

ISMOG

**Interagency
Smokejumper
Operations
Guide**

**Forest Service
Section**

**February
2018**



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Interagency Smokejumper Operations Guide

Forest Service Section

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
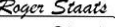

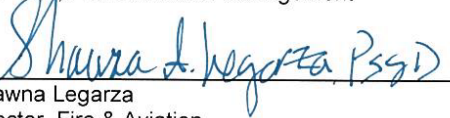
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Interagency Smokejumper Operations Guide – FS Section (Revised January 2018)

Approval

This revision of the Forest Service Section of the Interagency Smokejumper Operations Guide (ISMOG) was reviewed and approved as follows:

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Revision and Amendment Log

Users are encouraged to recommend changes to the Interagency Smokejumper Operations Guide (ISMOG) through their smokejumper base manager. The following chart may be used to track suggested and approved document revisions and amendments to the Forest Service Section of the ISMOG. See ISMOG, FS Section, 1.0 for more information on the revision process. For each revision or amendment, please enter the following information:

1. Tracking number.
2. Section number where the revision or amendment was made.
3. Brief description of the revision or amendment.
4. Date approved by appropriate official.

Revision and Amendment Log

Tracking No.	Section No.	Brief Description	Date Approved
12-2016-1	Appendices	Added appendices for incorporation by reference of U.S. Forest Service Smokejumper Training Guide, U.S. Forest Service Ram-Air Parachute Training Guide, and U.S. Forest Service Ram-Air Canopy Evaluation Plan.	12/2016
12-2016-2	Appendices	Added appendices as placeholders for Smokejumper Incident Response Flowchart and Smokejumper EMS (SEMS) Hospital Liaison Guidelines.	12/2016
12-2016-3	6.2.7	Modified sentence to read: "Video cameras may be used for training purposes only if approved by the loft and training managers."	12/2016
12-2016-4	6.3	Table 6.3 (Drawings and Specifications for Smokejumper Equipment) updated.	12/2016
12-2016-5	9.4.6	New section added for the "Four C Check": Clipped, Clear, Clean, and Controlled.	12/2016
12-2016-6	Table of Contents, Revision Log and Date	Table of Contents recompiled, Revision and Amendment Log updated, and revision date updated on cover, title page, and page headers.	12/2016

Interagency Smokejumper Operations Guide – FS Section (Revised February 2018)

Tracking No.	Section No.	Brief Description	Date Approved
01-2017-1	10.1, 10.2, 11.3, 13.0, 14.0	Corrected title of USFS Ram-Air Parachute Training Guide (RATG); added RATG to Glossary and Acronyms; updated 10.1 and 10.2.	03/2017
01-2018-1	1.7 (2)	Added clarification on when revisions and amendments require approval.	03/2018
01-2018-2	All	Replace “MTDC” with “NTDP” and updated the glossary with “National Technology and Development Program”	03/2018
01-2018-3	Signature Page	Updated names	03/2018
01-2018-4	2.3.4 (15)	Change upper weight limit from 200 to 210 pounds.	03/2018
01-2018-5	2.4.4 (2)	Changed to “Must be licensed by the Federal Aviation Administration (FAA) as a Senior Parachute Rigger”.	03/2018
01-2018-6	2.4.5	Added training requirements for GS-09/10/11 functional area manager positions.	03/2018
01-2018-7	5.7.4	Corrected paragraph on cargo dropper tether anchor system per John Kovalicky, NTDP.	03/2018
01-2018-8	7.1.4 (2)	Updated to “Each person wearing or having available to them an emergency parachute on the system they are current on.”	03/2018

1.0 Introduction

1.1 Mission Statement

U.S. Forest Service Smokejumper Program Mission Statement

To provide a safe, highly trained, fully equipped, and self-sufficient workforce to support the land stewardship and public safety goals of the U.S. Forest Service.

Core duties of U.S. Forest Service smokejumpers are to protect human life, defend property at risk, and conserve natural resources. In cooperation with federal, state, and local partners, smokejumpers are a workforce that natural resource and emergency managers utilize for safe and effective response to wildfires, all-risk emergencies, and project work. Smokejumpers train to carry out a wide range of conservation projects that serve to promote our Nation's legacy of healthy and productive forests and grasslands.

1.2 Objectives

The Interagency Smokejumper Operations Guide (ISMOG) provides standards for the administration of all smokejumper bases, including personnel qualifications, organization, certification, standardization, training, equipment, and operating procedures. The ISMOG also includes specific direction for parachute management and paracargo delivery. Managers, specialists, and technicians shall use the ISMOG in planning, administering, and conducting smokejumper and paracargo operations.

1.3 Scope

The procedures contained in the Forest Service Section of the ISMOG apply to smokejumper operations conducted by the seven U.S. Forest Service smokejumper bases. The level of standardization is determined by the U.S. Forest Service Smokejumper Base Managers Council (SJBMC).

1.4 Policy

Regardless of the size or extent of operations, smokejumper and paracargo delivery operations have similar administrative, technical, and safety requirements. Field organizations must provide adequate direction to ensure safe and efficient conduct of smokejumper and paracargo delivery operations.

1.5 Authority

Forest Service Manual (FSM) 5700, Aviation Management, contains the authority to publish this section of the interagency guide.

1.5.1 Line Officers

Line officers ensure that only qualified personnel supervise and administer smokejumper and paracargo operations (FSM 5704).

1.5.2 Smokejumper Base Managers

Smokejumper base managers ensure operational safety and compliance with administrative, equipment, and procedural standards.

1.6 Standardization of Equipment and Procedures

The total mobility and interchange of personnel and equipment between bases dictates that personnel qualifications and training, equipment, smokejumper and paracargo delivery methods, and operating procedures must be uniform and standardized. The ISMOG specifies standardized training, equipment, and procedures for uniform Service-wide application. The Washington Office must approve new equipment and procedures before they are adopted for Service-wide use (FSM 5703.17).

1.7 Review and Revision

1. Users are encouraged to recommend changes to the ISMOG through the smokejumper base managers.
2. The U.S. Forest Service Smokejumper Base Manager Council (SJBMC) will conduct a general review of the Forest Service Section of the ISMOG annually. Revisions can be made to the Forest Service Section of the ISMOG that include formatting changes; minor edits such capitalization, punctuation, and/or spelling corrections; or rewording for clarity that does not change meaning or intent without further approval. Appropriate revisions will be recommended by the SJBMC to the Washington Office Director, Fire and Aviation Management or other designated official. Revisions will be distributed by the National Smokejumper Program Manager.
3. A catalog of previous ISMOG revisions will be maintained by the National Smokejumper Program Manager.

1.8 Disclaimer

The use of trade, firm, company, product, and/or corporation names in the ISMOG is for information and convenience. Such use does not constitute an official evaluation, conclusion, recommendation, endorsement, or appraisal of any product or source to the exclusion of others that may also be suitable.

2.0 Organization, Personnel, Staffing, and Certification

Well-qualified and highly competent supervisors are crucial for helping maintain high standards in operating procedures, equipment, organization, and safety. A properly staffed and trained organization is essential to the smokejumper program.

2.1 Base Organization

1. Staff each smokejumper base to adequately supervise the base's activities. The staff at permanent bases shall include one of each of the following: base manager, loft manager, operations manager, and training manager.
2. Depending on the size of the base and complexity of the aviation/paracargo operation, an optional loadmaster manager may also be needed to provide adequate staffing and oversight of aviation-related functions.
3. Regions may structure spike base organizations to meet specific needs.
4. Organize and structure permanent and spike base facilities to provide an adequate ratio of managers and assistant managers to work leaders (such as spotters or squad leaders) and work leaders to smokejumpers. Each base requires a minimum of one work leader for every six smokejumpers. Depending on the base's size, workload, and responsibility, establish additional positions to ensure that all areas of responsibility receive the necessary supervision. Some or all of these positions may require full-time employees to obtain the skill levels necessary to accomplish the job.
5. The number of qualified spotters should be sufficient to staff the available aircraft fleet.
6. Organizational structures should strive to provide a clear and attainable career ladder whenever possible.

2.2 Overhead Personnel Staffing Requirements

2.2.1 National Smokejumper Program Manager

The National Smokejumper Program Manager must have administrative and smokejumping experience and must be thoroughly familiar with aircraft operations and all phases of smokejumping. This individual is responsible for ensuring that all U.S. Forest Service smokejumper bases maintain safe and efficient programs.

2.2.2 Smokejumper Base Overhead

National Standard Position Descriptions for smokejumper positions are available and should be used by all smokejumper bases. While organizational structures may vary

among smokejumper bases due to size and complexity, each smokejumper base shall provide qualified personnel to serve in overhead positions.

Key positions are as follows:

1. **Smokejumper Base Manager:** The base manager must have administrative and smokejumping experience and must be thoroughly familiar with aircraft operations and all phases of smokejumping. This individual is responsible for all administrative, preparedness, and fire operations at the smokejumper base. If the incumbent enters into this position in nonactive jump status, it is highly recommended the incumbent become requalified and remain an active smokejumper.
2. **Smokejumper Loft Manager:** The loft manager must be a certificated Federal Aviation Administration (FAA) Master Parachute Rigger. The loft manager reports to the base manager. The loft manager must be an experienced or previously qualified smokejumper, and must remain an active smokejumper. It is recommended that this individual be a qualified spotter, or have the ability to qualify or requalify as a spotter. In most organizations, this individual performs the following duties:
 - a. Organizes and controls all loft activity.
 - b. Supervises equipment repair and manufacture.
 - c. Selects and trains riggers.
 - d. Provides technical assistance to the base manager.
 - e. Maintains loft supplies, smokejumping equipment, and loft records.
 - f. Annually ensures inspection of all personnel parachute assemblies for airworthiness.
 - g. Assists MTDC Smokejumper Equipment Specialist in the testing and development of smokejumper equipment.
3. **Smokejumper Operations Manager:** The operations manager maintains standardized procedures in smokejumping operations, organizes project work, and keeps records of all smokejumper activities. In some organizations, this individual may also serve as loadmaster manager. The operations manager reports to the base manager. The operations manager must be an experienced or previously qualified smokejumper, and must remain an active smokejumper. It is recommended that this individual be a qualified spotter, or have the ability to qualify or requalify as a spotter.

4. **Smokejumper Training Manager:** The training manager is responsible for the various training activities of a smokejumper base, with the exception of loft training. At most bases, the training manager reports to the base manager. The training manager must be an experienced or previously qualified smokejumper, and must remain an active smokejumper. It is recommended that this individual be a qualified spotter, or have the ability to qualify or requalify as a spotter.
5. **Loadmaster Manager:** The loadmaster manager is responsible for loading and manifesting personnel, smokejumper gear, paracargo, and freight on aircraft and for coordinating loads carried with the pilot and spotter. If a base has a loadmaster manager, and at the discretion of the base manager, there may be a separation of personnel parachute systems and paracargo systems. Depending on the number of aircraft managed and the complexity of the aviation operation, not every base will require a dedicated loadmaster manager and these responsibilities may be assigned to another functional area manager. The loadmaster manager must be an experienced or previously qualified smokejumper, and must remain an active smokejumper. It is recommended that this individual be a qualified spotter, or have the ability to qualify or requalify as a spotter.
6. **Assistant Manager(s):** Each functional area (operations, training, loft, loadmaster) should have one or more assistant managers assigned. Assistant managers report directly to the functional area manager and assist in the overall management of the function as well as supervision of the spotters, squad leaders, and smokejumpers assigned to that area. Assistant managers must be experienced or previously qualified smokejumpers, and must remain active smokejumpers. It is recommended that these individuals be qualified spotters, or have the ability to qualify or requalify as a spotter.
7. **Clerical Personnel:** Each smokejumper base should have clerical personnel assigned to it consistent with the unit's needs and administrative requirements.

2.3 Basic Smokejumper Qualification Standards

All smokejumpers who participate in parachute jumping must meet Office of Personnel Management (OPM) Qualification Standards Handbook specifications for positions under the General Schedule. In addition, these individuals must meet the following qualifications annually:

2.3.1 Medical Examination

All smokejumpers must pass a physician's medical examination. The examiner shall complete a Certificate of Medical Examination (Form OF-178) during the examination. The examination shall be at Forest Service expense.

2.3.2 Physical Fitness Test

All smokejumpers must report in good physical condition and pass a test to measure cardio-respiratory endurance and muscular fitness which will include the following elements:

1. 7 chin-ups or pull-ups.
2. 45 sit-ups.
3. 25 push-ups.
4. 1.5-mile run in 11 minutes or less.

Physical Fitness Test specifications include the following:

1. The test shall be performed during one established time period with a break of not less than five minutes or more than seven minutes between events.
2. Prior to the 1.5 mile run, employees shall be given a reasonable warm-up period.
3. The 1.5 mile run shall be performed on an accurately measured course that is reasonably level.
4. Experienced smokejumpers will be allowed up to three opportunities within one week to pass the test during the time frame allotted for pre-jump training.
5. Individuals need to satisfactorily complete the entire test before being authorized to perform parachute jumps.
6. A failure of any one exercise will require retaking the entire test.
7. Failure to meet the minimum performance standard for any required exercise disqualifies the individual from jumping.
8. The base manager may allow re-testing in special circumstances, illness, or injury.

2.3.3 Basic Training Proficiency

New trainees must demonstrate minimum acceptable levels of proficiency in the following training units to qualify as smokejumpers. (See the U.S. Forest Service National Smokejumper Training Guide for additional information.)

1. Aircraft procedures.
2. Physical conditioning.
3. Parachute landing techniques.

4. Exit procedures.
5. Timber letdowns.
6. Parachute manipulation and emergency procedures.
7. Tree climbing and parachute retrieval.
8. Firefighting equipment.
9. First aid/CPR.

2.3.4 Medical Requirements for Smokejumper Positions

The duties associated with smokejumper positions require sustained, arduous physical exertion under rigorous and unusual conditions. Persons appointed will potentially be subject to extreme physical danger and to irregular and protracted hours of work. The health of individuals must be such that they have the capacity to meet the demands for performance in the position and for human reliability.

Before entrance on duty and periodically during employment, individuals must undergo a medical examination. Failure to meet any of the required medical qualifications will usually be considered disqualifying for employment or a basis for termination, except when substantial evidence is presented that the individual can perform the essential functions of the job efficiently and without hazard to themselves or others, with or without reasonable accommodation.

Medical conditions that must be met include the following (refer to X-118 Physical Requirements for Forestry Technician, Smokejumper):

1. **Eyes:** Individuals must be free from acute or chronic eye disease. Corrected distant vision must test at least 20/20 (Snellen) in one eye and at least 20/30 (Snellen) in the other eye. Individuals must be able to read printed material the size of typewritten characters, correction permitted.
2. **Ears:** Individuals must not have acute or chronic disease of the external, middle, or internal ear. Using an audiometer for measurement, there should be no loss of 25 or more decibels in each ear at the speech frequency range. A hearing aid is not permitted.
3. **Nose, Mouth and Throat:** Individuals must be free from acute or chronic sinus disease or other nasopharyngeal conditions that interfere with distinct speech or with free breathing.
4. **Teeth:** Individuals must be free from any mouth or dental defect that interferes with proper incision and mastication of food.

5. **Lungs:** Individuals must not have any acute or chronic disease of the lungs that impairs pulmonary function.
6. **Heart and Blood Vessels:** Individuals must not have organic heart disease, compensated or not; valvular diseases; coronary heart disease; cardiac enlargement; angina pectoris; cardiac arrhythmia or irregularity other than sinus arrhythmia; arteriosclerosis; and/or blood pressure readings that consistently exceed 150 systolic or 90 diastolic. High blood pressure that is regulated without side effects to no more than the above systolic and diastolic readings may be qualifying.
7. **Abdomen:** Individuals cannot have acute or chronic disease of the abdomen; significant enlargement of the liver or spleen; or hernia that interferes with lifting, stretching, bending, or working with tools.
8. **Genitourinary/Metabolic:** Individuals cannot have acute or chronic genitourinary disease; acute or chronic prostatitis; large and/or painful varicocele or hydrocele with functional impairment; or unreconciled abnormal finding on urinalysis, including drug use. Diabetes mellitus may be disqualifying if means or extent of treatment and control are incompatible with working conditions.
9. **Spine, Pelvis, Sacroiliac, and Lumbosacral Joints:** Individuals must not have restricted mobility of the spine and pelvic joints that interfere with normal function. Individuals cannot have any significant abnormal curvature of the spine or deformity or malformation of the parts, spondylolisthesis, or a history of herniated nucleus pulposus, with or without surgery, which may be reinjured on impact landing.
10. **Extremities:** Individuals cannot have anomalies in the number, form, proportion, and movement of the extremities that interfere with function. This includes non-united fractures; non-reducible dislocations; united fractures and reduced dislocations with incomplete restoration of function; amputation of arm, hand, leg, or foot; loss of any skeletal portion of the thumb of either hand; loss of more than the two distal phalanges of the ring or little fingers of either hand; ankylosed joints; pes cavus, weakfoot, or clubfoot; flatfoot with symptoms unresponsive to orthotics; loss or deformity of great toe or any two toes on the same foot; torn cartilage or loose foreign bodies within the knee joint; instability of the knee joint; and/or inadequately healed surgical procedure.
11. **Nervous System:** Individuals must not have mental, nervous, organic, or functional neuro-psychiatric disorders likely to interfere with performance; medical history or clinical diagnosis or a seizure disorder showing systems that are likely to recur or disturbance of consciousness without satisfactory explanation of the cause; paralysis or paresis; and/or muscular atrophies or dystrophies that would interfere with proper functioning in the position.

