catch under the grommet, causing a main parachute malfunction
Reference: PIA TS105

20. Q. What is the hazard created by nicks or other irregularities on a slider grommet?
A. damage to the lines or canopy
Reference: PIA TS105

21. Q. What malfunction of the main parachute system would result if the closing pin becomes detached from the bridle?
A. pack closure/main container lock and pilot-chute-in-tow malfunction
Reference: PIA TS105

22. Q. If you notice a hole in a customer's canopy larger than your fist, what would you do?
A. bring to the attention of the user and decline to pack the parachute
Reference: common to manufacturer's manuals

I. Task: Main Parachute Fabric Closing Loop Construction and Insertion.

Reference: PPM Vol. II.

Objective. To determine that applicant can construct and install a main closing loop following manufacturer instructions, including:

1. Choosing the correct material for the loop.
2. Finger-trapping the loop.
3. Making the closing loop the correct dimension and tying the correct knot.
4. Installing a washer at the base of the finished loop.
5. Inserting the loop into the main container.

Oral Questions

1. Q. What is the possible consequence of a main closing loop that is too loose?
A. premature opening of the main container
Reference: common to manufacturer's manuals

2. Q. What is the possible consequence of a main closing loop that is too tight?
A. damage to the container
Reference: common to manufacturer's manuals

3. Q. What is the possible consequence of packing a main parachute with a damaged closing loop?
A. loop breaks causing a premature container opening
Reference: common to manufacturer's manuals

4. Q. Why must a washer be used when installing a main closing loop?
A. to prevent the knot from slipping through the grommet
Reference: common to manufacturer's manuals

5. Q. Where is the information found to determine the correct material for fabricating the closing loop for a main parachute container?
A. manufacturer's manual
Reference: common to manufacturer's manuals

6. Q. What could result from using a washer on a main closing loop with sharp edges on the inside?
   A. damage to the loop leading to breakage
   Reference: common to manufacturer's manuals

J. Task: Service And Assembly of the 3-ring Canopy Release System

Reference: PPM Vol. II.

Objective. Exhibit knowledge of three-ring main riser service and assembly procedures according to manufacturer instructions by demonstrating on a system in common use—

1. The correct method and frequency of cleaning the three-ring release cable.
2. Manipulation of the components prior to assembly to remove the memory.
3. The correct configuration of the ring assembly.
4. The correct routing of the locking loop.
5. The correct routing of the release cable.
6. The correct routing and attachment of the reserve static line.
7. Inspection of a 3-ring system and recognition of common assembly errors.

Oral Questions

1. Q. What is the possible result if the cloth retainer loop is passed over both the smaller rings on the three-ring release system?
   A. failure on opening or during flight, or restricted break away (cut away)
   Reference: common to manufacturer's manuals

2. Q. What is the possible result if both the smaller rings are passed through the large ring of a three-ring release system?
   A. failure on opening or during flight, or a restricted break away (cut away)
   Reference: common to manufacturer's manuals

3. Q. What is the possible negative consequence of routing the RSL under the reserve riser before hooking it to the main riser?
   A. non-function of the RSL; main-reserve entanglement
   Reference: common to manufacturer's manuals

4. Q. On a system with an RSL, the cutaway cable must be trimmed so that which riser releases first?
   A. The non-RSL side
   Reference: common to manufacturer's manuals

5. Q. What is the correct method for cleaning dirt from the cable on a 3-Ring release system?
   A. Remove the dirt with a soft cloth and light petroleum solvent or silicon and wipe completely dry before reinstalling the cable
   Reference: common to manufacturer's manuals

6. Q. What is the likely result if the parachute is opened with the middle ring of a 3-Ring release system flipped through the big ring?
   A. 3-Ring system failure, breakage on opening and/or during flight or non-releasable due to the cutaway cable being pulled into the riser grommet.
   Reference: common to manufacturer's manuals

7. Q. What is the possible result if the nylon retainer loop passes over both the small and middle rings of the 3-Ring release system?
   A. Failure on opening or during flight
   Reference: common to manufacturer's manuals

8. Q. What is the possible result of packing a canopy of greater or lesser pack volume than the intended design criteria for the specific size of the container?
   A. could adversely affect the proper functioning of the entire parachute assembly
   Reference: AC 105-2E § 13(c)(1)

K. Task: Inspection of Assembly of a Main Pilot Chute and Deployment System

Reference: PPM Vol. II.

