U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Sport Parachuting **Date:** DRAFT **AC No:** 105-2E
Initiated by: AFS-800 **Change:**

1. PURPOSE. This advisory circular (AC) provides suggestions to improve sport parachuting safety and disseminates information to assist all parties associated with sport parachuting in compliance with Title 14 of the Code of Federal Regulations (14 CFR) part 105. It also contains information for jumpers and riggers on parachuting equipment, on-airport parachuting operations, jump pilot training, aircraft maintenance programs, parachute rigging, and procedures for Federal Aviation Administration (FAA) authorization for flight operations with a removed or modified door.

2. CANCELLATION. This AC cancels AC 105-2D, Sport Parachuting, dated 5/18/2011.

3. RELATED CODE OF FEDERAL REGULATIONS (CFR) PARTS AND PUBLICATIONS. The FAA's primary responsibility with respect to skydiving is the protection of air traffic and persons and property on the ground. 14 CFR part 105 was developed to accomplish this task.

a. Title 14 CFR. This paragraph describes the 14 CFR parts that are of interest to skydivers, parachute riggers, and jump aircraft pilots. Download them from the FAA's Web site at http://www.faa.gov. All FAA regulations, ACs, and other documents are also available for download from the FAA's Web site. Since the Federal regulations and other publications may be amended at any time, skydivers, parachute riggers, and pilots should keep up with changes to comply with current requirements.

(1) Part 65, Certification: Airmen Other Than Flight Crewmembers. Subpart F concerns parachute riggers, their eligibility requirements, privileges, and performance standards.

(2) Part 91, General Operating and Flight Rules. Parachute operators and jump pilots must comply with all applicable sections of part 91.

(3) Part 119, Certification: Air Carriers and Commercial Operators (§ 119.1(e)(6)). Parachutists who conduct operations within 25 statute miles (sm) of the airport of departure may conduct them as commercial operations under part 91.

(4) Parachute Operations. This part is especially important to parachutists, parachute riggers, and the pilots who fly parachutists since it contains regulations governing intentional parachute jumping.

b. Technical Standard Order (TSO)-C23, Personnel Parachutes Assemblies. The TSO-C23 series contains the minimum performance and safety requirements for parachute assemblies and components. Manufacturers must design and test new parachutes to the most current TSO standards. Manufacturers may continue to produce parachutes approved under earlier TSO standards. Obtain the most current TSO-C23 document from the FAA Web site at http://www.faa.gov.

c. Parachuting Symbols on Charts, Electronic Navigation Equipment, and Related Publications. Pilots are to be aware of and exercise caution in the vicinity of drop zone locations depicted on aeronautical charts, electronic navigation equipment, and related publications. The FAA Aeronautical Information Management (AJV-2) collects, stores, and distributes static parachute jumping activities (PAJA) data for use in FAA publications, charts, and Navigation Databases (NDB).

(1) Operators conducting parachute operations should report any additions, deletions, or changes to static PAJA data to the FAA air traffic control (ATC) facility with jurisdiction over the affected airspace. Operators should submit changes as outlined in § 105.15.

(2) ATC facilities that have jurisdiction over the affected airspace should report any additions, deletions, or changes to static PAJA data to AJV-2. At a minimum, include location; distance and radial from the nearest Very high frequency Omnidirectional Range (VOR); maximum altitude; drop zone radius; day/time of use; and the ATC frequency. Submit static PAJA changes to the National Flight Data Center (NFDC) Web site at http://nfdc.faa.gov. Use the “Aeronautical Chart Changes” link to submit information.

4. BACKGROUND.

a. FAA-Recognized Aeronautical Activity. Sport parachuting (the most common type of skydiving) continues to increase in popularity and is a FAA-recognized aeronautical activity even though parachutists are not certificated airmen. As a FAA-recognized aeronautical activity, regulations require airports that have received FAA funding to accommodate this activity unless the FAA determines that compatibility issues prohibit parachuting operations at a particular airport. See the current edition of FAA Order 5190.6, FAA Airport Compliance Manual, appendix C, paragraph 4, and appendix C, section 1, subparagraph 1.3.d.

b. Licensing, Instructor Rating, and Training. Sport parachuting has certain inherent risks for all participants. The FAA encourages sport parachutists to complete formal training courses offered by nationally recognized organizations or organizations that have equivalent training programs. The largest nationally recognized skydiving organization that licenses skydivers in the United States is the United States Parachute Association (USPA). Many local skydiving clubs, schools, and drop zone operators (DZOs) require documentation of experience and competency before using their equipment and/or parachuting facilities. This documentation usually consists of a logbook with endorsements and/or a skydiving license issued by a nationally recognized organization.

5. SKYDIVER SAFETY.

a. Medical Certificates. While the regulations do not require an FAA medical certification, the FAA urges prospective skydivers to receive a physical examination prior to their first jump and on a periodic basis thereafter. The skydiver should inform the physician of the purpose of the examination.

b. Training Methods. The skydiving industry has developed various methods of first-jump instruction. The FAA recommends that beginning skydivers seek instruction from instructors that have met the qualifications set forth by a nationally-recognized parachuting organization.

c. Safety Devices and Equipment.

(1) Deployment Assist Device. Section 105.47 requires that all persons making a parachute jump with a static line attached to the aircraft and main parachute use an assist device to aid the pilot chute in performing its function. An assist device is also required if no pilot chute is used in direct deployment of a round, main parachute canopy. The regulations do not require an assist device for direct deployment of a ram-air main parachute canopy.

(2) Automatic Activation Device (AAD). An AAD is a self-contained mechanical or electromechanical device attached to the parachute container that automatically releases the parachute closing system when it meets specific parameters, such as exceeding a specific vertical velocity and being at or below a specific altitude. Parachutists may attach this device to the main, reserve, or both. However, it is normally only attached to the reserve. An AAD does not physically open the parachute container or deploy the canopy, but rather initiates the container opening by pulling the ripcord pin or by cutting the container closing loop, allowing the canopy to deploy in a similar manner as when pulling the ripcord manually. Generally, AADs are installed on the reserve parachute.

(a) The FAA requires that all tandem parachutes have an AAD installed on the reserve parachute. Many skydiving schools and clubs provide and/or require the use of an AAD for all student or unlicensed skydivers.

(b) The FAA has not established minimum operational performance standards (MOPS) or a TSO for AADs. Therefore, the FAA recommends that anyone using an AAD review manufacturer's reports conforming to the parachute industry association (PIA) Technical Standard TS-120, AAD Design and Testing Report Format, and independent third-party reports attesting to the AAD's performance standard in order to make an educated decision prior to the use of any particular make or model AAD. The FAA recommends that jumpers using AADs to satisfy the requirements set forth in part 105 purchase them from manufacturers that provide such reports.