12. **Skin:** Individuals cannot have debilitating acute or chronic skin disease or extensive scarring that interferes with function.
13. **Other Conditions:** Conditions or other diseases not included herein will not exclude an individual from consideration providing the condition is satisfactorily corrected.
14. **Height:** Height without shoes must not exceed 77 inches or be less than 60 inches.
15. **Weight:** Individuals must weigh no less than 120 pounds and no more than 210 pounds without clothes.
16. **Immunization:** A tetanus immunization or booster within the last 10 years is required.

2.4 Smokejumper Qualification Standards

2.4.1 GS-5 Smokejumper Trainee

GS-5 Smokejumper trainees shall:

1. Have a minimum of one season (90 days) specialized experience in fire suppression work as part of an organized wildland fire crew. Smokejumper trainees must be qualified as Firefighter T2 (FFT2) at a minimum to be considered for hire.
2. Complete all elements of initial smokejumper training; failure to complete the training as prescribed will result in removal from the program.

2.4.2 GS-6 Smokejumper

GS-6 Smokejumpers shall:

1. Meet basic qualification standards at the GS-6 level.
2. Have a minimum of one season (90 days) specialized experience as a smokejumper.
3. Complete all elements of Smokejumper Refresher Training annually.
4. Act as an experienced smokejumper on fires and projects to ensure work is performed in a safe and efficient manner.
5. Obtain both Firefighter T1 (FFT1) and Incident Commander T5 (ICT5) qualifications.

GS-6 Smokejumpers may be trained and perform in all elements associated with the role of assistant spotter (in accordance with ISMOG, FS Section, 2.4).

Smokejumpers who have spent more than five years without having refreshed as a smokejumper must attend training with greater content than refresher training and perhaps as extensive as initial smokejumper training.

2.4.3 GS-7 Smokejumper Squad Leader

GS-7 Smokejumper squad leaders shall:

1. Meet basic qualification standards at the GS-7 level.
2. Act as a work leader for squads of smokejumpers on fires and projects to ensure work is performed in a safe and efficient manner.
3. Obtain a Single Resource Boss and Incident Commander T4 (ICT4) Trainee qualification within three years.

GS-7 Smokejumper squad leaders should:

1. Obtain and maintain a Federal Aviation Administration senior parachute rigger certificate.
2. Demonstrate good judgment and a willingness to accept responsibility as a smokejumper.
3. Instruct groups of 5 to 10 individuals in various phases of smokejumping.
4. Make decisions quickly and calmly under pressure.

GS-7 Smokejumper squad leaders may be trained and perform in all elements associated with the role of assistant spotter (in accordance with ISMOG, FS Section, 2.4.6).

2.4.4 GS-7/8 Smokejumper Spotter

Smokejumper spotters are qualified to drop smokejumpers and paracargo from an aircraft. A smokejumper spotter shall:

1. Be an experienced and active smokejumper. For single spotter mixed loads, must have received familiarization training on other agency system(s).
2. Must be licensed by the Federal Aviation Administration (FAA) as a Senior Parachute Rigger.
3. Act as a work leader for squads of smokejumpers on fires and projects to ensure work is performed in a safe and efficient manner. May also provide oversight for spike-base operations for small, typically single plane load, short duration operations.
4. Be safety conscious, cautious, careful, and thorough.

5. Successfully complete the basic spotter training course and obtain certification in all aircraft the base uses.
6. Demonstrate competency as a spotter and express willingness to accept responsibility as a spotter and work leader.
7. Be qualified as an Incident Commander T4 (ICT4) and obtain Task Force Leader (TFLD) within three years.

2.4.5 GS-9/10/11 Smokejumper Functional Area Manager (Supervisory)

Smokejumper functional area manager(s) are permanently assigned to manage/supervise in one of the following functional areas: operations, training, parachute loft, or loadmaster function. In addition to the duties/responsibilities found in section 2.2.2 these positions shall:

1. Be qualified as a Division Group Supervisor (DIVS) and Incident Commander T3 (ICT3) or Air Tactical Group Supervisor (ATGS), and complete Fire Program Management (M-581) within three years.
2. Parachute Loft Positions:
 - a. GS-09 Assistant Loft Supervisor shall complete FAA Master Rigger Certificate within three years.
 - b. GS-10/11 Loft Supervisor shall complete FAA Designated Parachute Rigger Examiner Certificate within three years.

2.4.6 Smokejumper Check Spotter

A smokejumper check spotter is a fully qualified, experienced, and active smokejumper spotter who is designated annually by their home base manager to train and recommend smokejumper spotters for certification.

2.4.7 Assistant Spotter

An assistant spotter is an experienced active smokejumper who assists the smokejumper spotter with dropping smokejumpers and paracargo from an aircraft. An assistant spotter shall have, as a minimum, the training outlined in the ISMOG, FS Section, 4.0.

2.4.8 Smokejumper Spotter Certification

Maintain a record within the agency's correspondence database of each individual passing the basic spotter training course. As a trainee spotter obtains certification and gains experience in various aircraft, update the record to reflect new qualifications. Each base shall maintain a current file indicating qualifications, aircraft authorizations, and the currency of each spotter in the Master Action Database.

2.4.9 Parachute Rigger

A parachute rigger must work within the authority of an FAA parachute rigger certificate, or under the supervision of an appropriately rated FAA certificated parachute rigger.

2.4.10 Parachute Rigger Certification

Parachute rigger certification must be consistent with FAA regulations contained in Federal Aviation Regulations (FAR), Part 65.

2.4.11 Smokejumper Pilot

An individual assigned to pilot smokejumper and paracargo aircraft shall complete specialized training and obtain certification to perform the required mission. The Standardized Smokejumper Aircraft Contract, Flight Operations Handbook (FSH 5709.16), and Interagency Smokejumper Pilot Operations Guide (ISPOG) provide direction for smokejumper pilot certification and training, including mountain flying technique and procedures.

2.4.12 Smokejumper Pilot Inspector

Forest Service smokejumper pilot inspector qualifications are specified in FSH 5709.16 and/or the Interagency Smokejumper Pilot Operations Guide (ISPOG).

3.0 Administration

This section of the ISMOG discusses smokejumper base reviews, controlled substances management, standardization requirements, and records and reports.

3.1 Smokejumper Base Reviews

The National Smokejumper Program Manager shall coordinate national-level reviews to ensure that smokejumper operations comply with national and interagency standards. This level of review should be conducted at least once within a five-year period. Equipment, training, facilities, and records must be reviewed to ensure that standardization requirements are met. Annual preparedness reviews should be conducted at the local level (see local unit protocols).

The following are part of the national-level review:

3.1.1 Base, Facilities, and Procedures Inspection

Base managers or higher authorities shall conduct and document a review of each smokejumper base, as scheduled, to ensure that operations are safely performed and conform to establish standards.

3.1.2 Administration and Records Inspection

Inspections shall be conducted to examine management practices including planning, organization, staffing, controlling, supervising, and reporting. The inspection shall include, but not be limited to, the following:

1. Personnel staffing, management, and organization.
2. Operating plans, training schedules, instructor assignments, and qualifications per NWCG PMS 901-1 Field Managers Course Guide.
3. Management practices, quality and timing of reports, records maintenance, work schedules, health and safety.
4. Inventory management, procurement, and replacement schedules, use practices and security, including controlled substances management.

3.1.3 Facilities Inspection

An annual inspection by appropriate personnel of the base facilities and associated equipment is recommended. This inspection is a review of the adequacy, safety compliance, and use of the facility. This may be performed at the local level.

3.1.4 Procedures Inspection

Procedures inspections must review operating practices related to mission effectiveness and safety. Reviews shall examine operational areas for compliance and standardization with established procedures. Reviews shall include:

1. The structure and methodology of smokejumper training.
2. Parachute packing, inspection, maintenance, repair, and replacement.
3. Paracargo packaging, aircraft loading, and cargo restraint.
4. Dispatching, personnel, and load manifesting.
5. Preflight, in-flight, and exit procedures for smokejumpers.
6. Spotting procedures.
7. Other fire suppression and ground procedures.

3.1.5 Smokejumper Base Review Checklist

This form contains information for conducting an inspection of a smokejumper base, equipment, facilities, and procedures. See Appendix 11.1 of the ISMOG, Forest Service Section.

3.2 Controlled Substances Management

As defined under the Controlled Substances Act (CSA), some medical support equipment or materials require specialized handling, inventory, security, and accounting. An updated and complete list of substances is published annually in Title 21 Code of Federal Regulations (CFR) §§ 1308.11 through 1308.15.

A controlled substances management plan that is compliant with FSM 5700 and the Code of Federal Regulations will be prepared and updated annually. This management plan will include procedures for dealing with equipment, drugs, and medicines that individuals may not possess without a medical prescription or written authorization.

3.3 Standardization Requirements

The safe and effective use of smokejumpers requires standardized operational procedures.

3.3.1 Training

Use of the U.S. Forest Service National Smokejumper Training Guide is mandatory for smokejumper training and qualifications. Section 4.0 of the ISMOG, FS Section, contains additional direction on standardized training requirements.

3.3.2 Equipment

The Forest Service has evaluated and approved specific items of smokejumping equipment for standard use Service-wide. Sections 5.0 and 6.0 of the ISMOG, FS Section, list standardized equipment requirements, drawings, and specifications. The following smokejumping equipment categories include standardized items:

1. Smokejumper aircraft accessories.
2. Personnel parachutes and accessories.
3. Smokejumper protective gear.
4. Special smokejumping equipment.
5. Paracargo equipment.

Equipment fabrication, maintenance, inspection, installation, packing, and replacement must meet appropriate Federal Aviation Administration (FAA) regulations or accepted practices or procedures that the equipment development centers have established and the Washington Office Director, Fire and Aviation Management, has approved.

Sections 5.0 and 6.0 of the ISMOG, FS Section, provide a list of approved equipment and accessories. The Washington Office must approve in writing any deviations from this standardized equipment policy.

3.3.3 Parachute Training

Each smokejumper base shall conduct parachute training in accordance with the U.S. Forest Service National Smokejumper Training Guide. Personnel shall receive training in approved parachute systems and exit procedures.

3.3.4 Paracargo Packaging and Loading

Package paracargo for aerial delivery consistent with existing standards. Load, position, and secure paracargo on aircraft consistent with the manufacturer's instructions concerning weight and balance limitations for each aircraft.

3.3.5 Paracargo and Smokejumper Restraint Devices

1. Smokejumpers shall use safety belts and other restraint devices during critical phases of the smokejumper delivery mission. All smokejumper aircraft crewmembers and passengers shall wear safety belts on all takeoffs and landings.
2. Secure all paracargo and loose equipment aboard aircraft to ensure that it remains in place throughout the flight until released for delivery purposes.
3. The minimum requirements for smokejumper restraint devices for takeoff and landings are:
 - a. 9g forward and aft.
 - b. 7g vertical.
 - c. 3g lateral.
4. The minimum requirements for paracargo restraint for takeoff and landings are:
 - a. 9g forward.
 - b. 3g lateral and vertical.
 - c. 1.5g aft.

3.3.6 Pilot Training

Smokejumper and paracargo pilot trainees must have specialized and standardized training. Refer to the National Smokejumper Aircraft Contract, Flight Operations Handbook (FSH 5709.16), and the Interagency Smokejumper Pilot Operations Guide (ISPOG) for qualification and training requirements for smokejumper and paracargo pilots.

Smokejumper base managers and designated spotters shall participate in the pilot training and evaluation process. Training must include, but is not limited to, the following:

1. Orientation and base operating procedures.
2. Smokejumper organization.
3. Smokejumper delivery mission.
4. Mountain flying and backcountry operations.
5. Streamer dropping and spotter responsibilities.

6. Smokejumper drop procedures.
7. Paracargo drop procedures.
8. Communications and dispatch organization.
9. Fire suppression organization.
10. Basic fire behavior.

Smokejumper pilots must also be provided a briefing and orientation when visiting another base before any smokejumping mission can be flown. Section 7.0 of the ISMOG, FS Section, provides a briefing outline.

3.3.7 Procedures

Each base shall perform the following procedures in accordance with guidance in the ISMOG; U.S. Forest Service National Smokejumper Training Guide, Flight Operations Handbook (FSH 5709.16), and Code of Federal Regulations (CFR):

1. Physical conditioning.
2. Parachute equipment.
3. Aircraft procedures.
4. Exit procedures.
5. Parachute malfunctions and other emergency procedures.
6. Parachute manipulation.
7. Landing techniques.
8. Letdowns.
9. Tree climbing.
10. Parachute retrieval.
11. Practical jump experience.
12. Spotter operations.
13. Paracargo operations.
14. Crosscut saw and chainsaw use.
15. Emergency care.

3.4 Records and Reports

Record keeping is mandatory for administering smokejumper operations. Accurate records of and reports on smokejumper activities, equipment use, training, and injury statistics shall be maintained.

3.4.1 Smokejumper Base Records

Each smokejumper base shall maintain the following records to ensure effective smokejumper organization administration:

1. **Spotter Qualification Record:** Maintain and update records to indicate spotter training, currency, and qualification in various aircraft. Section 4.0 of the ISMOG, FS Section, contains instructions on spotter qualifications. Annual spotter refresher training stating compliance with the ISMOG will be documented and placed in the spotter's training file.
2. **Smokejumper Resource Order and Spotter Report:** The Smokejumper resource order, in conjunction with the Spotter Report, provides a detailed description of the fire location, size, suppression forces needed, and information to facilitate the delivery, effectiveness, and return of the smokejumping force. It also provides a record showing time of request, aircraft used, pilot, load description, takeoff time, arrival time at fire, return time to base, and fire number.
3. **Master Action Database:** The Master Action Database includes the requesting unit, names of dispatched personnel, request time, aircraft used, pilot, takeoff time, return time, name and location of fire, fire number, and other pertinent information.
4. **Individual Jump Log:** This log usually includes the jump number, date, remarks, incident location, aircraft, etc. This form provides a record of each individual smokejumper's jumps.
5. **Parachute Loft Records:** Section 8.0 of the ISMOG, FS Section, contains information about records that each base must keep on parachute use, rigging, maintenance, and loft operations.
6. **Fire Experience and Fire Training Records:** These records shall be maintained on all individuals at each base in accordance with agency requirements and the Incident Qualifications and Certifications System.

3.4.2 Smokejumper Unit Data and Injury Reporting Form

Smokejumper Unit Data and Injury Reporting forms are entered into a database to produce a national parachute injury report. All units must submit these forms to the Missoula Technology and Development Center (MTDC) each calendar year (by November 1) for every injury that is sustained by smokejumper personnel while

parachuting. This report provides a comprehensive record of circumstances surrounding a smokejumper parachute injury. This information will be used for trend analysis and injury reduction. Each base shall account for all injuries and malfunctions of their assigned smokejumpers, regardless of where the accident occurs.

3.4.3 Malfunction Abnormality Reporting System (MARS)

MARS is a database maintained on the Forest Service Intranet by MTDC. This website was developed to track any abnormality or malfunction in the equipment involved in getting smokejumpers from the airplane to the ground. It can be accessed at <http://fswb.mtdc.wo.fs.fed.us/MARS/>.

4.0 Training and Qualifications

4.1 Instructor Selection and Qualifications

Generally, select smokejumper squad leaders and overhead personnel with appropriate expertise as instructors for recruit training, refresher training, and spotter training. Occasionally, GS-6 smokejumpers with special skills or knowledge may conduct such training, and for some topics, personnel from outside the smokejumper organization may be instructors.

4.2 Recruit Training

Smokejumper recruit training includes, but is not limited to, parachute jumping techniques, physical conditioning, woodsmanship, and firefighting techniques. Smokejumper bases shall structure and schedule their recruit training programs to comply with qualifications and training standards in the U.S. Forest Service National Smokejumper Training Guide, ISMOG, and FSM 5700.

4.2.1 Parachute Training

Each smokejumper base shall develop training agendas for recruit training from topics contained in the U.S. Forest Service National Smokejumper Training Guide. Parachute training must include a combination of classroom lectures and demonstration, pre-jump practical training on each of the parachute training units, simulated parachute maneuvering, and actual parachute jumps.

4.2.2 Parachute Use Classroom Topics

Smokejumper classroom training must include those topics outlined in the U.S. Forest Service National Smokejumper Training Guide. It is recommended that bases also maintain supplemental training aids to provide periodic emphasis on a variety of parachuting related topics such as:

1. Parachute landing roll.
2. Exit procedures.
3. Timber landing and letdown procedures.
4. Aircraft procedures and in-flight emergencies.
5. First aid/CPR.
6. Handling characteristics of the FS-14/FS-14R parachutes.
7. Parachute malfunctions and emergency procedures.

8. Water landings.
9. Paracargo and parachute retrieval.
10. Spotting procedures.

4.2.3 Pre-Jump Training

Pre-jump training must include practical and field training outlined in the U.S. Forest Service National Smokejumper Training Guide. Each smokejumper base conducting parachute training shall maintain the basic parachute training units to simulate parachute landings and maneuvering, aircraft loading and exit procedures, hook-ups, timber letdown techniques, and emergency procedures.