Objective. Applicant exhibits knowledge of:

1. Main pilot chute and deployment bag assembly procedures by demonstrating on a system in common use the correct method of attaching the pilot chute and deployment bag.
2. Inspection of a pilot chute and deployment bag system to include—
3. Potential assembly errors.
4. Typical areas of wear at the kill-line and deployment bag interface.
5. Kill line wear and shrinkage.
6. Pilot chute handle attachment.
7. Closing pin attachment.
8. Deployment bag grommets.
9. Candidate correctly assembles a pilot chute, deployment bag, and main canopy on a parachute system in common use.

Oral Questions

1. Q. What are the best-practice conditions for parachute system storage?
   A. cool, dry, away from UV light (dark)
   Reference: common to manufacturer's manuals
2. Q. What is the name of the insertion point from a "B" line into an "A" line
   A. cascade
   Reference: PIA TS100

3. Q. On most ram-air canopies, what are the wingtip extensions attached along or alongside the bottom edges of the end cells called?
   A. stabilizers
   Reference: PIA TS100

4. Q. What does PRO stand for in PRO Packing?
   A. Proper Ram-air Orientation
   Reference: common to manufacturer's manuals

MPP Blueprint: Appendix 4
Candidate Pre-Course Survey TEACHER'S GUIDE

This document is a TEMPLATE for which YOU may develop a pre-course survey from. It contains answers and suggestions to the questions and should not be handed to your candidate as-is.

IMPORTANT: CANDIDATES SHOULE BE ASKED TO ANSWER ALL QUESTIONS prior to the arrival of the course. They may use resources and references or answer from their own knowledge, by asking around, or simply guess. Each question raises a topic to be discussed more in depth at the beginning of the course.

This document serves as the first part of the course. Allow several hours to develop and discuss the ideas raised by the questions.

With their completed copies in hand, candidates should be prepared to provide and justify their answers (including "no idea"). This provides the instructor a starting point to develop the topics as needed.

Prepare samples of materials, hardware, webbing, website references, manuals, FAA documents, and other teaching aids to have at the ready as the topics are introduced. Some suggestions for the course director/discussion leader follow each question.

SURVEY QUESTIONS

1. Estimate the strength of the webbing used on your main risers.

Provide samples to discuss nomenclature, strength, and means of identification, including references from sources such as the FAA Parachute Rigger's Handbook ((PRH), Poynter's Parachute Manual (PPM), Mark Baur's Integrated Guide to Parachute Rigger Tests (Green Book), "Para-Gear Catalog," and the Materials Reference Manual from Paradigm Parachutes.

2. What is the difference between the "zero-P" fabric and the "F-111" fabric on a "hybrid" main, for example, the PD Silhouette? What is its purpose on a hybrid canopy?

Have samples on hands and explain the properties, purpose, and application of "F-111," "zero-P," "LPV," and "zero-P LPV" (industry jargon terms).

3. Estimate the strength of a typical single parachute line.

Provide samples of new and worn parachute line in common use—"microline" (Spectra, Dyneema, HDPA), Vectran, HMA, Dacron; their limitations, life expectancy and reasons for reline, how to compare A-line lengths on microline while packing, where and when line breakage occurs, and explain methods and the importance of a cursory inspection as part of the pack job.

4. May a jumper pack his or her own reserve under the supervision of an FAA rigger?

yes no

No. Refer to 14 CFR 105.43.b, and AC 105.14.a.1 (among others) which do not provide for rigger supervision of pack jobs to be placed into service. They are adjacent to passages that provide for supervised packing of main parachutes.

5. Who may train a senior parachute rigger?

In 14 CFR 65.115, the FAA requires proof only that an applicant for the FAA senior parachute rigger exam has packed a minimum of 20 parachutes under the supervision of an FAA rigger with a type rating for that type of parachute—seat, back, chest, or lap (obsolete).

6. Who may test a rigger and confer a parachute rigger certificate or rating?

DPRE. This opens the discussion that a DPRE exists, but only to conduct the exam. There is no hierarchy or authority provided to master riggers or DPREs. The rigger's only authority is to decline to pack a parachute.

7. What would you choose as the three most important aspects of packing a main parachute to ensure an orderly opening?

1. _____

2. _____

3. _____

Typically, this provides the discussion leader an opportunity to prioritize what must be done for a smooth, reliable opening. Examples include running the lines ("four-line check), slider placement, line stowage, cocking the collapsible pilot chute, bridle routing, etc.

8. If the loop holding the excess brake line on the main riser tears, may the owner fix it?

Yes No

No. Reference AC 105.13.f, which limits user handling of parachutes to disconnecting the main parachute at the 3-ring and 14 CFR 65.111.c, which requires a rigger certificate or supervision by a master parachute rigger to perform repairs. 14 CFR 65.125 grants the privilege to supervise repairs only to master riggers; senior riggers may supervise main packing only.