(c) Users of AADs should be aware of the device's level of reliability and its operating limitations, be knowledgeable about the various parameters of the device, and be trained on the specific use and setting for the particular AAD. Users should be well-informed about the use of the AAD and have access to the manufacturer's instructions.

(d) Furthermore, users should understand that AADs are strictly backup devices and are not intended to replace training or timely manual execution of emergency procedures. AADs may or may not initiate reserve parachute deployment at a sufficient altitude, depending upon various combinations of circumstances.

(e) Jumpers should make a pre-jump check using the manufacturer's recommended procedures for proper setting, arming, and operational status verification to ensure the proper functioning of the AAD. This pre-jump check is usually made prior to boarding the aircraft to ensure that it is set at the proper altitude and under current weather conditions to aid in accuracy. This is especially important when using an AAD that has selectable or adjustable activation settings, or when the intended landing area is at an elevation different from that of the departure airfield.

(f) AADs may have selectable or adjustable altitude activation settings. Some AADs are preset for the intended type of operation (e.g., Tandem, Student, Expert, etc.), while others may be user-selectable. Exercise caution to ensure that the appropriate model, version, settings, or all three are used for the particular type of equipment and jump. Be aware that different manufacturers may have different activation altitudes for the same settings.

(g) Since body position and other factors may cause a delay in the actual parachute opening altitude, the devices should only be used as a backup to manually deploying the reserve parachute. When the situation requires the use of the reserve parachute, the jumper should always manually pull the reserve ripcord using the established procedures for reserve deployment before ever reaching AAD activation altitude. The procedures for deployment of the reserve parachute are usually the same whether an AAD is installed or not.

(h) AAD owners or users should report malfunctions or activations to the AAD and container manufacturers.

(i) Report AAD malfunctions, activations or any other skydiving safety issue on the National Aeromatics and Space Administration (NASA) web site for the aviation safety reporting system (ASRS) found at http://asrs.arc.nasa.gov/. This ASRS is available for reporting or for searching for reports by anyone on the Internet.

d. Weather. Strong or gusty winds can be dangerous, especially to student jumpers. The industry best practices recommend that the maximum winds for students be 14 miles per hour (mph) for ram-air reserves and 10 mph for round reserves. In addition, skydivers and pilots should ensure adequate ceiling and visibility to maintain the required weather minimums.

e. Parachute Landing Areas—General. The FAA recommends that areas used as parachute landing areas remain unobstructed, with sufficient minimum radial distances to the nearest hazard.

f. Water Safety Equipment. Flotation gear should be worn whenever the intended exit point or landing point of a skydiver is within 1 mile of an open body of water.

g. Advanced Parachuting. Many of the safety suggestions presented in this AC are intended primarily for the student parachutist, who should make all jumps in a controlled training environment. Individual experience and judgment dictate what additional training should be obtained before undertaking more advanced parachuting activities. All parachutists should acquire experience and training before using unfamiliar or high-performance equipment.

6. PARACHUTE OPERATIONS ONTO AIRPORTS.

a. Stipulations for Landing at or Flying Over an Airport. Most parachute operations take place at airports, including having the parachute landing area located on the airport property. Section 105.23 requires approval from airport management prior to skydiving onto any airport. However, § 105.23(c) allows a parachutist to drift over an airport with an open parachute without airport management approval as long as the parachutist remains at least 2,000 feet above that airport's traffic pattern. (Airport traffic patterns are generally 1,000 to 1,500 feet above ground level (AGL)).

b. Additional Aviation Activities. A large number of airports that accommodate parachute operations also have different kinds of aviation activities taking place simultaneously, including flight training, glider and helicopter operations, Emergency Medical Services Helicopter (EMS/H), sightseeing operations, and aerobatic practice over or in the immediate vicinity of the airport. Many airports accommodate a large volume of transient traffic during skydiving operations.

c. Shared Facility Airports. The FAA recommends that shared facility airports have operating procedures so that each activity can operate safely by knowing the procedures for each of the other activities. Representatives of each type of activity can operate more effectively by knowing the procedures for each of the other activities. Representatives of each type of airport user group should develop procedures specific to their activity and share these procedures with other user groups. Airport management must ensure that airport policies and procedures are kept current, which can be accomplished via regularly scheduled meetings with all airport user groups.

(1) Traffic Patterns. With a minimum parachute opening altitude of 2,000 feet AGL (most parachutists open much higher), parachutes are nearly always open 800 feet or more above the traffic pattern altitude for any airport. Descending slowly and easy to visually acquire, parachutists and pilots have a shared responsibility to see and avoid each other. With a minimum parachute opening altitude of 2,000 feet AGL, parachutes are most often opened 800 feet or more above the traffic pattern altitude for any airport. Parachutists and pilots have a shared responsibility to see and avoid each other by descending slowly.

(2) Parachute Landings on Airports. Airports may designate suitable parachute landing areas. While skydivers attempt to land in such areas, at times there may be inadvertent landings in other grass or hard-surfaced areas. This could include landings on runways (RW), taxiways, and other hard-surfaced areas. Areas such as RWS, taxiways, clearways, and obstacle-free zones are not prohibited areas but should not be designated as a primary landing area and should be vacated as soon as practical. Flying a parachute over RWS at low altitudes should be avoided where possible. The FAA recommends that airport management work with parachute operators

to develop standard operating procedures (SOP) for activities conducted by parachutists. Airports that receive or have received federal funding or grant assurances may have additional requirements or restrictions to parachute landing areas. For additional information, see FAA Order 5190.6, AC 150/5190-7, Minimum Standards for Commercial Aeronautical Activities; and AC 150/5300-13, Airport Design current editions.

7. JUMP AIRCRAFT MAINTENANCE AND JUMP PILOTS. Whenever flights are offered for compensation or hire, the flight is considered a commercial operation under part 91, and Federal regulations require:

a. Aircraft Inspections. The operator must ensure the aircraft is maintained in accordance with part 91, § 91.409:

(1) Section 91.409(a) and (b), annual and 100-hour inspection programs;

(2) Section 91.409(d), progressive inspection program;

(3) Section 91.409(f)(3), manufacturer's inspection program; or

(4) Section 91.409(f)(4), approved inspection program.

b. Aircraft Inspection Quality Assurance (QA). Aircraft operated commercially under part 91 must be inspected by a person authorized to perform inspections under a 100-hour/annual program or a FAA-approved progressive inspection program consistent with the requirements for part 91 operations. Operators must maintain aircraft operated under 14 CFR parts 125 or 135 under a FAA-approved maintenance program. The FAA recommends the use of an aircraft status sheet for QA.

c. Additional Information on Acceptable Maintenance Programs. Anyone conducting parachuting operations should contact his or her local FAA Flight Standards District Office (FSDO) for additional information on acceptable maintenance programs. Reviewing aircraft maintenance records can be simplified by the use of an aircraft status sheet (See Figure 1, FAA Aircraft Status Inspection List Example).