The following is a summary of the basic parachute training units:

1. **Parachute Landing Simulation:** Simulation provides the trainee with experience in executing a proper landing roll. Various training equipment is available to teach recruits correct landing techniques.
2. **Exit Tower:** The exit tower teaches smokejumpers how to attain proper body position while exiting the aircraft. It also simulates a parachute's opening shock. The tower should have a door and standard accessories to teach all types of aircraft exits.
3. **Letdown Simulator:** This simulator teaches smokejumpers correct timber letdown procedures and techniques.
4. **Mock-up:** The mock-up simulates loading, hook-ups, and routine and emergency exit procedures. Trainees may use an aircraft while conducting a mock-up.
5. **Parachute Maneuvering Simulation:** Simulation may be performed at smokejumper bases in a controlled environment. Topics include parachute maneuvers, parachute maneuvers in relation to the wind, and practice jump strategies.
6. **Malfunction Video Training:** Malfunction video training is designed to reinforce and evaluate the learning of emergency procedures. Smokejumpers must perform, without hesitation, the appropriate malfunction procedure for the given malfunction presented on the screen.

4.2.4 Training Jumps

Smokejumper trainees shall make at least 15 training jumps before they qualify for operational fire jumps. Select training jump spots so that as jump training

progresses, jump spots simulate the terrain and conditions encountered in actual fire jump situations as closely as possible.

4.2.5 Physical Conditioning

Smokejumper training must include daily physical conditioning (including stretching, strength development, and aerobic exercises) during the entire employment period, as outlined in the U.S. Forest Service National Smokejumper Training Guide.

4.2.6 Pack-Out Test

Before they qualify for operational fire jumps, recruits shall successfully complete a 110-pound, 3-mile pack-out on level terrain within a 90 minute time limit.

4.2.7 First Aid Training

First aid training must include between 8 and 24 hours of classroom and practical instruction consisting of a basic multimedia first aid course or equivalent basic emergency care course. The course must include emergency care for common firefighter- or smokejumper-related injuries as outlined in the U.S. Forest Service National Smokejumper Training Guide.

4.2.8 Aircraft and In-flight Emergency Training

Recruits shall receive training in ground and in-flight emergency procedures, crash procedures, and emergency exit procedures. Personnel shall learn to use emergency equipment and the locations of fire extinguishers on various smokejumper aircraft. Information about aircraft and in-flight emergency equipment and procedures may be found in specific aircraft flight manuals and in the U.S. Forest Service National Smokejumper Training Guide.

4.3 Smokejumper Refresher Training

Each year experienced smokejumpers shall receive sufficient classroom and practical training to reestablish competency in the primary tasks related to smokejumping.

4.3.1 Mandatory Pre-Jump Training

Smokejumper bases shall structure refresher training programs to comply with qualifications and training standards in the ISMOG and directions in the U.S. Forest Service National Smokejumper Training Guide. Refresher training must inform experienced smokejumpers of changes in equipment, techniques, policies, and procedures. Finish ground and parachute training before authorizing individuals to perform operational jumps.

As a minimum, refresher training must include:

1. Aircraft and exit procedures.
2. Parachute malfunctions.
3. Aircraft emergencies.
4. Parachute manipulation.
5. Parachute landings.
6. Jump spot hazards.
7. Tree climbing.
8. Water landing.
9. Letdown techniques.
10. Physical fitness testing.

4.3.2 Optional Training

Refresher training topics may also include the following:

1. Helicopter long line.
2. Water handling.
3. Special fire suppression guidelines (such as wilderness fire suppression).
4. Safety.
5. Parachute rigger training.
6. Cargo packaging.

4.3.3 Mandatory Training Jumps

Annually, a minimum of two successful training jumps and one jump simulating a broken steering line is mandatory for experienced personnel re-qualifying for operational jump status.

4.3.4 New Parachute Training

1. Each smokejumper shall perform at least four training jumps to qualify to use a new parachute canopy on operational jumps.
2. Smokejumpers learning a new canopy system (ram-air or round parachute) shall train on that system with a number of jumps commensurate with that system's initial training.

4.3.5 Water Landing Training

Annually, each experienced smokejumper shall receive instruction in water landing techniques and procedures. Simulated water training should be conducted in actual water, and will take place in initial smokejumper training. Performing an actual water jump is optional.

4.3.6 Reserve Deployment Training

Reserve deployment training shall consist of suspended harness training, in conjunction with MTDC malfunction video, exit tower simulations, and “hit-it” exercises (pre-jump malfunction procedure simulations) prior to training or proficiency jumps. Procedures shall be consistent with the U.S. Forest Service National Smokejumper Training Guide.

4.3.7 Agency Required Training

All training required of FS fire personnel shall be completed before an employee’s refresher training is deemed complete.

4.4 Spotter and Paracargo Training

Smokejumper spotter trainees shall receive classroom and practical training in spotting, paracargo drop techniques, and in-flight procedures. Smokejumper spotters must receive base manager authorization to perform in specific aircraft before conducting solo training and operational spotter missions.

4.4.1 Classroom Training for New Spotters

Spotter trainees shall receive instruction in spotting and paracargo procedures, in-flight emergencies, and the duties and responsibilities identified in the U.S. Forest Service National Smokejumper Training Guide and the Interagency Mixed Load Procedures Document. Training must also include viewing the Professional Smokejumper Pilot and Professional Smokejumper Spotter video(s).

4.4.2 Practical Training for New Spotters

Spotter trainees must complete at least four actual spotter fire missions, including cargo dropping, under the supervision of a qualified check spotter before receiving base manager authorization for unsupervised operational missions. Practical training experience must include the following topics:

1. Preflight inspection of aircraft equipment and smokejumpers.
2. Aircraft radio communications.
3. Ground reference navigation using available technology.

4. In-flight training in jump spot selection.
5. In-flight training to determine wind drift and smokejumper release points.
6. Spotting of actual training jumps under the supervision of a qualified check spotter.
7. Serving as spotter on fire missions under the supervision of a qualified check spotter.
8. Cargo dropping.

4.4.3 Refresher Spotter Training

Every fire season, each spotter shall complete at least one training jump and one paracargo mission as a spotter before spotting operational missions. In addition, each spotter shall review loading procedures and ground and in-flight emergency procedures annually for each aircraft model assigned to the base, and mixed-load procedures. Annually, spotters shall receive refresher training in dispatch procedures, communications, and cargo dropping procedures.

4.4.4 Assistant Spotter Training

An assistant spotter shall have, as a minimum, the following training topics annually before performing in this position:

1. Familiarization with aircraft avionics.
2. Aircraft load configuration.
3. Emergency parachute procedures.
4. Aircraft emergency procedures.
5. Crew coordination.
6. Crew Resource Management (CRM).
7. Static line monitoring and equipment visual checks.
8. Administrative responsibilities.
9. Cargo dropping procedures.

4.4.5 Operational Procedures

Experienced spotters must learn all standard and emergency operating procedures for each aircraft model assigned to their base. Operational procedures related to spotting and dropping cargo are in the U.S. Forest Service National Smokejumper

Training Guide, the Interagency Mixed Load Procedures Document (see interagency section of the ISMOG), and at Section 7.0 of the ISMOG, FS Section. MTDC prepares aircraft evaluation reports, including spotting procedures, for new aircraft recently added to the approved smokejumper and paracargo aircraft listing.

Before spotting an aircraft model that a spotter is not already qualified to use, the spotter must receive the following preparation:

1. A ground briefing and in-flight training, as necessary, from the pilot and a spotter qualified in that model aircraft.
2. The base manager or a check-spotter's approval. See ISMOG, FS Section, 3.0 for qualification procedures.

4.4.6 Smokejumper Aircraft Contract Familiarization

When applicable, base managers and smokejumper spotters shall be familiar with the smokejumper aircraft contract and their roles and responsibilities related to the Contracting Officer Representative/Inspector. See the Flight Operations Handbook (FSH 5709.16) and Interagency Smokejumper Pilot Operations Guide (ISPOG) for information on smokejumper participation in evaluating and recommending pilots for smokejumper and paracargo certification.

4.4.7 Crew Resource Management (CRM) Training

All spotters shall attend a Washington Office approved initial CRM course or an approved equivalent. CRM training is required prior to beginning additional training required for the spotter to occupy the right seat of a single-pilot smokejumper aircraft as spotter or loadmaster on operational mission flights. Recurrent CRM training is required every three years. See FSH 5709.16, 20.5, (definitions), 21.1 paragraph 8, (CRM training), and 21.6 (CRM training).

4.5 Emergency Medical Training

Bases should make emergency medical technician (EMT) training, cardiopulmonary resuscitation (CPR), and other emergency medical training available to employees based on need.

4.6 Smokejumper Proficiency Training Requirements

1. Once trained at the beginning of each fire season, smokejumpers must maintain peak parachuting skills. Base managers shall ensure that smokejumpers maintain parachuting proficiency throughout the fire season.
2. Smokejumpers should make a proficiency or operational parachute jump every 14 days if possible.

3. A proficiency jump is mandatory every 30 days if there are no operational jumps during that period.
4. It may also be desirable to maintain the jump proficiency of key personnel during the off-season, for example, for search and rescue efforts.

4.7 Smokejumper Pilot Training

The National Smokejumper Aircraft Contract, Interagency Smokejumper Pilot Operations Guide (ISPOG), and FSH 5709.16 specify smokejumper and paracargo pilot qualifications. All smokejumper pilots not previously approved for smokejumper missions shall complete an initial course of formal training, following procedures outlined in the Smokejumper Paracargo Operations and Mountain Flying sections of the ISPOG, and the Professional Smokejumper Pilot video. Designated smokejumper spotters shall participate in the final evaluation check ride for qualifying pilots to perform the smokejumper and paracargo mission.

4.8 Parachute Rigger Training

This training must provide employees with exposure to basic parachute care procedures and provide the minimum knowledge and experience necessary for rigging. Practical training must include the supervised rigging of at least 20 main backpack parachutes that the Forest Service uses. Such training must occur before employees may pack parachutes for operational use under the supervision of an appropriately rated FAA licensed rigger. Such training does not qualify trainees for a FAA parachute rigger certificate. Only appropriately rated FAA riggers shall pack emergency and reserve parachutes. Parachute riggers shall be certified in accordance with Federal Aviation Regulations, Part 65.

4.9 Federal Aviation Administration Regulations

Parachute riggers must be familiar with the following parts of the Federal Aviation Regulations and Exemptions that pertain to parachute loft operations:

1. Part 65, Parachute Rigger Certificate.
2. Part 91, Parachute and Parachuting.
3. Part 105, Parachute Jumping.
4. Parts applicable to FAA Technical Standard Orders (PIA TS 135; FAA-TSO-C23d; AS-8015B).
5. FAA Grants of Exemption Numbers 392 and 392A (FSM 5716.11).

5.0 Equipment -- Aircraft and Aircraft Accessories

5.1 General Requirements

Aircraft used in smokejumper and paracargo operations must be the best available for efficiency, performance, and suitability for the specialized flying required. Each aircraft selected must meet certain performance and payload requirements, be compatible with safe use of smokejumper personnel and cargo parachutes, and be properly equipped with accessories to perform smokejumping and paracargo missions.

5.2 Types of Suitable Aircraft

Use only aircraft for smokejumper and paracargo operations that the Forest Service has evaluated for that purpose and approved as qualified smokejumper and paracargo aircraft.

5.3 Smokejumper Aircraft Evaluation

Only aircraft approved through a formal evaluation process using prescribed procedures may be used for the smokejumper delivery mission. The Washington Office, Regional Aviation Officer, or Smokejumper Base Manager usually request this evaluation when fire management planning indicates a need for an aircraft of a certain size, airspeed, or configuration, and existing approved aircraft that meet the needed requirement are not readily available. The above may also request an evaluation when a new aircraft model enters the market that appears to provide favorable cost benefits compared to currently approved aircraft. The Washington Office, Fire and Aviation Management must approve aircraft evaluation requests and shall provide the necessary funding.

5.4 Smokejumper Aircraft Screening/Evaluation Subcommittee

The Smokejumper Aircraft Screening and Evaluation Subcommittee (SASES) includes smokejumper and aviation management personnel from the USDA Forest Service, DOI Bureau of Land Management, and DOI Office of Aircraft Services. SASES has been assigned the responsibility to recommend policies for minimum smokejumper aircraft requirements to appropriate agency managers. SASES maintains documents that define minimum requirements for smokejumper aircraft. Smokejumper aircraft used by the Forest Service must meet the minimum requirements established by SASES.

5.5 Smokejumper Aircraft Evaluation Process

A smokejumper aircraft evaluation is structured to determine if a candidate aircraft meets the minimum SASES requirements for smokejumper aircraft. Smokejumper aircraft evaluations must conform to the most current version of the September 1982 MTDC publication “Smokejumper Aircraft Evaluation Plan” (8251 2809) and subsequent revisions. This document is maintained by MTDC; periodic revisions of this document are reviewed by SASES and approved by the Washington Office, Fire and Aviation Management. This evaluation plan ensures that candidate aircraft meet the minimum SASES requirements for a smokejumper aircraft.

5.5.1 Aircraft Sponsor’s Preliminary Investigation

A smokejumper or aviation organization interested in sponsoring a specific aircraft for evaluation must conduct an investigation and prepare a preliminary investigation report using the outline in the MTDC “Smokejumper Aircraft Evaluation Plan.”

5.5.2 Evaluation Director

The unit assigned responsibility for the evaluation by the Washington Office, Fire and Aviation Management (usually MTDC) shall appoint the evaluation director. The evaluation director shall conduct the evaluation according to the evaluation plan, coordinate, schedule, select evaluation personnel, plan logistics, oversee the design of special smokejumping accessories, and prepare required reports. The evaluation director shall brief all evaluation personnel on their duties and responsibilities. The evaluation director has the authority to modify, extend, or terminate all testing.

5.5.3 Field Evaluation

The first season of a new smokejumper aircraft’s operation is used as a field evaluation. The smokejumper base manager where the aircraft is assigned shall be the field evaluation conductor. The field evaluation conductor is responsible for operating the aircraft as the preliminary operational guidelines describe, and for refining or modifying those guidelines appropriately as experience is gained in operating the aircraft. After concluding the field evaluation, the field evaluation conductor shall provide the evaluation director with a report containing the following information:

1. Extent of aircraft use.
2. Smokejumper mission flight performance.
3. Accessory evaluation.
4. Optimum load configuration.
5. Optimum operational procedures.

5.5.4 Final Report

After completing all required evaluations, the evaluation director shall publish a final report, usually as a MTDC publication. This report provides aviation management with documentation about the evaluation aircraft's suitability to perform the smokejumper and paracargo mission. The report must include the following information:

1. Basic aircraft configuration and performance.
2. Preparation for airdrop.
3. Smokejumper flight performance data.
4. Operational and emergency procedures.

5.5.5 Final Approval

The Smokejumper Aircraft Screening and Evaluation Subcommittee (SASES) shall review the final report after the aircraft evaluation and shall recommend to the Washington Office Director, Fire and Aviation Management, and the Director, Office of Aircraft Services, Department of the Interior, whether to accept or reject the aircraft as an approved smokejumper platform. These directors are responsible for final aircraft and accessory approval. All essential information and procedures developed for each new aircraft must become part of the U.S. Forest Service National Smokejumper Training Guide following Washington Office, Fire and Aviation Management approval.

5.6 Smokejumper and Paracargo Aircraft Minimum Requirements

Smokejumper aircraft must meet minimum SASES requirements for physical configuration, performance, compatibility with smokejumping procedures and parachutes, and the strength of various special smokejumping accessories.

5.6.1 Minimum SASES Requirements for All Smokejumper Aircraft

Minimum SASES requirements for approved smokejumper aircraft are as follows:

1. FAA Certified as a Normal or Transport Category Aircraft.
2. FAA approved to fly with the smokejumper exit door open or removed.
3. Airspeed at 1.3 V stall (jump configuration) not to exceed 115 KCAS.
4. Jumper exit door at least 25 inches wide and 36 inches high.
5. Maximum safe jump speed of less than 115 KCAS.

6. Jumper exit door opening flush with the floor.
7. Acceptable pilot and spotter visibility for intended missions.
8. Compliance with Occupational Safety and Health Administration standards for acceptable exhaust fume levels with the smokejumper exit door removed.
9. Compatible with seats or benches suitable for seating and restraining fully suited smokejumpers. With fully suited smokejumpers, these seats or benches need to meet the strength requirements of CFR Part 23 and TSO 39a, Type II (9g fore and aft, 7g down, and 3g sideways).
10. The following approved installations are required:
 - a. Structural and functional static line anchor cable installation suitable for use with standard Forest Service (and BLM) personnel parachutes.
 - b. Emergency exit static line anchor cable.
 - c. Cargo dropper tether anchor system.
 - d. Cargo static line anchor system compatible with standard Forest Service (and BLM) cargo parachutes.
 - e. Cargo tie-down system.
 - f. Door safety strap or in-flight door.
 - g. Smokejumper exit step on multi-engine aircraft with a door height less than 52 inches.
 - h. Protection from any sharp corners and projections that might snag smokejumpers, static-lines, parachutes, or cargo near the door and step, along the fuselage aft of the jump door, and under the fuselage.
 - i. Standard audio spotter-to-pilot communications system.

5.6.2 Multi-Engine Aircraft Requirements

1. Ability to achieve a single engine (critical engine inoperative) rate of climb of 50 feet per minute at 9,000 feet density altitude at maximum gross weight, or at that lesser gross weight figure established to meet the requirements of paragraph (2) below.
2. Ability to achieve a single engine climb capability of +0.6 percent or better at 5,000 feet pressure altitude and at 81 degrees F, with 2.5 hours fuel on board, with no more than a 25 percent reduction in useful load. This ability shall be achievable with the aircraft in the following configuration: critical engine

inoperative and the propeller of that engine feathered (or pitch set to the minimum drag position) with landing gear retracted (if equipped with retractable gear).