9. Name three dangerous substances or other environmental conditions that damage parachute fabric.

a. _____

b. _____

c. _____

This question opens the discussion on environmental hazards to parachutes, including what harms parachute fabric, webbing, and hardware and what doesn't. Refer to PPM Vol. 1 9.3 and the PRH 7-8.

10. Who regulates parachute riggers in the U.S. : FAA, USPA, or the state where the jumping occurs?

Only the FAA

11. How many times does a person need to pack a practice reserve to apply for an FAA rigger certificate?

10 20 30 40 50

Twenty (for each type, seat, chest, back, or lap—and pass the FAA Parachute Rigger Knowledge Exam with a score of 70%, and an oral & practical exam conducted by a DPRE.

12. How do you know when to replace a main closing loop?

USPA's Skydiver Information Manual recommends changing at 10% damage, an accepted industry standard. Explain the importance to prevent a premature activation.

13. Circle which of the following is true of a main-assisted reserve deployment (MARD) system:

Replaces the RSL
Is used in addition to an RSL
Makes an AAD unnecessary
Jumper should disconnect in the event of a total malfunction

(In addition to an RSL—only to clarify operation to an MPP)

14. Why might a kill line need to be adjusted or replaced and what happens when it breaks?

Explain that the kill line is typically made from microline, which shrinks from heat and may render the kill line too short to allow maximum inflation of the pilot chute and too long can prevent full collapse and the bridle to twist excessively during canopy flight. A good learning aid includes two or more pilot chutes showing both conditions with the mesh partially cutaway to aid in observing the kill line. When the pilot chute is set in the normal fashion and then the tension on the bridle relaxed, a lazy S will form within the pilot chute canopy, visible through the mesh, indicating approximately 2 cm (3/4 inch) of slack. A dangerously short kill line can be felt inside the outer bridle during the routine re-set (cocking) of the pilot chute.

15. According to FAA rules, a jumper making the next jump on a main parachute may supervise someone else to pack it. Circle your answer:

True False No earthly idea.

False. Refer to 14 CFR 105.43.a. The person who is jumping a parachute may pack it. Only an FAA rigger may supervise packing, although anyone can teach another person how to pack it.

16. The pilot of the aircraft is responsible that all the parachutes being carried on board for intentional or emergency use are packed and maintained according to the FAA rules.

True False

True. Refer to 14 CFR 91.307

17. The correct orientation of the main (curved) closing pin on YOUR rig is (circle one)—

"smiley face" "frowny face" more or less straight up and down

Depends on the model of container, bridle routing, and model of the pilot chute. There is no single answer. Provides the opportunity to introduce the possibility of the pin piercing the bridle and causing a pilot-chute-in-tow malfunction. Training aids should include examples of different bridle routings and pin orientations, along either manufacturer instructions.

18. How do you determine the correct length of your main closing loop?

Depends. Some manufacturer manuals provide recommendations, but most don't. Provides the opportunity to discuss potential problems of loops being to short or too long on various models of containers.

19. Which riser does YOUR RSL hook to?

right left both

Provides the opportunity to explain the RSL and show that it can be on either side, neither, or both (rare).

20. What is the range of release tension (in pounds) recommended for each bight of lines stowed in rubber bands?

The accepted industry standard is 8-12 pounds, although closing stows often release significantly higher. Most manufacturers recommend double-stowing ALL line bytes in 2" x 3/8" by .060 natural rubber bands.

21. Do the main connector links on your rig need to be tacked in place with a needle and thread?

yes no

Depends. Training aids should include assembly instructions for various types of connector links. For this question, demonstrate correct assembly with a sample cloth-button type soft-link assembly and one that uses metal rings.

22. What is the range of the recommendations among various manufacturers for how much line to leave unstowed when packing a main parachute?

Manufacturer recommendations vary widely (see manuals), but the lines should lay along the sides of the pack tray to the lower corners without tension from the last line stow.

23. How long do skydiving rubber bands last when not in use? What might make them last not as long?

This is an opportunity to explain the differences among stow bands and that they deteriorate with age and environmental conditions. One brand of salt-cured bands has a recommended shelf life of two years, while steam-cured bands may last longer. Heat, cold, oxygen, strong electrical fields, contact with unplated brass grommets, and sunlight present the potential for deterioration.

24. What does PIA stand for and what does this organization do?

Parachute Industry Association. PIA represents the equipment-related interests of equipment manufactures and riggers, as well as drop zones. The content of this course was derived from a PIA program to recognize and better educate main parachute packers.