FIGURE 1. FAA AIRCRAFT STATUS INSPECTION LIST EXAMPLE

N_____ S/N_____ A/C M/M_____

Name of A&P, AI, or FAA Repair Station responsible for the inspection of the aircraft:

_____

A&P or IA Certificate No. or Repair Station No.:_____

Inspection/Item Pending	Hours:/Date		Next Due
Annual or Progressive Inspection			
100-Hour Inspection			
Static System Check			
Altimeter Check			
Transponder Check			
ELT Battery			

AD Number	Description	Hours/Date Completed	Next Due

8. PILOT RESPONSIBILITIES. The pilot in command (PIC) must adhere to all regulations applicable to the operation conducted. This includes, but is not limited to, the following:

a. Pilot Certification, Experience, and Operating Requirements. The PIC is responsible for meeting the certification, proficiency, operating, and experience requirements of, but not limited to, 14 CFR parts 61, 91, and 105. Pilots conducting flight operations for compensation or hire are required to possess a Commercial Pilot Certificate with the appropriate ratings for the aircraft being flown and must have a current Class 2 medical certificate or equivalent. Direct any questions regarding these requirements to the local FAA FSDO for consideration.

b. Jump Pilot Training. For those DZOs and parachuting operations that do not have a nationally recommended jump pilot training program, the FAA recommends that pilots flying aircraft for the purpose of sport parachuting have appropriate initial and recurrent training. The training program should include testing to ensure a high level of competence in the jump aircraft being flown. The training should include, but is not limited to:

(1) Ground Training.

(a) Preflight inspection specific to jump aircraft and modifications.

(b) Aircraft limitations.

(c) Weight and Balance (W&B).

1. Takeoff computations.

2. Weight shift in flight procedures for exiting jumpers.

3. Landing configuration.

(d) Low-speed operations for jump runs.

1. Maneuvering at minimum speed.

2. Opening and closing jump door, if applicable.

3. Stall recognition and recovery.

(e) Emergency procedures.

1. Standard aircraft emergencies.

2. Emergencies caused by jump activities.

3. Bailout procedures.

(f) Determining aircraft airworthiness.

1. Maintenance requirements and procedures.

2. Aircraft Status Inspection List (Figure 1).

3. Minimum equipment list (MEL), if applicable.

4. Logging maintenance discrepancies.

(g) Ensure that all parachutes have been packed within 180 days.

(h) Familiarity of jump area.

(2) Flight Training.

(a) Takeoffs and landings with representative loads.

(b) Center of gravity (c.g.) shift with unloading of jumpers.

(c) Stall-spin prevention and recovery.

(d) Tail strike prevention for jumpers.

NOTE: The potential exists for jumpers to strike the tail of many aircraft when exiting the airplane in flight. Pilots should brief the jumpers on tail strike avoidance procedures. Jumpers should only exit an airplane when it is in level flight and configured for jumper exit with reduced power and airspeed. Jumpers should not exit the airplane in a climb configuration.

c. W&B Procedures. The PIC is solely responsible for assuring that the aircraft being flown is properly loaded and operated so that it stays within gross weight and c.g. limitations. The PIC should obtain additional aircraft station position information (loading schedule) for future W&B computations. The PIC is also responsible for reviewing these records and the flight manual (fm) to gain familiarity with an aircraft's W&B procedures and flight characteristics.

d. Computing W&B. The PIC must include the following factors:

(1) The maximum allowable gross weight and the c.g. limitations.

(2) The currently-configured empty weight and c.g. location.

(3) The weight and c.g. location prior to each flight.

(4) The weight and location of jumpers during each phase of the flight in order to assure that the aircraft stays within c.g. limits. The PIC must remain aware of c.g. shifts and their effects on aircraft controllability and stability as jumpers move into position for exiting the aircraft and as they exit.

e. Operational Requirements. The PIC is solely responsible for the operational requirements of parts 91 and 105 to include the special operating limitations and placards required for flight with the door open or removed. The PIC is also responsible for ensuring that each occupant's restraint system is properly secured.

f. Suitable Placards. Placards should be located in the aircraft to help the pilot inform jumpers of the maximum approved loading and weight distribution. These placards should be located where anyone boarding the aircraft can see them. They should also clearly show the maximum approved seating capacity and the load distribution. However, since many jumpers are not familiar with aircraft W&B procedures, it remains the PIC's responsibility to ensure that proper W&B is maintained throughout all parachuting operations.

(1) Seatbelts and Approved Loading. Section 91.107(a)(3)(iii) permits persons aboard an aircraft for the purpose of participating in sport parachuting activities to use the floor of the aircraft for a seat. However, among jump aircraft there are a wide variety of seats, benches, troop seats, and floor seating arrangements. In all cases, each person must have access to an installation-approved seatbelt. See Appendix 3, Seats and Restart Systems, for additional information describing seat and restraint system configurations. The maximum number of skydivers is determined by that aircraft's W&B limitations, as long as there is a seatbelt or restraint for each skydiver. The approved number of skydivers that each aircraft can carry for parachute operations will most commonly be found on an FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance), used for field approvals, or an aircraft Supplemental Type Certificate (STC).

g. Oxygen. Jump pilots must use oxygen when flying above 14,000 feet mean sea level (MSL). Operators must provide skydivers oxygen when the jump plane is above 15,000 feet MSL. Above 25,000 feet MSL, jumpers should use pressure-demand oxygen systems. High altitude jumps should be made after becoming familiar with the problems and hazards created by low temperatures, lack of oxygen, and the various types of oxygen equipment. Jumpers should not attempt high altitude jumps without an adequate supply of breathing oxygen.

h. Altitude Reporting. Report all altitudes to ATC in feet above MSL.

9. PARACHUTE OPERATIONS IN DESIGNATED AIRSPACE. Section 105.25 contains information on the ATC authorization and notification process.

a. Parachute Operations Restrictions. No person may conduct a parachute operation, and no PIC of an aircraft may allow a parachute operation to be conducted from that aircraft:

(1) Over or within a restricted or prohibited area, unless the controlling agency of the area concerned has authorized that parachute operation;

(2) Within or into a Class A, B, C, or D airspace area without, or in violation of the requirements of, an ATC authorization issued under § 105.25; or

(3) Within or into a Class E or G airspace area (except as provided in subparagraph 9c and subparagraph 9d), unless the ATC facility that has jurisdiction over the airspace at the first

intended exit altitude receives notification of the parachute operation no earlier than 24 hours before and no later than 1 hour before the parachute operation begins.

b. Request for a Parachute Operation Authorization or Notification. Submit each request for a parachute operation authorization or notification required under this section to the ATC facility that has jurisdiction over the airspace at the first intended exit altitude and include the information prescribed by § 105.15(a).

c. Notification of Parachute Operations. For the purposes of subparagraph 9a(3), ATC facilities may accept a written notification from an organization that conducts parachute operations and lists the scheduled series of parachute operations over a period of time not longer than 12 calendar-months. The notification must contain the information prescribed by § 105.15(a); identify the responsible persons associated with that parachute operation; and be submitted at least 15 days, but not more than 30 days, before the parachute operation begins. The FAA may revoke the acceptance of the notification for any failure of the organization conducting the parachute operations to comply with its requirements.

d. Armed Force. Subparagraph 9a(3) does not apply to a parachute operation conducted by a member of a Department of Defense (DOD) armed force within a restricted area that extends upward from the surface when that area is under the control of the DOD armed force.