5.6.3 Single Engine Aircraft Requirements

1. Payload capability sufficient for two smokejumpers, their equipment, and a spotter while carrying 2.5 hours fuel.
2. Power loading at maximum certificated gross weight of 13.2 lbs. per horsepower or less.
3. Supercharged, if equipped with a reciprocating engine.

5.7 Strength Requirements for Smokejumper Aircraft Accessories

To ensure safety, strength requirements have been established by SASES for smokejumper aircraft accessories. These requirements ensure that accessory designs possess adequate strength for worst case scenarios.

In addition to being adequately strong, the configuration of smokejumper aircraft accessories must be compatible with standard smokejumper static-line hook-up procedures, exiting procedures, and deployment of standard FS personnel and cargo parachutes.

5.7.1 Primary Exit Static Line Anchor

The primary exit static line anchor requires a 2,000-pound Supplemental Type Certificate (STC). This requirement is based on the loads anticipated if a smokejumper is taken into tow. Energy absorbing devices may be used to control cable slack, but are not used to reduce the STC strength requirement because a multiple load may occur while a shock absorber is fully extended if a second smokejumper impacts the smokejumper being towed.

5.7.2 Emergency Exit Static Line Anchor System

An emergency exit static line anchor must be STC-certified for 750 pounds unless using an equivalent energy-absorbing design. An energy-absorbing design must provide load absorption as follows. The emergency exit anchor system must be STC-certified for at least 500 pounds, when using an appropriate energy-absorbing design. The strength requirement for an emergency exit anchor anticipates that the worst case load likely to occur during an emergency exit is a static-line misroute, not a smokejumper taken into tow.

Energy to be absorbed is displayed in the following table:

Table 5.7.2: Emergency Exit Static Line Anchor System – Energy to be Absorbed

STC Load (lbs.)	Pull Test Load (lbs.)	By Shock Absorber (ft. lbs.)
750	1125	0
700	1050	25
650	975	44
600	900	62
550	825	78
500	750	93

5.7.3 Cargo Static Line Anchor System

1. A cargo static line anchor system must withstand a 1,125 pound pull unless using an energy absorbing design. Load requirements for equivalent energy-absorbing designs are shown in the following table:

Table 5.7.3: Cargo Static Line Anchor System – Energy to be Absorbed

Load Requirements (lbs.)	By Shock Absorber (ft. lbs.)
1,125	0
1,050	25
975	44
900	62
825	78
750	93

2. The cargo static line anchor system must withstand at least 750 pounds of pull with an equivalent energy-absorbing design.
3. Use the FAA 337 procedure to install these systems.
4. A pull test to demonstrate strength is not mandatory if an engineering structural analysis of the design is prepared.
5. The strength requirement for a cargo static line anchor is based on the strength needed to exceed the strength of the standard weak link included in all smokejumper cargo parachute static lines.

5.7.4 Cargo Dropper Tether Anchor System

A cargo dropper tether anchor system must be STC-certificated for 750 pounds unless using an energy absorbing design. An energy-absorbing design provides load absorption as follows. The cargo dropper tether anchor system must be STC-certificated for at least 400 pounds when using an appropriate energy-absorbing design. The strength requirement for a tether anchor is based upon worst-case loads measured in tests that simulated a cargo dropper falling and putting a maximum load on a tether anchor.

Table 5.7.4: Cargo Dropper Tether Anchor System – Energy to be Absorbed

STC Load (lbs.)	Pull Test Load (lbs.)	By Shock Absorber (ft. lbs.)
750	1,125	0
700	1,050	25
650	975	44
600	900	62
550	825	78
500	750	93
450	765	106
400	600	118

5.7.5 Number of Anchor Systems

All smokejumper aircraft shall have at least two designated anchor systems, and personnel shall not be tethered to anchor points used for routine personnel or cargo delivery. An exception to this is operations involving ram-air parachutes.

5.7.6 Jump Step

Jump step installations in smokejumper aircraft must withstand 2g forces during an exit by a 300-pound smokejumper.

5.7.7 Jump Step Ladder

When a stepladder is suspended from the jump door sill or step for loading passengers, it must withstand 1.5g forces by a 300-pound smokejumper.

5.8 Smokejumper and Paracargo Aircraft Accessory Drawings

The Forest Service has approved certain smokejumper aircraft accessory designs for use in smokejumper aircraft. Approved items are identified by drawings or specifications prepared and maintained by MTDC, or specified by directives that the Director, Fire and Aviation Management issued for this purpose.

Do not use any alternate equipment for smokejumper or paracargo delivery other than the equipment shown in these drawings and specifications unless the Forest Service has evaluated and approved it for that purpose or unless it has the Washington Office, Fire and Aviation Management's written approval for field use (FSM 7120).

5.8.1 Twin Otter

Table 5.8.1: Twin Otter Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Vertical Anchor	MEDC 650	Anchor cable for Twin Otter 100, 200, 300 Series Aircraft	2,000	SA210RM
Secondary Horizontal Anchor	MEDC 753	Twin Otter Tether/Emergency Horizontal	750	SA2751NM
Jump Step & Step Attachment and Other Accessories	MEDC 759	Step Basket (universal) Smokejumper Aircraft		
Jump Step & Step Attachment and Other Accessories	MEDC 794	Universal Step Strut		
Jump Step & Step Attachment and Other Accessories	MEDC 784	Smokejumper Equipment for Twin Otter Aircraft		
Jump Step & Step Attachment and Other Accessories	MEDC-805	Aft track Segment for Twin Otter		
Smokejumper Restraint Bench Adapter	Simula Inc. drawing 101649 (available from MTDC).			
Special Use Twin Otter Accessories (not required for smokejumper Configuration)	MEDC 681	Anchor Cable, Horizontal, Twin Otter	750	SA1615NM

5.8.2 Beech 90

Table 5.8.2: Beech 90 Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Floor Anchor	MEDC-617	Anchor cable for Beech 90, 99, 100, & 200 & Nomad N24A Series Aircraft. Note: There is no secondary anchor design for the Beech 90.	2,000	SA566NW
Other Accessories	MEDC-643	Handrail & Wind Deflector for Beech 90, 99, 100, & 200 Series Aircraft		
Other Accessories	MEDC-644	Floor Panels for Beechcraft 90, 99, 100, & 200 Series Aircraft		
Jump Step and Attachment		Jump step not used on Beech 90.		
Smokejumper Restraint Bench Adapter	Simula Inc. drawing 101649 (available from MTDC)			

5.8.3 Beech 99a

Table 5.8.3: Beech 99a Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Floor Anchor	MEDC-617	Anchor cable for Beech 90, 99, 100, & 200 & Nomad N24A Series Aircraft	2,000	SA566NW
Secondary Anchor	MTDC-809	Horizontal Anchor Track for Beech 99A	750	SA4047NM
Other Accessories	MEDC-643	Handrail & Wind Deflector for Beech 90, 99, 100, & 200 Series Aircraft		
Other Accessories	MEDC-644	Floor Panels for Beechcraft 90, 99, 100, & 200 Series Aircraft		
Jump Step and Attachment	MEDC-759	Step Basket (universal), Smokejumper Aircraft		
Jump Step and Attachment	MEDC-794	Universal Step Strut		
Jump Step and Attachment	MEDC-794	Jump Step Attachment Points, Beech 99		
Smokejumper Restraint Bench Adapter	Simula Inc. drawing 101649 (available from MTDC)			
Door Brace		The Beech 99 requires a door brace between the aft air stair door and the forward jump door. Contact MTDC for information about this accessory.		

5.8.4 King Air 200

Table 5.8.4: King Air 200 Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Floor Attachment	MEDC-617	Anchor cable for Beech 90, 99, 100, & 200 & Nomad N24A Series Aircraft	2,000	SA566NW
Secondary Anchor		Pending		
Other Accessories	MEDC-643	Handrail & Wind Deflector for Beech 90, 99, 100, & 200 Series Aircraft		
Other Accessories	MEDC-644	Floor Panels for Beechcraft 90, 99, 100, & 200 Series Aircraft		
Jump Step and Attachment	MEDC-759	Step basket (universal), Smokejumper Aircraft. Contact MTDC for information about step attachment configuration for the King Air 200.		
Jump Step and Attachment	MEDC-794	Universal Step Strut. Contact MTDC for information about step attachment configuration for the King Air 200.		
Smokejumper Restraint Bench Adapter	Simula Inc. drawing 101649 (available from MTDC)			

5.8.5 DC-3TP

Table 5.8.5: DC-3TP Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Overhead Anchor Cable	MTDC-844	Horizontal Anchor Assembly (Primary Strength 2,000 pounds)		ST00372DE
Secondary Overhead Anchor Cable	Basler Turbo Conversions drawing 5130	15 sheets, Strength 750 pounds, Basler Turbo Conversions, Inc., P.O. Box 2305, Oshkosh, WI 54903-2350, (414)-236-7820).		ST00372DE NA
Cargo Floor Mount Anchor Cable	MTDC-883	Cargo Anchor Assembly Floor DC-3	750	ST00372DE
Handrails	MTDC-885	Handrail and Communication Box Guard		
Smokejumper Restraint Bench Adapter	Simula Inc. drawing 101649 (available from MTDC).			

5.8.6 CASA 212

Table 5.8.6: Casa 212 Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Vertical Anchor	MEDC-760	Vertical Anchor Cable Casa 212 Aircraft	2,000	SA3888NM
Primary Vertical Anchor	MTDC-836	Secondary Support Strut for Casa 212 Vertical Anchor Cable		
Secondary Horizontal Anchor	Casa Factory Design			
Smokejumper Restraint Bench Adapter	Simula Inc. drawing 101649 (available from MTDC),			
Smokejumper Restraint Bench Adapter	MTDC 894			
Embraer Bandeirante (Emb 110). Primary Vertical Anchor	MEDC-732	Vertical Anchor Cable for Bandeirante. An identical anchor to MTDC-732 can be provided as an Embraer factory installation. This anchor is shown on Embraer drawing 110K1-948-11-05 (6 sheets, No Rev.).	2,000	SA1577NM

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Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Secondary Horizontal Anchor		The approved anchor is an Embraer design that is available as an Embraer factory option. This anchor is shown on Embraer drawings (Sheet 1 of 3, 110K1-948-10 Rev. N; Sheet 2 of 3, 110K1-948-10 Rev. N; Sheet 3 of 3, 110K1-948-10 Rev. L). Strength 750 pounds.		NA – Factory Installation
Floor Platform and Handrails				
Jump Step and Attachment	MEDC-739	Floor, Platform & Smokejumper Step & Bracket for Bandeirante Aircraft		
Smokejumper Restraint Bench	Simula Inc. drawing 101649 (available from MTDC)			
Smokejumper Bench Adapter		Reserved.		

5.8.7 Cessna 208 Caravan

Table 5.8.7: Cessna 208 Caravan Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Vertical Anchor	MEDC-804	Vertical Anchor Cable for Cessna 208	2,000	Pending
Secondary Horizontal Anchor	MEDC-791	Horizontal Cable Shock Absorber for Cessna 208		
	MEDC-808	Cessna 208 Caravan Horizontal Anchor Cable-Forward Attachment Point	750	Pending
Jump Door, Jump Step, & Step Attachment	MEDC-759	Step basket (universal), Smokejumper Aircraft		
Jump Door, Jump Step, & Step Attachment	MEDC-794	Universal Step Strut		
Jump Door, Jump Step, & Step Attachment	MEDC-792	Cessna 208 jump door		Pending
Smokejumper Restraint System		Reserved.		

5.8.8 Dornier 228

Table 5.8.8: Dornier 228 Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Vertical Anchor	MTDC-833	Vertical Anchor, Dornier 228	2,000	SA5221NM
Secondary Horizontal Anchor	MTDC-854	Dornier 228 Horizontal Anchor	750	SA5241NM
Step and Step Attachment	MTDC-871	Dornier Step & Hand-hold Assembly		
Step and Step Attachment	MTDC-872	Step Basket Dornier 228		
Step and Step Attachment	MEDC-794	Universal Step Strut		
Handrails	MTDC-873	Dornier 228 Door Guard & Secondary Forward Handrail		
Smokejumper Restraint Bench Adaptor	Simula Inc. drawing 101649 (available from MTDC)			

5.8.9 Shorts SD3-30 (C-23A-Sherpa)

Table 5.8.9: Shorts SD3-30 (C-23A-Sherpa) Accessories – Drawings and Specifications

Accessory	Drawing No.	Description	STC Strength (pounds)	STC No.
Primary Vertical Anchor	MTDC-877	Vertical Anchor for C-23. C-23 is not certified aircraft.	2,000	NA
Secondary Horizontal Anchor	MTDC-896	C-23 Horizontal Anchor Assembly		
	MTDC-895	C-23 Anchor & Shock Absorber Assembly. C-23 is not certified aircraft.	750	NA
Handrails	MTDC-868	C-23 Handrails		
Tailgate Gear Box	MTDC-881	C-23 Cargo Bin		
Smokejumper Restraint Bench	Simula Inc. drawing 101649 (available from MTDC).			
Smokejumper Bench Adapter	MTDC 891			
Universal Accessories	MEDC-759	Step Basket (universal), Smokejumper Aircraft.		
Universal Accessories	MEDC-794	Universal Step Strut		
Universal Accessories	Simula Inc. 101649	Smokejumper Restraint Bench (available from MTDC).		

5.8.10 Shorts SD3-60 (C-23B+-Sherpa)

To be determined.

5.9 SASES Approved Smokejumper and Paracargo Aircraft

The Forest Service and the Department of the Interior, Office of Aircraft Services use a common list of approved smokejumper aircraft. This list is maintained by SASES. For an aircraft to be on this interagency approved list, it must have been formally evaluated using the process described in ISMOG, FS Section 5.0 and have successfully demonstrated suitability for the smokejumper mission. Approved accessories necessary to configure the aircraft for smokejumping must be available. Within the Forest Service, only approved smokejumper aircraft may be used for paracargo operations. The current SASES approved aircraft list can be found at www.nifc.gov/aviation/SASES.htm.

5.9.1 Approval Revocation

When necessary, SASES shall recommend removing specific models of aircraft from the approved list. The SASES procedure for removing an aircraft from the approved list is as follows:

1. Written documentation from a user agency to SASES indicating they have a specific problem with an aircraft. Following this notification, all user groups shall receive a letter asking for information about the proposed revocation.
2. Document contract availability problems, lack of contract competition, operational deficiencies, maintenance history, accident information, and airworthiness considerations that indicate aircraft unreliability.
3. Review historical, contracting, and use records to determine actual user reliance on each aircraft and to ensure that an aircraft to be removed is not essential to the program or is so cost prohibitive that approval continuation is impractical and unrealistic.
4. Consider the possible modification potential of the aircraft, such as a turbine engine installation, that might make it more effective and attractive to users with documented results.
5. Evaluate the utilization and operational effectiveness of the aircraft related to current agency safety and use policies with documented results.
6. Provide recommendations to agency directors.

6.0 Equipment -- Smokejumper and Paracargo

6.1 General Requirements

For personnel safety and easy interchange of smokejumpers among bases, smokejumper and paracargo delivery equipment and procedures must be standard among all bases. It must be functional, technically sound, and essential to the task.

6.2 Standards and Requirements

To ensure safety, strength, and operational suitability, standards and requirements have been established for various items of smokejumping equipment. Standards and requirements that apply to smokejumping equipment are as follows.

6.2.1 Main Parachute

A main parachute must be a military design manufactured under a military quality assurance system, or an approved Forest Service design manufactured under a Forest Service quality assurance system.

6.2.2 Reserve/Emergency Chest Pack Parachute

This parachute must be FAA certified, a military design manufactured under a military quality assurance system, or an approved Forest Service design manufactured under a Forest Service quality assurance system.

6.2.3 Emergency Backpack Parachute

This parachute must be FAA certified, a military design manufactured under a military quality assurance system, or an approved Forest Service design manufactured under a Forest Service quality assurance system. The FS-14R (LoPo 550) canopy may be installed in the Butler Parachute System emergency back container.

6.2.4 Cargo Parachutes

All cargo parachutes must include the following features:

1. 15-foot yellow static-line with approved weak link stitching at the snap end.
2. MS-70120 static-line snap.
3. A lines-first deployment configuration.

6.2.5 Smokejumper Suit

Patterns MEDC 754 and 755 will serve as the baseline for the smokejumper suit. All smokejumper suits shall incorporate the following features:

1. Suit material shall be non-flammable and puncture resistant.
2. Protective collar shall cover front, back, and both sides of the smokejumper's neck. Collar shall be rigid enough to keep the collar upright.
3. Protective pads may be incorporated into the suit design or be independent, but at a minimum, shall cover the body locations shown in patterns MEDC 754 and 755.
4. Protective pads shall at a minimum have the square inches of body coverage per locations shown in patterns MEDC 754 and 755.
5. All smokejumper suits shall incorporate enough flotation that when combined with the un-deployed reserve parachute, it will keep the smokejumper afloat so that their head will remain above water for a minimum of 30 minutes.
6. All pads shall provide impact protection equal to or greater than 3/8-inch Rubatex.

6.2.6 Smokejumper Helmet

1. The helmet must be a high-impact type meeting one of the following standards:
 - a. Snell RS-98, Protective Headgear for Recreational Skiing and Snowboarding.
 - b. ASTM F2040, Standard Specification for Helmets Used for Recreational Snow Sports.
 - c. USA Standards Institute Z901.1-1966 Impact and Penetration Requirements.
2. The helmet must have a chinstrap with a quick release and a wire mesh face shield.
3. If the helmet is severely impacted it should be discarded and replaced immediately.
4. Follow manufacturer's recommendation for inspection and service life.

6.2.7 Video Cameras

Video cameras may be used for training purposes only if approved by the loft and training managers. If a smokejumper is to wear a video camera for flight recording,

the camera needs to be of a small profile no larger than 5” long, 2” high, and 2” wide. An approved camera may only be attached to a helmet or personal gear bag with the direction of the loft manager. All cables need to be taped down and routed inside the jump suit. If the camera is to be worn on the helmet, the placement needs to be in accordance to the system the smokejumper is qualified on.

6.2.8 Boots

Western logger-style leather boots with minimum 1-inch heels, 8-inch tops. Built-in arch supports and nonskid composition or rubber soles are required. Steel toed, caulked, or hobnailed soles are not permitted. A stirrup strap retention device for boots is required for boots with potential for jump pant stirrup slipping from heel position under canopy.

6.2.9 Gloves

Personnel shall wear snug, pliable leather and Nomex aviation-style gloves on all parachute jumps and letdowns.

6.2.10 Letdown Line

The letdown line must be constructed of nylon tubular webbing, specification MIL-W-5625, with minimum width of 3/4-inch and a minimum tensile strength of 2,300 pounds when new. Permanently mark the length in feet; use letters at least 1/2-inch high within 6 inches from the end. Dye at least 20 feet of one end yellow or red to alert the smokejumper that the end is approaching when making letdown.

6.2.11 Tree Climbing Spurs

The spur gaff length depends on the major timber type. The minimum gaff length is 1.5 inches.

6.2.12 Tree Climbing Rope

A steel core rope is mandatory when any cutting tools are used.

6.2.13 Ankle Braces

Aircast over-the-boot ankle braces are required on all parachute jumps. The braces come in three different sizes (Small, Medium, and Large) and can be ordered from Aircast Inc.

6.3 Smokejumper and Paracargo Equipment Drawings

The Forest Service has approved certain items of specialized smokejumper equipment for Forest Service use. Approved items are identified by either drawings or specifications prepared by MTDC, or by directives that the Washington Office

Director, Fire and Aviation Management issued for this purpose. Do not use any alternate equipment for smokejumper or paracargo delivery other than the equipment shown in these drawings and specifications unless the Forest Service has evaluated and approved it for that purpose, or unless it has the Washington Office, Fire and Aviation Management’s written approval for field use (FSM 7120). MTDC maintains the list of all equipment approved for smokejumper use including equipment that is currently in use as well as items which are approved but not currently in use.

The following is a list of the Forest Service drawings and specifications that control smokejumper equipment currently in use:

Table 6.3: Drawings and Specifications for Smokejumper Equipment

Smokejumper Equipment	Drawing No.
Cargo static line weak link (500 lbs.)	MEDC 740
Container assembly, Smokejumper personnel parachute (FS-10)	MEDC 376
Container, chest pack parachute, model FS-14R	MTDC 992
Curved closing pin (FS-12R)	MEDC 723
Deployment Bag	US Air Force drawing 56D6276
Deployment bag, smokejumper personnel parachute (FS-10)	MEDC 382
FS-12 pack-tray waist strap modification	MEDC 763
Harness assembly, model H-5	MEDC 764
Helmet and Mask Smokejumper (Giro Talon)	MTDC-1070
Helmet and Mask Smokejumper (POC Orbic X)	MTDC-1122
Pack Tray	US Air Force drawing 52E6269
Parachute Canopy Type, FS-14	MTDC 922
Para-Cushion tether harness	MTDC 813
Patterns, jackets, smokejumper suit, sizes: XS, S, M, and L	MEDC 755
Patterns, trousers, smokejumper suit, sizes: XS, S, M, and L	MEDC 754
Riser and Riser Cross-Connector	MTDC 926
Smokejumper Spotter Tether Harness with Droop Riser (Round Reserve)	MTDC-1077

Smokejumper Equipment	Drawing No.
Smokejumper Spotter Tether Harness with Droop Riser (Ram-Air Reserve)	MTDC-1120
Static line, smokejumper personnel parachute (FS-10)	MEDC 381
Toggle, control line, personnel steerable parachute	MEDC 425
Wind drift indicator for FS-14 parachute	MEDC 930

6.4 Standard Smokejumper and Paracargo Equipment Products

Certain equipment items used for smokejumper and paracargo missions are products of military or industrial design. Although not controlled by Forest Service drawings or specifications, the use of this equipment is mandatory and standardized Service-wide. Do not use any alternate equipment for smokejumping or paracargo delivery other than these standardized products unless the Forest Service has evaluated and approved it for that purpose or unless it has Washington Office, Fire and Aviation Management’s written approval for field use. List of standardized smokejumper and paracargo equipment products:

6.4.1 Emergency Backpack Parachute

The Strong Enterprises Para-Cushion, the Butler XTC 500 and LoPo 550 are approved emergency backpack parachutes for the smokejumper and paracargo program.

6.4.2 Reserve Parachute

The Butler LoPo 550 is the approved reserve parachute for the smokejumper program.

6.4.3 Reserve Knife

Personnel shall use “Jack the Ripper” hook knife Service-wide. It is available from Para-Gear at the following address: Para-Gear 3839 West Oakton Street, Skokie, IL 60076, (312) 679-5905 or 1-800-323-0437.

6.4.4 Static Line Clip

The MS-70120 Static Line Snap and the USL 11-1-6991-1 Universal Static Line are the approved static line snaps for the smokejumper and paracargo program.

6.5 Equipment Development

Because of the inherent risks associated with smokejumper and paracargo delivery, and the need for Service-wide standardization of equipment and operating procedures, professional development work is essential to provide optimum smokejumping equipment. Proper evaluation, testing, and controlled development have resulted in standardized smokejumper and paracargo equipment designs. This has significantly reduced the risks associated with parachute delivery of personnel and equipment. MTDC develops smokejumper and paracargo equipment for the Forest Service at the request of, and under the authority of, the Washington Office, Fire and Aviation Management.

6.6 Equipment Development Committee

The Washington Office Director, Fire and Aviation Management recognizes the Forest Service Smokejumper Base Manager Council (SJBMC) as a smokejumper equipment development committee that performs the following functions:

1. Reviews all equipment innovation and proposals for development. The SJBMC will forward recommendations to the National Smokejumper Program Manager for further consideration.
2. Provides field input and recommends priorities for smokejumper equipment development projects.
3. Provides field involvement and participation in an equipment development program, including serving as a contact point for equipment questionnaires and equipment review processes.
4. Provides input for identifying operational and technical requirements for new equipment.
5. Identifies problems resulting from field use of equipment.
6. Identifies standardization requirements for equipment and procedures to facilitate the interchange of personnel between bases.
7. Reviews and recommends new smokejumper equipment for adoption.

6.7 Equipment Development Process

See FSM 7120, Equipment Development, for a detailed description of the equipment development process. A simplified description of the smokejumper and paracargo equipment process is as follows:

1. Recognition of equipment needs comes from many sources. It is possible to develop ideas or identify needs through accident reports, base manager

meetings, the Smokejumper Aircraft Screening and Evaluation Subcommittee, employee suggestions, equipment committees, program and activity reviews, and management input from all levels.

2. Equipment ideas that receive Fire and Aviation Management approval, meet established objectives, and do not require significant funding are usually developed under the Smokejumper Technical Services Project, an ongoing project at MTDC. The MTDC Smokejumper Equipment Project Leader provides technical direction.
3. Development of equipment that requires significant funding is a more complicated process and must follow consistent criteria provided by the Division of Engineering. The Director, Fire and Aviation Management, also must review and approve these ideas. Development must comply with a project proposal. The equipment development committee must review project proposals before development work begins. The National Smokejumper Program Manager shall provide technical direction.
4. After projects receive funding and approval, MTDC initiates development work. The actual work may occur in various ways, such as through MTDC personnel, smokejumper bases under MTDC supervision, or contracts with industry or consultants. Work may take from a few months to several years to complete.

6.8 Smokejumper Equipment Development Files

A file of materials accumulated during smokejumper equipment development work is maintained at MTDC. This material includes reference documents, technical and operational requirements, test data, and a development history that enumerates information pertinent to the development of specialized equipment.

6.9 Field Development Work

Contact MTDC prior to field development work.

Smokejumping bases may accomplish some equipment development work when implementation of new equipment does not replace a standard equipment design controlled by an MTDC drawing, does not adversely affect safety, and does not conflict with standard operating procedures in service-wide or interagency smokejumping operations.

The purpose of field development work may be to meet a local need; to meet a request for support of an ongoing development project at MTDC; or to accomplish a special development task when assigned with coordination and prior approval from Washington Office, Fire and Aviation Management.

Such work must comply with direction in FSM 7120, Equipment Development. This procedure ensures that the following conditions exist:

1. Development objectives progress toward an established national goal for improved smokejumping equipment.
2. Smokejumper bases have personnel who can accomplish the work safely, and the technical expertise needed to produce professional results is available at the smokejumper base.
3. Duplication does not occur.
4. Ongoing work complies with funding available for Service-wide implementation.
5. Appropriate controls are maintained.
6. Appropriate data and records are kept.
7. Workloads assigned to smokejumper bases comply with other project activities and assigned workloads.

7.0 Operating Procedures

7.1 Smokejumper Mission Requirements

Safe and efficient smokejumper delivery missions depend on the proper execution of standardized procedures. Management of these procedures is the responsibility of various personnel in the smokejumper organization whose detailed instructions and close supervision are essential to safe mission accomplishment.

7.1.1 Assigned Spotter Responsibilities

The spotter shall perform a number of activities before takeoff. The spotter-in-charge of each mission should be clearly identified. The Interagency Smokejumper Pilot Operations Guide (ISPOG) provides additional detailed instructions on spotter responsibilities. These duties include the following:

1. Inventory and inspection of spotter's equipment.
2. Preflight inspection of aircraft equipment, door latches, static line anchor cables, cargo, load placement, restraint, and jump door edge and boot to ensure a smooth surface.
3. Ensure that pilot briefing and avionics checks are performed.
4. Ensure that smokejumpers are familiar with the aircraft, equipment, and procedures.
5. Perform spotter checks or assure buddy checks have been completed.
6. Ensure personnel and equipment are properly configured, loaded, and restrained.
7. Load manifesting.

7.1.2 Pilot and Spotter Briefing

When a base receives a fire call, designated personnel shall brief the pilot and spotter on the mission and flight hazards, provide them with area maps, inform them of flight routes and communications requirements, and furnish them with fire locations and other information regarding the mission. This information is often transmitted in written form, as in a Resource Order. The spotter shall ensure that the pilot is briefed on these items.

7.1.3 Aircraft Loading and Smokejumper and Paracargo Restraint

Each aircraft shall be loaded according to a plan that the individual smokejumper base formulates and the pilot approves. The following are the spotter’s responsibilities and general considerations for performing the mission:

1. Ensure that the necessary cargo, emergency parachutes, and aircraft accessories are in place and functional and that spotter kits and miscellaneous equipment are on board and secure.
2. Spotter or buddy checks shall be conducted for each smokejumper’s equipment before smokejumpers board the aircraft.
3. Smokejumpers will load into the aircraft in reverse order, so the first smokejumper to jump is nearest the door.
4. Ensure that cargo, personnel, and PG bags are secure and that personnel and cargo locations maintain the aircraft’s center of gravity during the entire flight.
5. Ensure that the pilot-to-spotter communications system functions.
6. Ensure that, when flying with the door off, smokejumpers wear protective jump suits and/or Nomex pants and shirt, parachute, and boots.

Table 7.1.3: Door On/Off Requirements

Equipment Required (an X means it is required)	Door Off Without FAA Seats	Door Off With FAA Seats	Door On Without FAA Seats	Door On With FAA Seats
Smokejumper Suit with Emergency Parachute	X			
Smokejumper Harness and Emergency Parachute		X		
Complete Smokejumper Suit			X	
Seatbelts and Cargo Restraint Utilized	X	X	X	X

7. During takeoffs, landing, and paracargo operations, smokejumpers shall wear gloves, and helmet with mask down and fastened. Spotters in the rear of the aircraft shall wear approved fire resistant clothing, gloves, and helmet. Approved seats and seat belts are mandatory for everyone on board the aircraft.

7.1.4 Spotter Emergency Equipment

Each spotter and assistant spotter shall wear an emergency parachute with tether or an approved tether harness with provisions for attaching an emergency chest pack parachute which shall be on board the aircraft.

1. Each spotter shall “pin check” the spotter’s emergency parachute before use.
2. Each person wearing or having available to them an emergency parachute on the system they are current on.
3. Each spotter shall wear an approved tether harness during spotting and cargo dropping operations. The tether harness should be attached only to adequate anchor points or auxiliary cables (see ISMOG, FS Section, 6.0).

7.1.5 Spotter Footgear

A smokejumper spotter’s footgear must have uppers constructed of leather, be of a lace-up design, and have nonskid soles. The height of the footgear shall be such that there is 2-inch overlap between the footgear and the fire-resistant clothing in both the sitting and kneeling positions.

7.2 In-flight Procedures

The spotter shall be responsible for in-flight procedures, as outlined in the Flight Operations Handbook (FSH 5709.16), Interagency Smokejumper Pilot Operations Guide (ISPOG), Professional Pilot and Spotter videos, and U.S. Forest Service National Smokejumper Training Guide.

7.2.1 Jump and Cargo Drop Spot Selection

1. The safety of smokejumpers and aircraft must be the primary consideration when the spotter selects jump spots and cargo drop zones.
2. Fire behavior and safety shall be considered when selecting jump spots.
3. The spotter also shall coordinate with the pilot to establish the flight pattern and location for dropping smokejumpers and paracargo.
4. A low pass should be considered whenever there is any question as to the suitability of the jump spot.
5. The pilot shall be the final authority on flight procedures and patterns.
6. Before performing personnel jumps, the spotter shall brief the smokejumpers on jump spot selection, cargo drop zones, and fire safety.

7.2.2 Flight Patterns and Jump Altitude Determination

The spotter, with the pilot's concurrence, shall determine the flight pattern and initial altitude. Initial pattern altitude must be the estimated altitude that provides at least 1,500 feet terrain clearance over the intended exit point for round parachutes or 3,000 feet for ram-air parachutes.

7.2.3 Simultaneous Aircraft Operation

The spotter shall ascertain and confirm if other aircraft are assigned to the incident, will be operating in close proximity to each other, or will be traveling over the same route. Aircrews of all of the involved aircraft shall establish radio communication. If this is not possible, smokejumper operations must cease until the airspace is clear of other aircraft.

7.2.4 In-Flight Door Removal

If an aircraft is equipped with an in-flight door, spotters shall receive training in its use. Specific aircraft may require an airspeed reduction before opening or removing the door. Opening or removal of the in-flight door shall be done with pilot approval and coordination, and should be announced to all flight crewmembers and smokejumpers on board.

7.2.5 Wind Drift and Altitude Determination

The spotter shall drop streamers to determine wind drift and to check aircraft altitude. The spotter shall use approved drift streamers and shall time their descent to determine that the aircraft is at least 1,500 feet above the exit point.

7.2.6 Incident Briefing

The spotter shall inform the smokejumper-in-charge of the radio frequency to use and the radio contact point on the ground (lookout, District Officer). The route to the fire, fire tactics, and demobilization should also be discussed. The spotter shall provide the Smokejumper Request to the smokejumper-in-charge.

7.2.7 Hook-Up Procedures

Procedures prior to exiting should occur in the following order:

1. The spotter shall inform the pilot that the smokejumpers are ready to begin live drops.
2. The spotter shall signal smokejumpers to hook up.
3. Each smokejumper in the stick shall attach the parachute static line snap or universal static line (USL) to the appropriate anchor cable, with the button up or

- facing the smokejumper. Insert the safety pin downward (if applicable) and slightly bent, and check to see that the static line is clear and properly routed.
4. The spotter shall conduct a visual check to ensure that each smokejumper's static line is stowed and routed properly, that the snap or universal static line (USL) is attached correctly to the anchor cable, and that the snap safety pin is in place (if applicable).
 5. The spotter will conduct a pre-jump briefing. The briefing shall include as a minimum:
 - a. Jump spot confirmation.
 - b. Jump spot hazard identification (if any).
 - c. Estimated streamer drift.
 - d. Type of drop pattern.
 - e. Jump spot elevation.
 - f. Pertinent wind information at jump elevation.
 - g. End the briefing by asking if the smokejumper has any questions.
 6. The spotter will release and stow the door strap and tell the first smokejumper to get in the door.
 7. The spotter shall conduct a final visual check of each smokejumper's harness snaps, the reserve parachute attachment, PG bag attachment, and all protective equipment, ensuring that all is properly in place.
 8. The spotter shall make a final visual check and verbally confirm with the smokejumper that the static line is clear.

7.2.8 Static Line Monitoring and Spotter Requirements

Closely monitoring smokejumper static lines during exits is essential to eliminate the potential for static line misroutes. The following requirements shall apply:

1. Static line monitoring requires an assistant spotter or a static line monitoring device on each smokejumper small-door exit. This requirement only applies when two or more persons jump in a stick.
2. Each aircraft using large door (stand-up) exit procedures shall have a spotter and assistant when dropping two or more smokejumpers in a stick.
3. In large aircraft, single spotter/single-stick jump operations may be conducted.