10. JUMPS OVER AND INTO CONGESTED AREAS AND OPEN-AIR ASSEMBLIES OF PERSONS.

a. Off-Airport Jumps. A skydiver may make parachute jumps away from the usual on-airport parachute school, club, or center location, as long as landowner permission is obtained for the off-airport location.

b. Certificate of Authorization (COA). Section 105.21(a) requires an FAA COA in order to conduct a parachute operation over or into a congested area of a city, town, or settlement, or an open-air assembly of persons. The responsible person of the proposed jump must obtain this COA from the FAA FSDO that has jurisdiction over the site where the jump is proposed by submitting an application, FAA Form 7711-2, Certificate of Waiver or Authorization Application. A copy of FAA Form 7711-2 and information on filling out this form can be obtained from your local FSDO or downloaded from http://www.faa.gov/about/initiatives/airshow. An application for a COA should be submitted at least 10 working days in advance of the intended jump date to allow time for processing. Approval or denial of the application must be completed within 5 working days of receipt by the FSDO.

11. REQUIRED INFORMATION.

a. COA—Required Information. A person submitting a request for a COA is required to submit the information found in § 105.15:

(1) The date and time the parachute operation will begin.

(2) The radius of the drop zone around the target expressed in nautical miles (NM).

(3) The location of the center of the drop zone in relation to:

(a) The nearest VOR facility (in terms of the VOR radial of its location) and its distance in NM from the VOR facility when that facility is 30 NM or less from the drop zone target; or

(b) The nearest airport, town, or city depicted on the appropriate Coast and Geodetic Survey World Aeronautical Chart (WAC) or Sectional Aeronautical Chart, when the nearest VOR facility is more than 30 NM from the drop zone target.

(4) Each altitude above MSL at which the pilot will operate the aircraft when parachutists or objects exit the aircraft.

(5) The duration of the intended parachute operation.

(6) The name, address, and telephone number of the person who requests the authorization or gives notice of the parachute operation.

(7) The registration number of the aircraft that the pilot will use.

(8) The name of the ATC facility with jurisdiction over the airspace at the first intended exit altitude.

b. Available on Request. Each holder of a COA issued under § 105.21(b) must present that certificate for inspection upon the request of the Administrator or any Federal, State, or local official.

c. Postponed or Canceled Operation. Each person requesting an authorization under § 105.21(b) must promptly notify the ATC facility that has jurisdiction over the affected airspace if the proposed or scheduled parachute operation is canceled or postponed.

d. Authorization and Notification Requirements. Whether regulations require verbal or written authorization, or a COA (FAA Form 7711-1, Certificate of Waiver or Authorization), for a parachute operation depends upon the type of airspace involved and the area where the parachutist intends to land. The airspace and landing area will determine the requirements. Parachutists and pilots can use Appendix 1, Table of Location of Jump Authorization or Notification, to determine what authorization or notification requirements are necessary for various types of jumps. The FAA recommends that anyone establishing a permanent drop zone or a temporary jump site contact the ATC facilities nearest the site as early as possible. ATC personnel are in the best position to provide information on arrival and departure routes, airspace classifications, and other airspace operations that may affect the safe and efficient flow of a parachuting operation. If you are uncertain of the requirements after looking at Appendix 1, contact your local FSDO and/or ATC facility for additional information.

12. PARACHUTE LANDING AREAS FOR MOST EXHIBITIONS—OFF-AIRPORT LOCATIONS. The FAA requires the following size areas when issuing a COA for parachuting operations conducted over or into a congested area or an open air assembly of persons.

a. Open Field. No less than 500,000 square feet that will accommodate landing no closer than 100 feet from spectators.

b. Level I. An open area that will accommodate a landing area no smaller than 250,000 square feet and which will accommodate landing no closer than 50 feet from spectators.

c. Level II. The level II landing area must be large enough in any direction to accommodate jumpers landing no closer than 15 feet from spectators.

d. Stadium. A level II landing area smaller than 150 yards in length by 80 yards in width and bounded on two sides or more by bleachers, walls, or buildings in excess of 50 feet high.

> **NOTE: In addition to landing area size requirements, the FAA also imposes qualification and currency requirements found in the Parachuting Special Provisions listed in the current edition of FAA Order 8900.1, Flight Standards Information Management System (FSIMS), Volume 3, Chapter 6, located at http://fsims.faa.gov. Parachuting demonstrations that seek relief from any requirement listed in these special provisions must have a letter of approval from the FAA General Aviation and Commercial Division (AFS-800), Federal Aviation Administration, Flight Standards Service, 800 Independence Avenue, S.W., Washington, D.C. 20591 (e.g., airborne reenactment by civilians for reduced experience or lower opening altitudes).**

13. PARACHUTE EQUIPMENT RULES.

a. Parachute. Section 1.1 defines a parachute as a device used, or intended to be used, to retard the fall of a body or object through the air. For the purposes of this AC, a parachute assembly normally, but not exclusively, consists of the following major components: a canopy, a deployment device, a pilot chute and/or drogue, risers, a stowage container, a harness, and an actuation device (ripcord). There are, of course, some lesser parts associated with these major components such as connector links, bridles, and hardware. The term “pack,” when used in this AC, refers to the complete harness-container system, including the main parachute container, plus the reserve parachute and associated components. Except for a reserve static line (RSL) (if installed), it does not include the main canopy, main risers, or components that depart with the main canopy if it is jettisoned. If a parachutist or rigger (e.g., a chest-type system or some pilot emergency systems) assembles the design of the reserve stowage container to a harness, the term “pack” refers to the parachute assembly without the harness.

b. Parachute Harness. Section 105.43 requires a solo parachutist making an intentional jump wearing a single-harness dual-pack parachute to have at least one main parachute and one approved reserve parachute. For tandem jumps, the parachute system defined in § 105.3 includes a main parachute, a reserve parachute, a harness and dual parachute container, an AAD, and a forward harness for a passenger parachutist. For both solo and tandem parachutists, the harnesses (including the forward harness of a tandem system), and reserve parachute packs must be approved types, but the main parachutes do not need approval. The following are examples of approved parachutes as defined in § 105.3.