7.2.9 Exit Signals

1. Only the first round smokejumper in each stick will receive a slap as the exit signal. The signal for the remaining smokejumpers in each stick will be the exit of the smokejumper immediately preceding them.
2. The pilot will inform the spotter when they are turning final.
3. The spotter will give a verbal “Get ready” command prior to signaling the first smokejumper in each stick to exit.
4. When the jump is from a standing position, the exit signal for the first smokejumper shall be a sharp slap on the leg or shoulder.
5. All ram-air smokejumpers will receive a slap to signal exit as is standard in FS and BLM ram-air operations. Ram-air smokejumpers are spaced a minimum of three seconds apart on exit.
6. If a spotter does not want a smokejumper to exit, the spotter blocks the door with an arm or covers the smokejumper’s face mask. This action informs the smokejumper that the jump is canceled for that pass.

7.3 Exit Procedures

Proper exit procedures are essential to successful smokejumper parachute delivery. Detailed instructions on exit procedures are found in the U.S. Forest Service National Smokejumper Training Guide. Compliance with established exit procedures is mandatory.

7.3.1 Standard Smokejumper Exits

All smokejumpers shall use the standard smokejumper exit approved for the specific aircraft being used.

7.3.2 Approved Exit and Maximum Smokejumpers Exiting Within a Stick

The door size and aircraft accessories determine the maximum number of smokejumpers per stick on all jumps. Operational and training jumps shall conform to the following:

1. Large-door aircraft may use up to a three-person stick on operational and training jumps. The approved exit is a standing exit.
2. Small-door aircraft (less than 52 inches high) with an approved step may use up to two-person sticks on operational and training jumps. The approved exit is a step position exit.

3. Four ram-air smokejumpers will be the maximum stick size in any type of smokejumper aircraft.
4. In all aircraft, emergency jumps progress in a continuous fashion, as the spotter-in-charge directs.
5. For mixed-load operations, see ram-air guiding publications.

7.4 Emergency Procedures

Situations that require an emergency exit vary. The spotter shall be responsible for maintaining control during an emergency. Detailed instructions on emergency procedures are specified in the U.S. Forest Service National Smokejumper Training Guide.

7.4.1 Non-Critical Emergency Exit

The pilot shall inform the spotter about the nature of the emergency and course of action. If an emergency exit is necessary, the spotter shall be responsible for maintaining control over the smokejumpers and for ensuring that the emergency exit is orderly and timely. Emergency exit procedures in a non-critical emergency usually are the same as those for an operational jump. In some cases, the spotter may even select a jump spot.

7.4.2 Critical Emergency Exit

The spotter must assume control in a critical emergency to ensure that exits proceed as smoothly and quickly as possible. Considerations and procedures for an emergency exit in a critical emergency are as follows:

1. **Center of Gravity Limitations:** A pilot cannot maintain adequate control of an aircraft with an aft center of gravity; therefore, a spotter must not allow smokejumpers to rush toward the aircraft door, if they anticipate an emergency exit.
2. **Decision to Initiate Emergency Exit:** The pilot shall be the primary authority in matters pertaining to the aircraft's condition and the necessity for an emergency exit. The pilot shall notify the spotter to initiate an emergency exit. Before initiating an emergency exit, the spotter must be certain that a crash is imminent and that the aircraft is high enough for a parachute to open. During a critical emergency exit from a smokejumper aircraft, gloves, helmets, and other protective equipment may be left behind.
3. **Critical Emergency Exit Procedures with Main Parachute:** If smokejumpers are wearing main parachutes when the pilot or spotter orders an exit, the smokejumpers shall use the designated emergency cable. They must not

attempt to fasten the static line safety pin. Depending on the aircraft accessories, smokejumpers may need to keep one hand on the static line snap to guide it along the cable while moving toward the door. This prevents the main parachutes from opening accidentally in the aircraft.

4. **Exit Procedures with Reserve Parachutes:** Smokejumpers shall jump with their emergency parachute when it is impractical to hook their static lines to the emergency cable or if they are not equipped with backpack parachutes.

7.4.3 Aircraft Crash on Takeoff

All personnel shall be prepared for an aircraft crash on takeoff. Smokejumpers and spotters shall use proper seating arrangements for the model aircraft used in the operation and must know where all the emergency exits are located and how to use them. If the aircraft crashes on takeoff, personnel shall evacuate the aircraft as soon as the aircraft stops moving. Be alert to smokejumpers and crewmembers who may have been hurt or incapacitated in the crash, and get them out quickly. Evacuate away from any fire that exists, depart the crash upwind, and account for all personnel.

Interagency Safety Alert 18-03 for secondary restraint systems, installation-training – Use for aircraft door (s) – off, doors(s)- open operations (DO/DO), dated on April 23, 2018 states the following: “Missions requiring the use of a secondary restraint with DO/DO are when moving about the cabin or operations requiring extremities outside of the aircraft” need to updated Guides, Standards, Plans and Risk Assessments to include required mitigations. Refer to the U.S. Forest Service Training Guide, Unit 3, Chapter 1, Lesson D Aircraft Emergency Procedures, and the Ram-Air Training Guide, Chapter 3 General Aircraft Safety for required restraint mitigations.

7.4.4 Crash Landing Procedures

Whenever possible follow the procedures below when a crash landing is imminent:

1. Put on helmet and gloves. Assume a fetal position, arms close to the body, with seat belt or restraint device snugly attached. Occupants of side-facing seating shall attempt to face 45 degrees to the front of the aircraft.
2. Because the pilot’s control of the aircraft may be very limited in an emergency situation, restrict unnecessary movement in the aircraft.
3. Locate emergency escape hatches and equipment.
4. After a crash, vacate the aircraft quickly and in an orderly manner. Be alert to all crew members and passengers who may have been hurt or incapacitated in the crash, and get them out quickly. Evacuate and depart the aircraft upwind, and account for all personnel.

7.4.5 Aircraft Fire in Flight

The spotter and pilot shall make a coordinated decision concerning appropriate action if an aircraft fire occurs in flight. The spotter must maintain control of the situation and take aggressive action to control the fire. If the fire becomes uncontrollable, begin emergency evacuation procedures.

7.4.6 Other In-Flight Emergencies

Although the potential for a smokejumper in tow or an inadvertent opening is extremely remote, procedures are addressed in the U.S. Forest Service National Smokejumper Training Guide.

7.5 Ground Procedures

Maintaining safe, efficient, and effective incident operations and post-fire operations is imperative.

7.5.1 Safety Briefing

Prior to taking action on any incident, the smokejumper-in-charge shall ensure a thorough safety briefing is conducted. The briefing place should be determined by the smokejumper-in-charge and should include travel route, safety precautions, and lookouts, communications, escape routes, and safety zones (LCES).

7.5.2 Radio Communications

1. All smokejumpers shall be issued a radio.
2. On landing, the first smokejumper or designee shall contact the aircraft and inform the spotter whether conditions remain acceptable. If jump conditions differ from those originally anticipated, the spotter will reevaluate the conditions.
3. The smokejumper-in-charge or designee shall ensure that the spotter is informed when all smokejumpers are safely on the ground and ready to receive cargo.
4. As soon as possible, the smokejumper-in-charge shall establish communication with the local contact, provide a fire situation report, and schedule check-in times.

7.5.3 Ground-to-Air Signals

Each smokejumper shall carry a drift streamer. If radio communication is not available, drift streamers will be used for air to ground communication. Ground-to-air signal cards shall be placed in all packing data pocket of each parachute. The card must include both the Forest Service and Federal Aviation Administration ground-to-air signals. If smokejumpers land outside the established jump spot, they will place an individual "L" signal panel to signal safety.

7.5.4 Jump Injury Procedures

If a jump injury occurs, the spotter shall stop jump operations, assess the situation and take appropriate action. Responsibilities are as follows:

Table 7.5.4: Jump Injury Responsibilities

Smokejumper-in-Charge	Spotter	Medical Personnel
Notify spotter.	Maintain communication with smokejumper-in-charge, dispatch, and medevac transport.	Assess patient.
Coordinate patient care, helispot construction, and incident activities.	Aircraft will remain on scene as appropriate.	Render patient care.
Utilize protocols for medical response listed in the IRPG.	Drop all requested emergency medical supplies and medical personnel.	
	Direct medevac transport to scene.	

7.5.5 Smokejumper Pack-Out and Gear Retrieval

Once smokejumpers are on the ground, they are a resource of the ordering unit. The smokejumper-in-charge shall coordinate demobilization with the ordering unit and follow their direction.

7.5.6 Post-Fire Reports

The smokejumper-in-charge shall complete all required agency documentation including an Incident Organizer with Fire Report, Fire Time Reports, Injury Report, and Smokejumper Master Action Report and submit to the proper authority on completion of each fire assignment. The smokejumper-in-charge shall sign the time reports of all smokejumpers assigned to the incident and shall have their time report signed in accordance with local policy.

7.6 Booster Aircraft, Pilots, and Smokejumpers

To facilitate the mobility and use of smokejumpers, aircraft, and pilots, the following procedures shall be followed:

7.6.1 Aircraft Familiarization

Smokejumpers shall receive an operational briefing on aircraft types they have not had training on during the current season. This briefing shall include but not be limited to the following items:

1. Personnel loading and restraint.
2. Hook-up and exit procedures.
3. Aircraft ground evacuation procedures.
4. Aircraft in-flight emergency hook-up and exit procedures.
5. Aircraft safety and emergency procedures briefing from pilot.

7.6.2 Pilot Orientation and Operational Familiarization

All incoming or new pilots shall receive a briefing before conducting flight operations from any given base. The briefing shall include, but not be limited to, the following items:

1. Smokejumper base organization, staffing, and operation.
2. Dispatching, communications, and operational controls.
3. Aircraft loading, restraint, and manifest requirements.
4. Spotter coordination, cargo dropping commands and communications.
5. Operating area familiarization, including local hazards and flight safety information.
6. Requirements and limitations on using backcountry airfields.

7.6.3 Smokejumper Orientation and Operational Familiarization

Each base shall prepare an orientation package. Smokejumpers shall receive a briefing before being assigned to any incident. The briefing shall include information about the following areas:

1. Smokejumper base organization, staffing and operations.
2. Current fire situation and status and fire weather forecasts.
3. Smokejumper aircraft.
4. Fire call procedures.
5. Jump procedures.
6. Radio systems and communications procedures.
7. Fire management procedures and standards.
8. Equipment return procedures.

9. Work and physical training (PT) schedules.
10. Timekeeping procedures.
11. Meals and lodging and transportation arrangements.
12. Emergency medical equipment and procedures.
13. Review paracargo and climber boxes unique to each base.
14. General policies.

7.7 Accidents, Injuries, Hazardous Conditions, and Near-Misses

All accidents, injuries, hazardous conditions, and near-miss events should be reported as soon as possible to the base manager who will provide direction for any follow-up reporting.

7.7.1 Agency Reporting Requirements

Each smokejumper base will report accidents, incidents, and injuries according to agency specific direction found in FSM 5100 and FSH 6709.11, FSM 5720 (Aviation), FSM 5130 (Ground Operations), FSM 6730 (Specific Policy), FSH 6709.12 Chapter 30 (General Guidance), and the most recent Accident Investigation Guide which can be found at www.nifc.gov/safety/accident_resources.htm.

Agency reporting protocol requires a determination as to whether the incident was an Aviation Safety or Fire Ground Safety incident.

1. **Aviation Safety:** Any incident involving that portion of the smokejumper operation from aircraft start-up until the smokejumper has safely reached the ground will typically be categorized under Aviation Safety.
2. **Fire Ground Safety:** Any incident that occurs after the smokejumper has safely reached the ground will typically be categorized under Fire Ground Safety.

In addition to agency reporting requirements, immediate notification to all smokejumper bases will follow utilizing the appropriate databases listed below in 7.7.2 through 7.7.7. Capture of this information in these databases listed below will allow managers to review and identify potentially hazardous trends in the workplace.

7.7.2 Smokejumper Mission Incident Worksheet

1. Base Managers shall alert other smokejumper bases regarding the circumstances of incidents or hazardous conditions which could be repeated in order to prevent others from suffering potential misfortunes.

2. Base managers shall immediately alert (within 24 hours, or sooner if critical) all smokejumper bases that may be using the same or similar equipment, procedures, aircraft, systems, etc. of any incident or condition concerning smokejumper operations and or equipment which has potential for others to suffer the same or similar mishap. This includes accidents, incidents, injuries, near misses and astute observations of conditions that may lead to accidents, incidents or injuries.
3. Alerts will be issued using the Smokejumper Mission Incident Worksheet and should include the relevant facts, equipment used, circumstances of the incident, and any recommended mitigation.

7.7.3 SAFECOM

The USFS and DOI use the SAFECOM Form AMD-34/FS-5700-14 to report any condition, observation, act, maintenance problem, or circumstance with personnel or the aircraft that has the potential to cause an aviation-related mishap. Organizational learning is crucial to our future as a leader in fire and aviation. As Forest Service employees, it is our responsibility to report any hazardous condition, observation, act, incident, or maintenance deficiency that could jeopardize our mission. The SAFECOM system may be accessed at www.safecom.gov.

7.7.4 SAFENET

A program for reporting and correcting unsafe situations and for sharing critical safety information related to fire operations (wildland and prescribed), SAFENET has three primary purposes:

1. To provide immediate reporting and correction of unsafe situations in fire operations.
2. To provide a vehicle for sharing important safety information throughout the fire community.
3. To provide long-term data to assist in identifying trends.

Anyone may initiate a SAFENET anonymously for the purpose of reporting an unsafe condition, unsafe procedure, or near-miss. In order for the SAFENET originator to receive notification of corrective actions taken, the originator's name should be included on the form. To ensure the most immediate corrective action, a SAFENET should be submitted to your supervisor. However, the originator has the right to submit a SAFENET to any level of the organization. SAFENET may be accessed at www.fs.fed.us/fire/safety/safenet/safenet.html.

7.7.5 Esafety

Injuries will be reported in Esafety according to agency policy. Supervisors and/or managers are responsible for ensuring timely and accurate reporting to facilitate Office of Workers' Compensation Programs (OWCP) claims as well as to track trends in injury cause/type for their base. Reports on injury types and causes may be requested from the unit's Safety Officer or other designated safety coordinator.

7.7.6 Malfunction-Abnormality Reporting System (MARS)

Report all malfunctions or abnormalities related to any and all aspects of the smokejumper mission. The incident does not have to result in an accident or injury to be recorded. This database is actually best suited to identify those weak signals that when monitored, may indicate that a significant problem exists that needs attention. Examples include, but are not limited to, parachute malfunctions such as blown panels, broken or wrapped steering lines, lost equipment (radios, helmets, etc.) during parachute operations, and failure or unsafe condition of tree-climbing equipment. MARS may be accessed at <http://fsweb.mtdc.wo.fs.fes.us/MARS/>.

7.7.7 MTDC Smokejumper Injury Reporting Form

Injuries related to parachute operations shall be recorded on the MTDC Smokejumper Injury Reporting Form. MTDC will request a summary of all such injuries to be compiled by each base at the end of each season along with the individual reporting forms for inclusion in the MTDC Parachute Injury Database.

8.0 Parachute Management and Loft Procedures

8.1 Parachute Loft Administration

Successful and safe smokejumper delivery depends on proper parachute equipment management, including storage, packing, and maintenance. Bases performing personnel parachute operations must adhere to special equipment requirements and standardized loft operating procedures. A properly supervised parachute loft is a requirement for smokejumper and spike bases engaged in packing, repairing, and maintaining parachutes and parachute assemblies used for personnel.

8.2 Loft Operating Requirements

Smokejumper base parachute lofts must comply with the following requirements:

1. **Supervision:** Operate lofts under the direct administration of a full-time employee in each Region who meets the qualification requirements related to Smokejumper Loft Manager in Section 2.0 of the ISMOG, FS Section.
2. **Federal Aviation Administration (FAA) Regulation, Part 65:** Operate all smokejumper base lofts according to FAA Regulation, Part 65.
3. **Records Maintenance:** Maintain loft records on all parachute equipment repaired, maintained, manufactured, modified, altered, or packed according to procedures specified in Federal Aviation Regulations and the ISMOG. A master rigger shall supervise all major repair work performed.
4. **Manufacturer Instructions:** Pack maintain, repair, or alter parachutes to comply with the manufacturer's instructions.
5. **Industry Standards:** Ensure that all repairs or other work accomplished in Forest Service lofts not covered in the above instructions comply with best industrial practice, and when applicable, with Federal Aviation Regulations.

8.3 Federal Aviation Administration Requirements

FAA Regulation, Part 65, establishes the personnel ratings authorized to maintain or alter parachutes, records of work accomplishment, personnel performing work, and other maintenance and materials standards. No work shall occur in Forest Service parachute lofts unless it complies with this regulation.

8.3.1 Personnel Authorization

Maintenance and alteration must be performed in accordance with approved manuals and specifications. The only personnel authorized to maintain or alter

parachutes are: (1) personnel authorized by FAR Part 65, and/or (2) the manufacturer.

8.3.2 Parachute Loft Equipment and Facilities

Requirements for parachute lofts include having personnel appropriately certified under FAR Part 65 and having the facilities, materials, and necessary equipment. Necessary equipment includes suitable housing that is adequately heated, lighted and ventilated, as well as an adequate inspection system, adequate drawing equipment, and adequate facilities for segregating and storing parts and materials.