(1) Parachutes Manufactured under TSO-C23. This TSO prescribes the minimum performance and QA standards for a parachute that is carried aboard civil aircraft or by skydivers for emergency use. The manufacturer must meet these standards before labeling its parachute or components as complying with the TSO.

(2) Demilitarized or Military Surplus Parachutes. Military personnel-carrying parachutes (other than high altitude, high-speed, or ejection kinds) identified by military drawing number, military order number, or any other military designation or specification. These parachutes are often referred to as demilitarized or military surplus parachutes.

c. Assembly of Major Components. A certificated, appropriately rated parachute rigger may make the assembly or mating of approved parachute components from different manufacturers in accordance with the parachute manufacturer's instructions and without further authorization by the manufacturer or the FAA. Specifically, when various parachute components are interchanged, the parachute rigger should follow the canopy manufacturer's instructions as well as the parachute container manufacturer's instructions. However, the container manufacturer's instructions take precedence when there is a conflict between the two.

(1) Assembled parachute components must be compatible. Each component of the resulting assembly must function properly and may not interfere with the operation of the other components. For example:

(a) Do not install a canopy of lesser or greater pack volume than the intended design criteria for the specific size of container, since it could adversely affect the proper functioning of the entire parachute assembly. Likewise, do not install a high-volume canopy into a low-volume container.

(b) A TSO'd canopy may be assembled with a demilitarized harness, or vice versa, as long as the assembled components comply with the safety standard of the original design.

(2) Actual tests by a parachute rigger should resolve any questions about the operation of the assembly to make certain the parachute is safe for emergency use.

(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 opening speed of the harness or the reserve canopy (whichever is lower). The rigger who assembles the system should record these limits on the outside of the container in a place readily available to the user when he or she dons the assembly. 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-C23 or later are marked on the components themselves.

(b) In the case where either the harness or canopy of a single-harness system is certified under TSO-C23b and the manufacturer has not specified operating limits, derive the maximum pack opening speed for that component from the strength test table in National Aerospace Standards (NAS) Specification, NAS-804, Parachutes.

1. For the maximum operating weight of the TSO-C23b component, use the highest weight in the table less than or equal to 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

2. For the maximum pack opening speed of the TSO-C23b component, use the highest speed in the table less than or equal to 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.

(4) For tandem systems, there may be additional limits for each harness.

d. AAD Installation. The FAA accepts the installation (addition of pockets, channels, guides, etc., required for the AAD assemblage in the parachute container) of each make/model AAD as part of the paperwork that is submitted by the parachute manufacturer during the TSO approval for parachute harness/container systems. The TSO approval by the FAA and the AAD approval by the manufacturer (mentioned, for example, in § 105.43(b)) are for the installation only, and are based on AAD operation not interfering with normal function of the parachute. A retrofit installation, or installation of a make or model AAD other than those specifically authorized for use by the parachute manufacturer for a particular TSO or Military Specifications (MIL-SPEC)-approved parachute, constitutes an alteration to that parachute (refer to paragraph 16). Manufacturer and retrofit installation are done in consultation and agreement with the AAD manufacturer, and in accordance with established test procedures such as Parachute Industry Association (PIA) Technical Standard (TS)-112, Harness/Container - AAD Installation Test Protocol.

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 Web sites. The PIA Web site, http://www.pia.com, provides a good starting point for searches. When such instructions are not available, The Parachute Manual, Volumes I and II (Dan Poynter, 1991) and FAA-H-8083-17, Parachute Rigger Handbook set out commonly accepted repair practices. The Parachute Manual and The Parachute Rigger Handbook can be purchased from commercial booksellers; The Parachute Rigger Handbook is also available for download at: http://www.faa.gov/library/manuals/aircraft/media/FAA-H-8083-17.pdf.

f. Parachutist's Handling of Equipment. The user of a parachute system may perform simple assembly and disassembly operations necessary for transportation, handling, or storage between periods of use if the parachute's design simplifies such assembly and disassembly without the use of complex operations.

g. Removal of Pilot Chute. A certificated senior or master parachute rigger may remove the pilot chute from a front-mounted (e.g., chest-type) reserve parachute if the canopy does not use a diaper, bag, or other deployment device. When complete, the parachute must have the plain marking, "PILOT CHUTE REMOVED." This kind of parachute can be used for intentional jumping only.

h. Extra Equipment. The FAA does not consider the attachment of an instrument panel, knife sheath, or other material to the exterior of the parachute assembly an alteration. If attaching any extra equipment, take care not to impair the functional design of the system.

14. PARACHUTE PACKING.

a. Reserve Parachutes.

(1) A certificated and appropriately rated parachute rigger must pack the reserve parachute (refer to § 65.111(a), and § 105.43(b)).

(2) Visiting foreign parachutists jumping parachute systems that the FAA has not approved must have their reserve parachutes packed by someone acceptable to the foreign parachutist's Civil Aviation Authority (CAA) or by a FAA-certificated rigger. (Refer to § 105.49(a)(4)(ii).)

(3) The certificated and appropriately rated parachute rigger must pack the reserve parachute within 180 days before the date of use if the parachute system is made of materials substantially resistant to mold, mildew, or other rotting agents, or within 60 days of the date of use otherwise. (Refer to § 105.43(b).)

(4) A parachute user must ensure that an AAD is maintained in accordance with the AAD manufacturer's instructions and service requirements. When a rigger packs a reserve parachute the rigger is only certifying that it meets all safety requirements on the day it is packed; therefore, riggers should note any maintenance or battery replacement due date(s) on the packing data card so that users are able to determine AAD airworthiness and ensure conformance to the regulations. (Refer to §§ 105.43(c) and 105.45(b)(3).) AADs are to be installed as per the parachute manufacturer's instructions.

(5) Only the rigger who did the packing, and whose seal is removed to permit scheduled or unscheduled maintenance or repairs to the reserve container, may open, re-close, and reseal it (e.g., AAD service or closing loop adjustment) within the 180-day or 60-day period in subparagraph 14a(3).

b. Main Parachutes. Main parachutes must be packed within 180 days before the date of use and be packed by any certificated parachute rigger or a person working under the direct supervision of a certificated parachute rigger. The person making the next jump (including a tandem parachutist in command, but not the passenger parachutist) may also pack the main parachute. (See § 65.111(b), 105.43(a), and 105.45(b)(1)).

15. PARACHUTE REPAIRS.

a. Major Repairs. A major repair, as defined in § 1.1, is a repair that, if improperly done, might appreciably affect airworthiness.

b. Minor Repair. A minor repair is a repair other than a major repair.

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 the manufacturer's instructions, riggers should use the FAA's Parachute Rigger Handbook and the Parachute Manual Volume I or II as guides. If the procedure calls for a master rigger, it should be considered a major repair. If the procedure allows for a senior rigger, it should be considered a minor repair.

(1) The same kind of repair may be classed as major or minor depending on size or proximity to key structural components. For example, a basic patch may be a minor repair if it is small and away from seams, but may be a major repair if it is large or adjacent to a seam.

(2) The same kind of repair may be classed as major or minor depending on whether it is done to an approved or unapproved component. For example, replacement of a suspension line on a reserve canopy is usually 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).

(3) If an operation results in an approved configuration, the operation is considered a repair. For example, if a parachute system is approved with and without an RSL, then removing or replacing RSL components is a repair that may be major or minor depending on whether, if improperly done, it might appreciably affect airworthiness. Similarly, resizing a harness, when the original design permits a range of sizes, is a repair when the resized harness remains within the permitted range.

(4) Only an appropriately rated master rigger or a manufacturer of approved parachute components may make major repairs. The manufacturer may exclusively designate certain repairs for the manufacturer or the manufacturer's designee.

16. PARACHUTE ALTERATIONS.

a. Configuration. Alterations are changes to a parachute system configuration that the manufacturer or the manufacturer's supervising FAA ACO has not approved. Examples include removing a deployment device from a reserve canopy, adding harness fittings to permit attaching an additional canopy, using nonstandard repair materials or techniques, or installation of a specific make/model AAD, when the manufacturer has not authorized such changes. Changes that result in an approved configuration are considered repairs (refer to paragraph 15).

b. Approval. An alteration to an approved parachute system must be done in accordance with approved manuals and specifications and only by those with specific authorization to perform that alteration. Specific approval is not needed for the method of altering a non-TSO'd main parachute canopy. A person seeking authorization to alter an approved parachute system should proceed as follows:

(1) A person qualified to alter a parachute (as listed below) should contact his or her local FAA FSDO inspector to discuss the proposed alteration. The applicant should be prepared to show the inspector the nature of the alteration by using a sample assembly, sketch, or drawing and be prepared to discuss the nature of the tests necessary for showing that the altered parachute meets all applicable requirements.

(2) The inspector will review the proposal with the applicant and a plan of action will be agreed upon.

(3) The applicant will then prepare an application, in the format of a letter, addressed to the local FSDO. Attach all pertinent data. The data should include:

(a) A clear description of the alteration;

(b) Drawings, sketches, or photographs, if necessary;

(c) Information such as thread size, stitch, pattern, materials used, and location of altered components; and

(d) Some means of identifying the altered parachute (model and serial number).

(4) The FSDO aviation safety inspector (ASI) may send an alteration to the ACO for review if the ASI is not experienced in parachute alterations. When satisfied, the inspector will indicate approval by date stamping, signing, and placing the FSDO identification stamp on the letter of application.

(5) Only a certificated and appropriately-rated master parachute rigger, a current manufacturer of approved parachute systems or components, or any other manufacturer the Administrator considers competent may perform alterations to approved parachutes.

17. MATERIALS USED FOR REPAIRS TO TSO-APPROVED COMPONENTS.

a. Material Quality. Materials used for repairs to TSO-approved components including, but not limited to, fabric, suspension line, tape, webbing, thread, and hardware, must meet the same specifications, requirements, and certifications of the original materials used by the manufacturer.

b. Parachute Fittings. Hardware may be reconditioned and reused, as long as it complies with subparagraph 17a. However, the plating or re-plating of load-carrying parachute fittings may cause hydrogen embrittlement and subsequent failure under stress unless the plating is done properly. Chrome or nickel-plated harness adjustment hardware may also have a smoother finish than the original and may permit slippage.

John M. Allen
Director, Flight Standards Service

APPENDIX 1. TABLE OF LOCATION OF JUMP AUTHORIZATION OR NOTIFICATION

Location of Jump	**Kind of Authorization Required**	**When to Apply or Notify**	**Where to Apply or Notify**	**Title 14 of the Code of Federal Regulations (14 CFR) Section Reference**
Over or onto any airport	Prior approval (see Note 1)	Applicant's choice	Airport management	Part 105, § 105.23
In or into Class E or G airspace	Air Traffic Control (ATC) notification	Between 24 hours and 1 hour prior to jump	ATC facility having jurisdiction	§ 105.25
In or into Class A, B, C, or D airspace	ATC authorization (see Notes 1 and 2)	Apply before jump	ATC facility having jurisdiction	§ 105.25
Over or within a restricted or prohibited area	Prior authorization	Apply and receive before jump	Controlling agency, as noted on sectional chart	§ 105.25
Over or into a congested area or open air assembly of persons	Submit Federal Aviation Administration (FAA) Form 7711-2, Certificate of Authorization Application	10 working days prior to jump	Flight Standards District Office (FSDO) having jurisdiction over the area where jump is to be made	§ 105.21
Note 1: Verbal authorization normally issued. **Note 2: Title 14 CFR § 105.13 requires radio communication be established prior to jumps in or into controlled airspace.**				

APPENDIX 2. OPERATION OF AIRCRAFT WITH DOOR REMOVED OR MODIFIED FOR PARACHUTING OPERATIONS

1. Operating Limitations Revision. The previous revision, Advisory Circular (AC) 105-2D, Sport Parachute Jumping, Appendix 2, provided a list of aircraft that have Federal Aviation Administration (FAA)-approved door open or removal procedure authorization with operating limitations. That list did not include all the aircraft currently used in skydiving operations. Instead of continuing with the use of that list, contact your local Flight Standards District Office (FSDO) for information on getting an authorization to operate your aircraft with the door removed and/or a door modified to open/close in flight. Aircraft that have approved procedure and operating limitations in their FAA-approved Aircraft Flight Manual (AFM) or a FAA-approved Supplemental Type Certificate (STC) may operate in accordance with those documents.

2. Operation with Modified or Removed Door. Any aircraft type, utility/normal category model that has had FAA-approved data used for skydiving operations or door removal can be considered. It is the responsibility of the applicant to supply the FAA aviation safety inspector (ASI) with any data necessary to have his or her aircraft approved to operate with a door removed or a door modified to open/close in flight during jump operations. If the aircraft is altered and operated in accordance with an STC, no other limitations are required.

> **NOTE: Many aircraft have jump door and/or restraint systems approved by type certificate (TC), STC, or field approval. Aircraft that have not been FAA-approved by TC, STC, or field approval must have the required data to address the alteration from a Designated Engineering Representative (DER), Organization Designation Authority (ODA), or other FAA-approved data. This data will allow the owner/operator the ability to apply for a field approval or one-time STC for that aircraft.**

3. Previously Approved Field Approvals. Applicants can present a previously FAA-approved field approval for jump door, handles, step, and skydiver restraint systems as data for the field approval process if the FAA-approved data are for the same aircraft make, model, and series (M/M/S).