8.3.3 Records and Reports

Each parachute loft shall maintain the following records and reports:

1. **Records:** Make an adequate record of all work performed, including the name(s) of the person(s) doing the work. These records shall be kept for at least two years after the work is performed.
2. **Reports:** Report to the base manager any recurring or serious defect, or other un-airworthy conditions that are found in any parachute or parachute component.

8.3.4 Maintenance and Alteration Standards

Each parachute loft shall perform maintenance and alteration operations in a manner so as to maintain the article worked on in, or restore it to, an airworthy condition.

8.3.5 Materials Standards

Each parachute loft shall use materials of proper strength and quality for the maintenance or alteration operation being performed.

8.3.6 Drop Testing

Drop testing may be conducted for any of the following reasons:

1. **After Major Repairs:**
 - a. Whenever a parachute or component has received a major repair or alteration, including the canopy, harness container, accessory or any combination of them.
 - b. When a Certificated Master Parachute Rigger who inspected it considers that the repair or alteration may have affected the structural, functional, or airworthiness characteristic of the article.

2. **Functional Determination:** Whenever it is necessary to determine the functional characteristics of an entire parachute assembly, the loft shall drop test it at the appropriately determined weight, airspeed, and altitude.
3. **Material Strength Determination:** Whenever it is necessary to determine the material strength values of an entire parachute assembly, or the material airworthiness of the entire assembly before maintenance, the loft shall drop test it at the appropriately determined weight, airspeed, and altitude.
4. **Field Development:** Any drop testing done for field development purposes must be approved by the National Smokejumper Program Manager and MTDC and will be conducted in accordance with established equipment development procedures outlined in Sections 5.0 and 6.0 of the ISMOG, FS Section.

8.4 Record Keeping Requirements

All Forest Service parachute lofts shall maintain, display, and have available the following records in proper order:

1. Master Parachute Log.
2. Individual Parachute Repair Records.
3. Certificated Rigger List.
4. Rigger's Logbook.
5. Parachute Inventory and Service-Life Records.

8.5 Field Rigging Requirements for USFS FS-14 Round Parachute

When field rigging is needed for a spike base operation, the following requirements will apply:

8.5.1 Main Parachute

The FS-14 Main parachute is approved for field rigging when a fully equipped Field Rigging Kit is available.

8.5.2 Personnel

The FS-14 must be rigged by a certificated FAA Rigger. A certificated FAA Rigger may supervise non-certificated personnel when packing parachutes to be used only by that individual being supervised.

8.5.3 Equipment

Contents of Field Rigging Kit are as follows:

Required items are as follows:

1. Device to hang a canopy (for shake out and inspection).
2. Debris-free rigging surface – tables are preferred; a clean tarp from apex to connector links is acceptable.
3. Tension device (for canopy tension during flaking).
4. New 80 lb. break tape (must be approved type).
5. Rigging hooks.
6. Shot bags or other acceptable weight.
7. Scissors or knife.
8. New rubber bands (must be approved type for flap containers and steering line stowage).
9. Screwdriver (for checking connector links).
10. Tape and marking pen.
11. Log Book.
12. Manufacturer's Rigging Instructions for the parachutes being rigged.

Optional items are as follows:

1. Packing paddle.
2. Packing data cards.
3. Parachute inspection cards.
4. Parachute cord for hanging parachutes.
5. Rubber bands for jump jacket shoulder.

8.5.4 Environment

If field rigging is to be done outdoors, humidity, wind, and dust conditions must be considered and mitigated. Minimize the amount of time that the parachute is exposed to sunlight.

8.5.5 Repairs

Repairs shall be performed to the same standard as in an established parachute loft (i.e., FAA Rigger certification commensurate with the repair type, serviceable

patch/replacement materials on hand, and appropriate equipment such as lay-out boards and sewing machines to perform the repair).

8.5.6 Reserve Parachute

The FS-14R Reserve parachute is not approved for field rigging and may only be rigged at an established parachute loft. Inspection and dress-up may be done outside of an established loft by a certified FAA Rigger.

8.5.7 Cargo Parachutes

Field rigging of all cargo parachutes is approved.

1. **Personnel:** Individuals who have been trained on a particular parachute type may pack those cargo parachutes in the field.
2. **Equipment:** Any debris-free surface (table, tarp, lawn, etc.); tie-off and closure materials as needed; rubber bands as needed
3. **Repairs:** Follow the managing base's cargo parachute repair standards.

8.6 Parachute Management

Loft personnel shall follow special procedures and administrative practices to ensure high quality parachute management.

8.6.1 Parachute and Equipment Procurement

1. **Consolidated Procurement:** Procuring parachutes and specialized equipment by consolidating purchase requests reduces costs to the Federal Government. Whenever possible, procurement between bases should be consolidated.
2. **Procurement Process:** The contract for procurement of parachute canopies and related equipment from commercial sources can be processed through Administrative Services. Fire and Aviation Management personnel from the Washington Office shall coordinate procurement activities.

8.6.2 Parachute Service Life and Condemnation Standards

1. **Manufacture Date:** The manufacture date of each parachute is stamped on the canopy data panel.
2. **In-Service Date:** The service life of all smokejumper personnel parachute canopies starts on the date the Forest Service places them in service. When placed in service, the in-service date is stamped next to the manufacture date on the canopy data panel.

3. **Main Canopies:** Main canopies shall have no more than a 4.5-year shelf life prior to being put into service. Main canopies have a 12-year or 100-jump service life, whichever occurs first.
4. **Reserve and Emergency Canopies:** Reserve and emergency canopies can have no more than a 1.5 year shelf life prior to begin put into service. Reserve and emergency canopies have a 13.5 year service life. In addition, if a reserve or emergency parachute is deployed in the last 1.5 years of its service life, it should be removed from service.
5. **15 Year Limitation:** Remove all Forest Service personnel parachute canopies from service within 15 years of the manufacture date indicated on the canopy data panel, regardless of the above service life limitation.
6. **Airworthiness:** If, for any reason, the loft manager or a master rigger determines that a Forest Service personnel parachute canopy is not airworthy, then it must be immediately condemned for personnel use.

8.7 Parachute Cleaning

Loft personnel shall clean parachutes according to the following guidelines.

Normally, wash or clean only those parachutes that are pitchy or extremely muddy. Remove grease or oil with a gentle soap such as Woolite. See Poynters Parachute Manuel for further instructions using solvents.

8.7.1 Harnesses and Containers

Muddy containers and harnesses should be allowed to dry, and then be brushed clean.

8.7.2 Canopies

1. Wash canopies in a large tub or container with smooth sides and bottom. Use lukewarm water and mild soap. The amount of soap depends on the type and volume of foreign matter on the fabric. Canopies containing large amounts of sticky pitch require a heavy concentration of suds and often require several changes of soapy water.
2. Wash by gently kneading the entire canopy, and follow by gently kneading the pitchy sections. Continue kneading until the water color indicates no more foreign matter is being dislodged.
3. Thoroughly rinse the canopy, changing the water often enough to remove all traces of soap.

4. Place the rinsed canopy in a seamless sack and suspend above the tub for one-half hour to drain. Do not wring.
5. Then suspend the damp canopy by the apex from the tower ceiling, and dry with lines fanned out to give a partially inflated appearance.
6. When the canopy is dry, gently manipulate each pitchy section until the pitch, which should now look dry and dusty, dislodges. Pitchy sections may require several days of drying.

8.7.3 Lines

Washing the nylon suspension lines follows the same method as washing the canopy. Give special attention to the lines when drying to prevent kinks or waves in individual lines when dry. Straighten lines during drying preferably by suspending them vertically. Do not add extra tension to the lines other than their own weight, and hang lines free of the floor.

8.8 Parachute Storage

Loft personnel shall store parachutes according to the following guidelines:

1. Store parachute equipment to comply with the practices specified by Federal Aviation Regulations, Part 65.127.
2. Protect canopies and harnesses from dust and heat extremes.
3. Most Forest Service lofts have storage bins or lockers, and it is usually possible to protect the canopies by placing them loosely in a seamless sack.
4. Any parachute containers must be sufficiently porous to permit air circulation, particularly during long storage periods.
5. Protect nylon canopies from direct sunlight.
6. Store nylon fabrics, including thread and repair fabric as well as canopies, in a cool, dark place.
7. For winter storage, canopies should be stored in an unpacked condition with the canopy fluffed.
8. Harnesses and containers require the same storage treatment as canopies.
9. Cotton and linen materials are more subject to deterioration under improper storage than nylon.
10. Thoroughly dry the entire parachute before storing it, and take preventive measures to ensure that stored parachutes are not exposed to dampness.

11. Protect parachutes against rodents and insects while in storage.

8.9 Parachute Stocking Levels

Loft managers shall stock repair materials and maintain a parachute inventory to reflect the base's smokejumper staffing level and cargo delivery workload.

Guidelines for inventory control are as follows:

8.9.1 Main Backpack Parachutes

Stocking requirement is 2.5 per smokejumper.

8.9.2 Reserve Parachutes

Stocking requirement is 1.5 per smokejumper.

8.9.3 Emergency Parachutes

Determine stocking levels for emergency parachutes based on the number of aircraft and the number of spotters and droppers expected during peak operational periods.

8.9.4 Cargo Parachutes

No stocking requirement.

8.10 Materials Quality Assurance

Follow appropriate quality assurance procedures to procure textile materials and hardware used in critical safety equipment fabrication or repair. Quality assurance procedures are necessary to ensure that materials and hardware conform to the requirements of appropriate military or Forest Service specifications. Follow appropriate-in-process and end product inspection procedures to fabricate critical safety equipment.

8.10.1 Parachute Loft Manufacturing Quality Assurance

The Forest Service routinely manufactures parachute equipment items, such as harnesses, in its parachute lofts. Quality assurance procedures must be prescribed in writing for the manufacture of parachute equipment exempted from an FAA Technical Standard Order (TSO) certification. Specific quality assurance procedures vary for each item of equipment. Typical procedures include the following:

1. **Drawings:** Forest Service drawings control parachute equipment materials, construction, dimensions, and configuration.
2. **Test Data and Certificates of Compliance:** Suppliers' test data and verification testing required by Mil-Std-1525 ensure that component materials conform to

appropriate material specifications. Certificates of compliance also ensure material conformance to specification requirements.

3. **Inspections:** Forest Service loft technicians shall provide in-process and end-item inspections to ensure drawing conformance.
4. **Parachute Development:** When the Forest Service designs and develops a new parachute, the Forest Service shall test it to demonstrate that the parachute design conforms to appropriate performance standards. The Washington Office Director, Fire and Aviation Management shall establish appropriate tests on a case-by-case basis for each parachute design.

8.10.2 Contract Procurement Quality Assurance

The Forest Service shall require a prescribed quality assurance system during the manufacture of Forest Service auxiliary and emergency parachutes that are not FAA approved. The quality assurance procedures must be prescribed in Forest Service parachute procurement contracts. Typically, these procedures include the following:

1. **Drawings:** Forest Service drawings and specifications control Forest Service parachute materials, construction, dimensions, and configuration.
2. **Military Specification Mil-P-6645:** Military Specification Mil-P-6645 (Parachutes, Personnel, General Specifications for), and other military specifications referenced in this document control sampling procedures and tables for inspection by attributes, inspection requirements, defect definitions and classifications for parachutes, and provide basic manufacturing quality assurance requirements.
3. **Verification Testing:** The requirements of appropriate Forest Service or military specifications control the quality and characteristics of specific lots of component materials used to fabricate Forest Service parachutes, such as cloth, cord, tape, webbing thread, and parachute hardware. In addition, the Forest Service routinely applies U.S. Air Force Mil-Std-1525, Verification Testing Component Materials, and requires verification test data for comparison to prescribed test data from material suppliers. Normally, the Brooks Air Force Base textile laboratory conducts this verification testing. Certificates of compliance may be accepted for non-critical materials.
4. **First Article:** All Forest Service parachute procurement contracts require the contractor to provide a first article item for inspection by Forest Service personnel. These first article inspections are routinely conducted at the contractor's plant. Inspection of the contractor's facilities and of the contractor's in-house quality assurance system is accomplished at this time.

5. **End Item Inspection:** Forest Service personnel conduct an end-item inspection of each parachute before accepting it from the contractor.

8.11 Equipment Inspection

8.11.1 Responsibility

The following personnel shall inspect all equipment used in parachute operations:

1. **Loft Manager:** The loft manager shall ensure annual inspection of all personnel parachute assemblies for airworthiness.
2. **Master Rigger:** The master rigger shall inspect damaged or used equipment before repair or disposal, and approve repairs to personnel parachutes.
3. **Senior Rigger:** The senior rigger is responsible for the airworthiness of each parachute packed. During packing, the rigger shall conduct a visual inspection of the canopy, container, and other accessories.
4. **Spotter and Cargo Dropper:** The spotter and cargo dropper shall inspect personnel and cargo parachute assemblies before their use.
5. **Smokejumper:** The smokejumper shall inspect harnesses, parachutes, and other equipment before use to ensure airworthy condition, proper attachment, adjustment, and packing date.

8.11.2 Canopy Inspection and Repair

1. **Suspending:** Suspend all canopies by the apex in the tower to inspect before packing. Shake out or remove by hand all twigs, grass, and debris. Thoroughly check the inside of the canopy for foreign objects.
2. **Drying:** Hang damp canopies until thoroughly dry. Lines should hang straight while drying.
3. **Inspecting:** Starting at the stamped gore, examine the entire canopy, gore by gore from perimeter to apex. Remove twigs and tree needles lodged in the cloth. Lower the apex to within 6 feet of the floor to allow close examination of the upper sections, apex bridle cords, and vent hood. Inspect for damage, rips, tears, line burns, frayed spots, or any foreign substance such as mud, grease, pitch, or fire retardant, that may affect the parachute's serviceability. Inspect the top of each slot closely for damage from tree landings.
4. **Tagging:** List all damage or required cleaning on the parachute inspection tag, and attach the inspection tag to the parachute riser.

5. **Repairs:** Most parachute loft personnel perform minor repairs and cleaning throughout the year. Parachutes requiring major repairs usually are removed from service by a master rigger and repaired during the winter.
6. **Condemning:** Loft managers shall examine canopies with extensive damage, make a determination of condemnation or major repair, and make an estimate of materials needed for repair. The loft manager shall decide the economic repair limitation of damaged canopies.

8.11.3 Container Inspection

Closely inspect each container for damage or wear affecting air-worthiness.

8.11.4 Harness Inspection

Because the harness is the most important single item worn by the parachutist, make a detailed examination of the harness. Carefully check the following items:

1. **All Stitching:** Check for excessive wear.
2. **Webbing Members:** Check leg, back, chest, and main sling for excessive wear.
3. **Hardware:** Check for corrosion, damage, and proper functioning.
4. **Canopy Releases:** Check for corrosion, damage, and proper functioning.

8.11.5 Packed Parachute Inspection

Inspect the condition of all packed reserve and emergency parachutes after use in jumping, spotting, and cargo missions. Check for the following:

1. **Dampness:** It should not be damp.
2. **Ripcord Safety Thread and Seal:** These should be intact.
3. **Pin Seating:** Pin should be fully seated, not bent, loose, or jammed.
4. **Ripcord Handle:** Check placement and pocket condition.
5. **Flaps:** Check arrangement and general tidiness.
6. **Tacking:** Tacking should not be broken.
7. **Packing Date:** Packing date should not be expired.

8.12 Equipment Repair Standards

Maintaining and repairing smokejumper parachute equipment requires high standards, detailed instructions, qualified personnel, and adherence to specified

procedures. Maintain these high standards through close supervision by qualified personnel and the development and use of specifications and instructions pertinent to the equipment being maintained.

8.12.1 General

Maintain smokejumper equipment according to the following standards:

1. **Original Condition:** Use materials and construction techniques defined in the manufacturer's specifications.
2. **Airworthiness Condition:** A master rigger shall determine airworthiness consistent with FAA governing parachute equipment and accepted industry practices when FAA specifications do not provide specific instructions.
3. **Economic Repair Limitations:** A master rigger shall determine when parachute equipment is beyond economical repair.
4. **Parachute Alteration or Modification:** Obtain approval from the Chief of the Forest Service before making any alterations or modifications to personnel parachute equipment.

8.12.2 Repair Authority

Federal Aviation Regulations (FARs) define the Chief, Forest Service, as a parachute manufacturer. The FARs state that the Forest Service must repair and maintain parachutes according to the manufacturer's instructions.

The ISMOG contains instructions on maintaining and repairing Forest Service personnel parachutes. Use these instructions to train Forest Service parachute riggers and as a reference for quality of parachute loft work. The prescribed methods have been field-tested and meet Forest Service safety and efficiency standards.

Repairs or other work not covered in these instructions shall conform to the best industrial practice or, in the case of military equipment, shall conform to military instructions provided with the equipment.

The parachute master rigger is responsible for inspecting and approving major repairs on personnel parachutes.

8.12.3 Minor Repair Standards

Minor repair of parachute assemblies shall conform to the following standards:

1. **Small Tears:** Small rips and tears with no material missing may be darned. Six inches is the maximum linear tear that may be darned. Adhesive repair tape may

be used for temporary repair of minor canopy damage. The edges of adhesive tape must be stitched.