4. Field Approval Process. Applicants need to follow the latest guidance found in FAA Order 8900.1, Flight Standards Information Management System (FSIMS), Volume 4, Chapter 9, Selected Field Approvals, for a field approval process. This guidance can be referenced at http://fsims.faa.gov. Any changes to the flight manual require FAA and Aircraft Certification Office (ACO) approval. Applicants must include placards and skydiver restraint systems in the continued airworthiness instructions covering the repair of placards, restraint system components, steps, handles, jump doors, etc. Installation, removal, and inspection of installed equipment will be entered in the aircraft maintenance records, including the inspection checklist for the installation and operational check of restraint systems. All aircraft used in skydive operations will maintain records of all required FAA inspections and/or maintenance programs.

APPENDIX 3. SEATS AND RESTRAINT SYSTEMS

1. Seating Configuration and Restraint System Safety. Not all seating and restraint system configurations used in jump aircraft provide the same level of safety in the event of an emergency landing. This appendix provides general information concerning the relative safety of commonly used seating configurations and restraint systems. These safety assessments are based on available research data and in-service experience.

2. General Information.

a. Quick Release Track Fittings. Single stud quick release track fittings have been shown to release from the track at dynamic loads much lower than their rated strength. Dual stud quick release fittings did not exhibit this behavior in dynamic tests. Therefore, dual stud quick release fittings of the type shown in Figure 1, Dual Stud Quick Release Track Fitting, provide a much more reliable restraint anchorage than single stud fittings.

b. Lap Belts. Lap belts are only effective if there is a solid support surface behind the occupant, such as a seat back, aircraft sidewall, or bulkhead. Otherwise, a tether restraint that attaches to the parachute harness provides more effective restraint.

c. Restraint for Aft-Facing Parachutists. Research has shown that to restrain aft-facing parachutists, the most effective point to attach a tether restraint to a parachute harness is at the junction of the leg straps, main lift web, and the horizontal back strap. Figure 2, Tether Restraint Usage, illustrates this attachment method, in which the tether loop encircles the junction by passing between the main lift web and the horizontal back strap, and between the upper leg strap and the lower leg strap. One way to achieve this is to route the tether loop under the upper leg strap, then under the main lift web before latching the loop, as depicted in Figure 3, Pass Tether Loop Under Upper Leg Strap, Figure 4, Pass Tether Loop Under Main Lift Web, and Figure 5, Latch Tether Loop Around Parachute Harness. Since these two components of the harness are easily assessable by the wearer, this attachment method should not be prone to misuse. It also provides more effective restraint than attaching at other points on the parachute harness since the restraining force is applied near the seated occupant's center of gravity (c.g.).

d. Restraint Belts or Tethers. Past experience and testing have shown the validity of attaching a restraint belt(s) or tether(s) to the parachute harness as part of the overall integrated restraint system. However, manufactuers have not tested most, if not all, parachute harness configurations to accept the load vectors that would be experienced during the actual use of this type of restraint configuration.

(1) Because of this, any parachute harness that has been subjected to actual use as part of an integrated restraint system must be removed from service and inspected by the manufacturer or a parachute rigger designated by the manufacturer to determine the continued airworthiness of the parachute harness.

(2) If the inspection shows that the harness is Airworthy, it may be returned to service (RTS).

3. Specific Seating/Restraint Configuration Information.

a. Side-Facing. Conventional side-facing bench seats employing dual point lap belts are a superior means of carrying parachutists in aircraft large enough to accommodate them. They offer the advantages of being simple to use and can be designed to provide significant vertical energy absorption.

b. Rear-Facing Floor Seating.

(1) Restraints are more effective if attached to the floor instead of the sidewall. Only use sidewall attachments if floor attach points are not available.

(2) Effectiveness is increased if overall tether length is kept as short as possible, and the tether attachment to the aircraft is aft of the harness attachment point.

(3) Single point, single tether restraints are not very effective.

(4) Dual point, dual tether restraints offer superior restraint compared to single point, single tether restraints. This restraint method consists of two straps, each connecting the parachute harness to the aircraft floor on both sides of the parachutist as shown in Figures 6, Tether Restraint Attachment To Floor For Rear-Facing Floor Seats, Figure 7, Dual Point, Dual Tether Restraint Configuration For Rear-Facing Floor Seats, and Figure 8, Dual Point, Dual Tether Restraint Attachment To Floor For Rear-Facing Straddle.

c. Rear-Facing on Straddle Bench.

(1) Straddle benches can offer more occupant crash protection than floor seating since they can be designed to provide significant vertical energy absorption.

(2) As with floor seating, restraints are more effective if attached to the floor instead of the sidewall.

(3) Restraint effectiveness is improved if the tether strap is attached to the floor such that it is at an approximately 45-degree angle, as shown in Figure 8.

(4) Single point, single tether restraints are not very effective.

(5) Dual point, dual tether restraints offer superior restraint compared to single point, single tether restraints.

FIGURE 1. DUAL STUD QUICK RELEASE TRACK FITTING

FIGURE 2. TETHER RESTRAINT USAGE

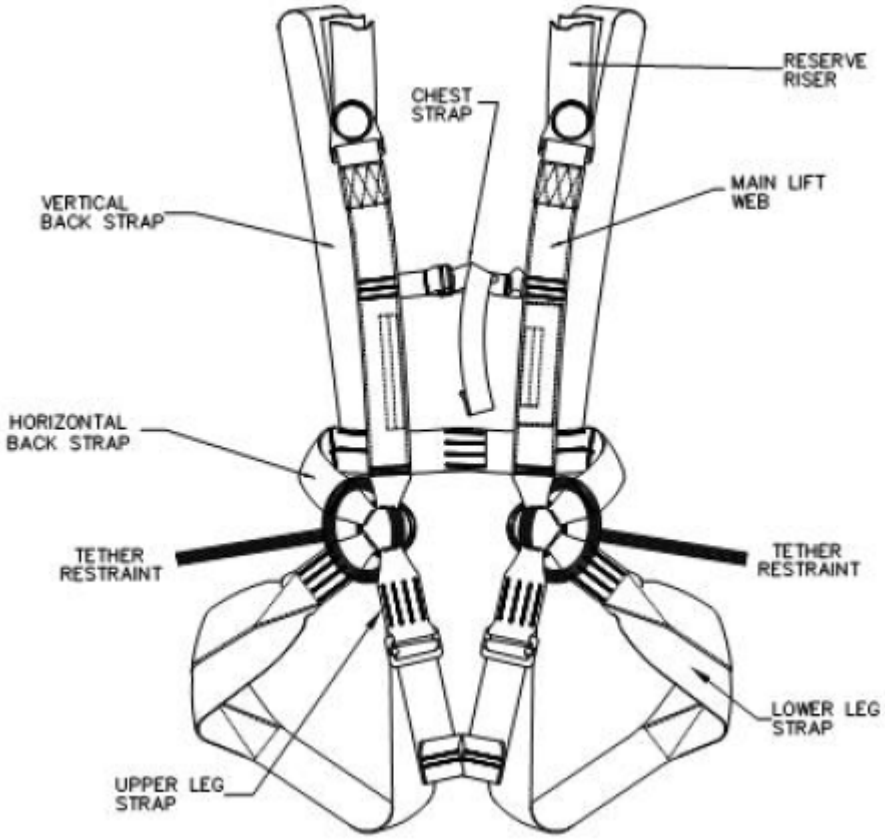

FIGURE 3. PASS TETHER LOOP UNDER UPPER LEG STRAP

FIGURE 4. PASS TETHER LOOP UNDER MAIN LIFT WEB

FIGURE 5. LATCH TETHER LOOP AROUND PARACHUTE HARNESS

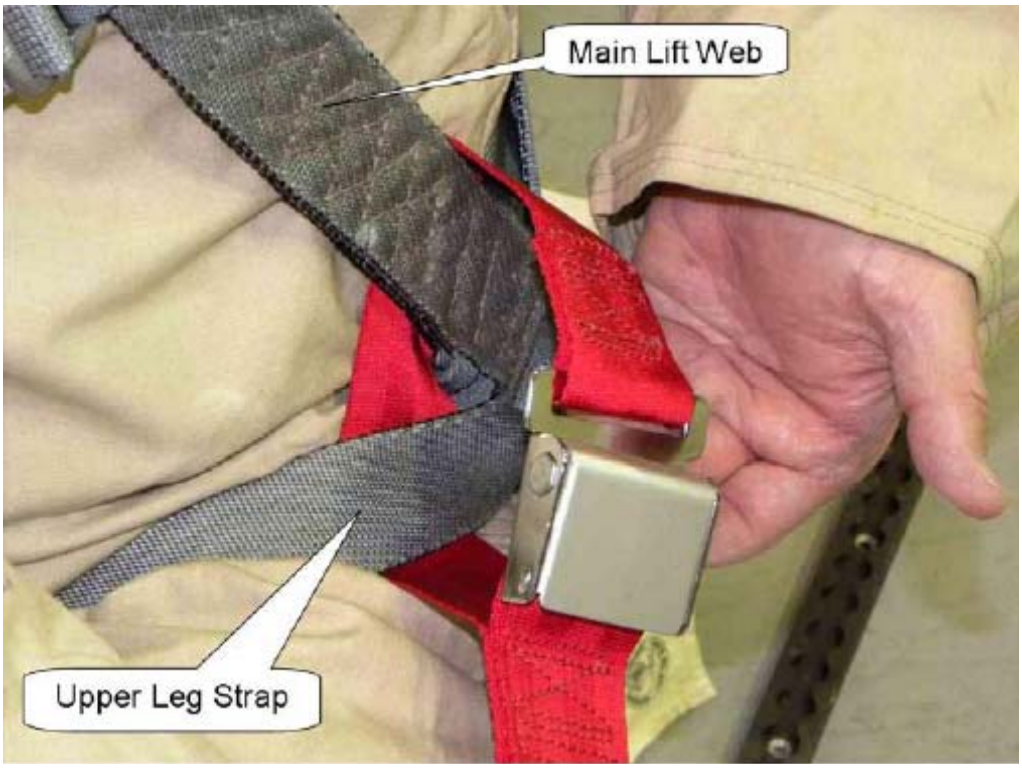

FIGURE 6. TETHER RESTRAINT ATTACHMENT TO FLOOR FOR REAR-FACING FLOOR SEATS

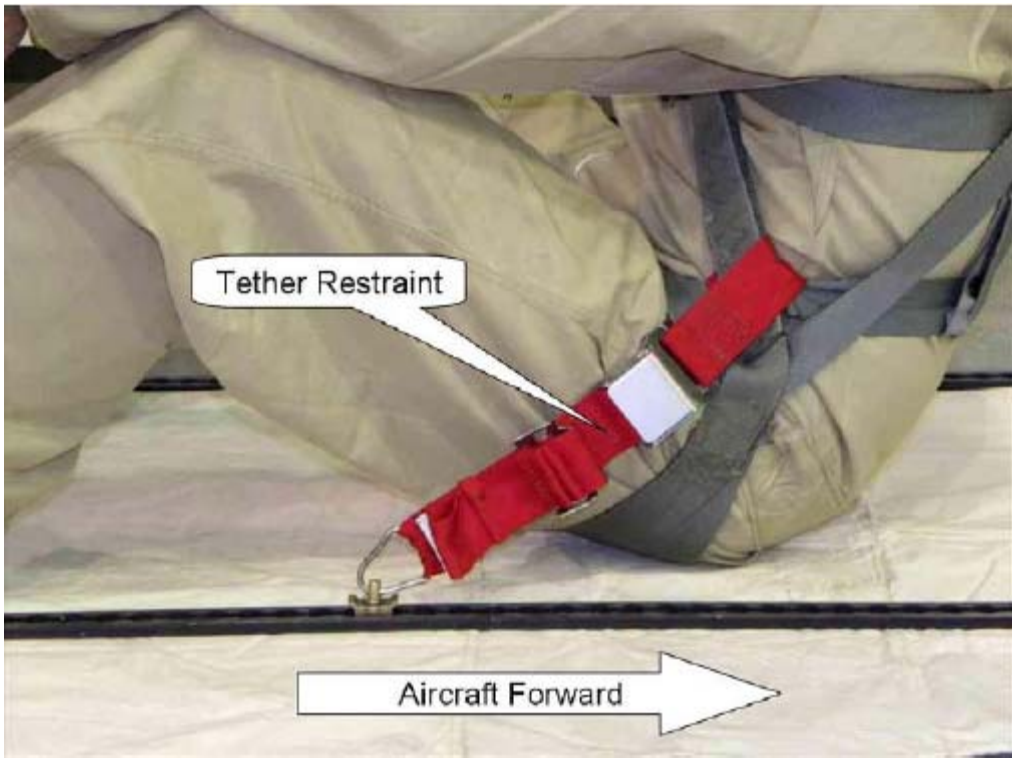

FIGURE 7. DUAL POINT, DUAL TETHER RESTRAINT CONFIGURATION FOR REAR-FACING FLOOR SEATS

FIGURE 8. DUAL POINT, DUAL TETHER RESTRAINT ATTACHMENT TO FLOOR FOR REAR-FACING STRADDLE