2. **Suspension Lines:** Minor repair is limited to re-stitching of broken thread and whipping of small area of damaged sheath. Sheath damage not exceeding 1-inch in length may be repaired by whipping. Replace any line requiring such repair at more than three places.
3. **Anti-Inversion Net:** The braided nylon anti-inversion net is a 3-3/4-inch mesh net, 18-inches wide. It is sewn to the inside of the lower lateral band and suspension lines of a canopy to prevent complete canopy inversions and partial inversions. Repair anti-inversion netting using instructions in Equipment Development Booklet 8051-2604, Anti-Inversion Net Repair, dated June 1980.

8.12.4 Major Repair Standards

Repair smokejumper parachute assemblies according to the following general limitations. In addition, follow the specific repair standards and procedures determined by the manufacturer for specific equipment.

1. **Component Replacement:** Make every replacement of a parachute component in a manner to restore the parachute assembly to an airworthy condition. Use procedures and facilities described in FAR, Part 65.127.
2. **Canopy Sections:** Patch tears more than 6 inches long with new fabric that conforms to the same specifications as the original material. Replace parachute sections and gores whenever the amount of damage indicates that replacement is more economical than patching and darning. Usually, replacing complete sections or gores is less costly than several small patches and darns.
3. **Mesh Sections:** Generally, the same standards are used for mesh repair as are used for canopy section repair.
4. **Suspension Lines:** Do not whip-stitch lines when the inner core of the suspension line is damaged. Such damage requires replacing the entire line. Any damage to solid braided suspension lines requires line replacement.
5. **Risers:** Limit riser repair to re-sewing damaged stitching and replacing filler webbing. Remove all broken sewing threads before re-stitching. Use new thread and stitching that corresponds to the original. Ensure that the filler webbing replacement is the same type as the original. Replace risers that have damaged webbing.
6. **Containers and Deployment Bags:** Inspect parachute containers and deployment bags for holes, tears, broken stitching, burns, abrasions or other damage before each packing. If defective remove the part from service until

repaired to original construction standards. When damage to a part is extensive and costly to repair correctly, condemn and replace it.

7. **Ripcord Pockets:** Confine repair to re-stitching around the pocket. Re-stitching must ensure firm positioning of the handle so that it can be withdrawn with a pull not exceeding 22 pounds.
8. **Harness Repairs:** Make only limited repairs to the harness, which is a critical piece of equipment. Limit repair to replacing defective hardware, such as leg, chest, and back straps, and to re-stitching. Replace parts or condemn the entire harness if appreciably damaged.
9. **Hardware:** Replace damaged hardware with new or known-serviceability equipment. Use extreme care when removing stitching on webbing.

8.12.5 Equipment Repair Manuals and Instructions

Each parachute loft must keep or have available for reference the following documents:

1. **Federal Aviation Regulations:** Parts 21, 37, 65, 91, and 105.
2. **Federal Aviation Administration Grant of Exemption:** Nos. 392 and 392A.
3. **Federal Aviation Administration Advisory Circulars:** Circulars affecting parachutes are listed below:

Table 8.12.5: FAA Advisory Circulars Affecting Parachutes

FAA Advisory Circulars
AC 00 – 1
AC 00 – 2
AC 00 – 41
AC 00 – 44
AC 20 – 62
AC 20 – 90
AC 20 – 100A
AC 21 – 9
AC 21 – 11
AC 43.9 – 1
AC 65 – 5A
AC 105 – 2
AC 183 – 31

Copies of circulars are available from the Department of Transportation at:

Distribution Requirements Section
TAD 482.3
Federal Administration
U.S. Department of Transportation
Washington, DC 20590

4. **FAA Parachute Riggers Handbook:** FAA-H-8083-17. Available online at <http://www.faa.gov/>.
5. **The Parachute Manual (Dan Poynter):** Copies of the latest edition are available from the publisher at the following address:

Parachute Publications
P.O. Box 4232
Santa Barbara, CA 93103
6. **Forest Service Packing and Maintenance Instructions:** Apply to each piece of equipment designed and manufactured for or by the Forest Service.
7. **Military Packing and Maintenance Instructions:** Apply to each piece of equipment manufactured for or by the military services and used by the Forest Service.
8. **Manufacturer's Packing and Maintenance Instructions:** Apply to each piece of commercial equipment that the Forest Service uses.

8.13 Parachute Packing Instructions

Follow the direction below for proper procedure in regard to packing main, emergency, and reserve parachutes. Pack and maintain all commercial and military parachutes according to manufacturer's instructions and FAA regulations.

8.13.1 Due Date

All Forest Service personnel parachutes when packed shall have the due date for repacking clearly recorded on the outside of the container.

8.13.2 FS-14 Main Parachute

Use most current individual packing instructions for the FS-14 parachute system found in the Technology and Development Booklet 0357-2806-MTDC.

8.13.3 FS-14R Reserve Parachute

Use most current individual packing instructions for the FS-14R reserve parachute found in the Technology and Development Booklet 0257-2814-MTDC, FS-14R Parachute Packing Instructions. Reserve and emergency parachute systems approved for smokejumper spotters and cargo droppers to use on smokejumper and paracargo missions are military and commercial models that meet the requirements

of Federal Aviation Administration Technical Standard Order (TSO) C23c or PIA TS 135 for aircraft in the standard category (over 150 MPH).

8.13.4 Butler XTC-500 Parachute

The Butler XTC-500 uses a 26 foot diameter, tri-conical parachute. It is a bias constructed, diaper deployed, 24-gore, steerable canopy. The XTC-500 has been approved by the FAA under TSO C23b, Category B. Use packing instructions for the Butler found in the owner's manual for the Beta Emergency System. This manual must be used with the most current Addendum, and with the most current General Canopy Folding and Packing Instructions. Refer to <http://butlerparachutes.com>.

8.13.5 Strong Enterprise Para-Cushion Model 1045-2 Parachute

The Strong Enterprise emergency backpack parachute model 1045-2 uses a 26-foot-diameter, conical, steerable parachute constructed of low-porosity rip-stop nylon material. It uses a pilot chute and is equipped with soft cones, flexible container, and quick-fit harness. Use packing instructions for the Strong Enterprises Parachute Model 1045-2 found in the undated Strong Enterprises Booklet, The Para-Cushion Back Service Manual, <http://www.strongparachutes.com>.

8.13.6 Cargo Parachute

Cargo parachute failures can cause serious injury to personnel in the aircraft and on the ground. The cargo loss may seriously impact the efficiency of ground operations. To ensure parachute reliability, exercise care in cargo parachute packing operations. The loadmaster or loft manager will maintain and make valuable instructions for all types of cargo parachutes in use at a particular smokejumper base.

9.0 Paracargo Operations

Mobility and safety requires that paracargo equipment and procedures identified in this section are standardized.

9.1 Organization, Personnel, and Staffing

Safe and efficient paracargo delivery depends on qualified personnel and equipment management. Bases shall adhere to standardized equipment and procedural requirements. Each base shall maintain a sufficient organization to support delivery of paracargo.

9.1.2 Loadmaster

The loadmaster is responsible for loading and manifesting personnel, smokejumper gear, paracargo, and freight on aircraft and for load coordination with the pilot and spotter.

9.1.3 Smokejumper Spotter

All paracargo missions will be conducted under the supervision of a qualified smokejumper spotter.

9.1.4 Pilot

Only qualified pilots as defined in Section 3.0 of the ISMOG, FS Section, and in the Interagency Smokejumper Pilot Operations Guide (ISPOG) shall fly paracargo missions.

9.2 Personal Protective Equipment

Personal protective equipment is required for mission personnel and includes the following:

1. Nomex clothing.
2. Gloves.
3. An approved backpack emergency parachute and tether; or an approved harness/tether and quick attach emergency parachute. Either system used shall incorporate an approved quick release mechanism from aircraft attachment point.
4. An approved helmet.
5. Leather lace-up footwear with non-skid soles.

9.3 Aircraft

Only aircraft approved by SASES will be utilized as paracargo platforms. See ISMOG, FS Section, 5.0 for details. All aircraft shall have:

1. Approved seats and seat belts for all personnel that meet TSO39a Type II requirements. (Refer to ISMOG, FS Section, 5.0.)
2. An in-flight door, safety strap, or other bar device to secure the aircraft doorway.
3. A sharp sheathed knife near the door.
4. An approved cargo restraint system is required for all aircraft cargo loads.

9.4 Paracargo Delivery Operations

9.4.1 Drop Zones

1. On most smokejumper missions, the drop zone will be selected by the spotter and the smokejumper incident commander, in conjunction with the mission pilot.
2. The drop zone should have a safety area and be clear of all personnel during the drop.
3. When necessary, qualified personnel will be at the drop zone to provide control during paracargo operations.
4. At a minimum, communications must be established with a pre-identified contact.
5. During large incident support and heavy paracargo operations, the drop zone should be established prior to aircraft arrival and should meet safety guidelines referenced in the most current version of the Incident Response Pocket Guide (IRPG).

9.4.2 Cargo

All aircraft shall be loaded within the specific manufacturer's weight and balance limitations.

1. Each aircraft will have a load calculation completed to determine the useful load and the pilot shall approve it.
2. All cargo must be properly restrained prior to takeoff. Minimum restraint requirements are as follows:
 - a. 9g forward.
 - b. 3g lateral and vertical.

- c. 1.5g aft.
3. The weight of the cargo bundle must be compatible with the capacity of the cargo parachute being used.

9.4.3 Cargo Parachutes

All cargo parachutes (with the exception of 24-foot and larger parachutes) shall incorporate the following features:

1. Line first deployment.
2. Standard personnel static line snap (MS 70120).
3. Standard 15-foot static line with MTDC weak link and with the words “weak link” stenciled on the line.
4. Red risers.
5. Protective flap over static line stows.
6. Cargo loops used on all bundles.
7. Method for securing parachute to bundle.
8. The canopy size, type, and weight range will be stenciled on the riser, and when packed, the container should be labeled similarly.

9.4.4 Cargo Parachute Packing Instructions

1. The loadmaster or loft manager will maintain and make available instructions for all types of cargo parachutes in use at a particular smokejumper base.
2. Package density, or ratio of weight to volume, must be considered for all bundles being dropped. (See Critical Density Table in U.S. Forest Service National Smokejumper Training Guide, Spotter Section, Chapter 2). The critical factor is not weight to volume, but weight to square footage of the largest side of the bundle.
3. Each base shall establish base-specific cargo packaging and strapping instructions.

9.4.5 Delivery

The pilot shall have final authority over all flight decisions.

1. Use a standard left hand pattern when possible.

2. Prior communication with other aircraft in the area must be established before starting the mission. Mission priorities will be established by the Fire Tactical Group Supervisor or in their absence, the spotter/cargo dropper.
3. Drops will be at a minimum of 150 feet AGL.
4. Stacked cargo deployment is only acceptable for tail-gate deployed cargo. (Stacked cargo is two or more pieces of cargo stacked vertically with no attachment to each other and pushed out of the plane all at once).
5. Communication must be maintained between the spotter/cargo dropper and the pilot. The spotter will notify the pilot of bundle type and number and when they are ready to deploy the cargo. The pilot will notify the spotter when the plane is turning final.
6. The signal for deploying the cargo shall be:
 - a. “On Final.”
 - b. “Short Final.”
 - c. “Standby.”
 - d. “Kick.”

9.4.6 “Four C” Check

The spotter will perform the following “Four C” Check when turning final:

1. **Clipped:** the static line is hooked up to the anchor cable.
2. **Clear:** the static line is clear.
3. **Clean:** the cargo chute is cleanly attached to the bundle and any attachments are cleanly attached.
4. **Controlled:** the cargo bundle is under control in the door.

9.5 Emergency Procedures

Emergency procedures for paracargo missions are standard for smokejumping missions. Reference the U.S. Forest Service National Smokejumper Training Guide and Section 7.0 of the ISMOG, FS Section, for critical and non-critical emergency procedures.

10.0 Ram-Air Parachute System

10.1 Standard Operating Procedures

See the U.S. Forest Service Ram-Air Parachute System Transition Operations Plan (updated annually) for guidance related to Forest Service ram-air standard operating procedures. Also, see U.S. Forest Service Ram-Air Training Guide when completed.

10.2 Equipment Standards

See the U.S. Forest Service Ram-Air Parachute System Transition Operations Plan (updated annually) for guidance related to Forest Service ram-air equipment standards. Also, see U.S. Forest Service Ram-Air Training Guide when completed.

11.0 Appendices

11.1 Smokejumper Base Review Checklist

Reserved for the Smokejumper Base Review Checklist which is currently being revised.

11.2 U.S. Forest Service Smokejumper Training Guide

The Forest Service Section of the Interagency Smokejumper Operations Guide incorporates by reference all direction contained in the most recent version of the U.S. Forest Service Smokejumper Training Guide.

11.3 U.S. Forest Service Ram-Air Parachute Training Guide

The Forest Service Section of the Interagency Smokejumper Operations Guide incorporates by reference all direction contained in the most recent version of the U.S. Forest Service Ram-Air Parachute Training Guide (RATG).

11.4 U.S. Forest Service Ram-Air Canopy Evaluation Plan

The Forest Service Section of the Interagency Smokejumper Operations Guide incorporates by reference all direction contained in the most recent version of the U.S. Forest Service Ram-Air Canopy Evaluation Plan.

11.5 Smokejumper Incident Response Flowchart

Reserved for the Smokejumper Incident Response Flowchart which is currently under development. When this flowchart is finalized, it will serve as a tool smokejumpers may use to help determine notifications and reporting needs for serious injuries, aircraft issues, and/or equipment malfunction or abnormalities.

11.6 Smokejumper EMS (SEMS) Hospital Liaison Guidelines

Reserved for the Smokejumper EMS (SEMS) Hospital Liaison Guidelines which are currently under development. These guidelines are intended to assist Smokejumper Program personnel who may serve as an advocate for an injured employee.

12.0 References Cited

- Accident Investigation Guide, www.nifc.gov/safety/accident_resources.htm.
- Code of Federal Regulations.
- Equipment Development Booklet 8051-2604, Anti-Inversion Net Repair, June 1980.
- FAA Parachute Riggers Handbook, FAA-H-8083-17, <http://www.faa.gov/>.
- Federal Aviation Administration Advisory Circulars.
- Federal Aviation Administration Grants of Exception: Nos. 392 and 392A.
- Federal Aviation Regulations.
- Forest Service Handbook(s), including FSH 5709.16, Flight Operations Handbook.
- Forest Service Manual(s), including FSM 5700, Aviation Management.
- Interagency Mixed Load Procedures Document.
- Interagency Smokejumper Operations Guide (ISMOG).
- Interagency Smokejumper Operations Guide, BLM Section.
- Interagency Smokejumper Pilot Operations Guide (ISPOG).
- The Parachute Manual (Dan Poynter), Parachute Publications, Santa Barbara, CA.
- Professional Smokejumper Pilot video.
- Professional Smokejumper Spotter video.
- Smokejumper Aircraft Evaluation Plan, Missoula Technology and Development Center, 8251 2809.
- U.S. Forest Service National Smokejumper Aircraft Contract.
- U.S. Forest Service National Smokejumper Training Guide, 2008.
- U.S. Forest Service Ram-Air Parachute System Implementation Project, Change Management and Implementation Plan (CMIP), June 2015.
- U.S. Forest Service Ram-Air Parachute System Implementation Steering Committee Charter, July 1, 2015.
- U.S. Forest Service Ram-Air Parachute System Transition, Operations Plan, 2016.
- U.S. Forest Service Smokejumper Base Managers Council Charter, March 18, 2015.

X-118 Physical Requirements for Forestry Technician, Smokejumper.

13.0 Acronyms

Acronyms Used in ISMOG, Forest Service Section

Acronym	Full Text
AGL	Above Ground Level
BLM	DOI Bureau of Land Management
CFR	Code of Federal Regulations
CPR	Cardiopulmonary Resuscitation
CRM	Crew Resource Management
CSA	Controlled Substances Act
DOI	U.S. Department of Interior
EMT	Emergency Medical Technician
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FS	USDA Forest Service
FSH	Forest Service Handbook
FSM	Forest Service Manual
IRPG	Incident Response Pocket Guide
ISMOG	Interagency Smokejumper Operations Guide
ISPOG	Interagency Smokejumper Pilot Operations Guide
KCAS	Calibrated Airspeed in Knots
LCES	Lookouts, Communications, Escape Routes, and Safety Zones
MARS	Malfunction Abnormality Reporting Systems
MTDC	Missoula Technology and Development Center
NIAC	National Interagency Aviation Council
NWCG	National Wildfire Coordinating Group
OPM	Office of Personnel Management
OWCP	Office of Workers' Compensation Programs
PG	Personal Gear
PT	Physical Training
RATG	USFS Ram-Air Parachute Training Guide
RATM	BLM Ram-Air Parachute Training Manual
SASES	Smokejumper Aircraft Screening and Evaluation Subcommittee
SJBMC	Smokejumper Base Managers Council

Acronym	Full Text
STC	Supplemental Type Certificate
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USL	Universal Static Line

14.0 Glossary

Accessory -- For a parachute, the part of a parachute assembly necessary to complete the unit as designed by the manufacturer; for example, a parachute pack retaining belt. For an aircraft, a device that smokejumpers use, such as a step or static line cable, to facilitate the delivery mission.

Accordion Folding -- The act of folding the pleated parachute canopy into the container or deployment bag.

Active Smokejumper -- An individual who meets all of the current smokejumper training requirements and maintains parachute jumping currency throughout the season.

Apex -- The uppermost part of a parachute canopy.

Approved Exit -- A standardized body position that the smokejumper assumes immediately before and when exiting the aircraft. Approved exit positions vary, depending on the type of aircraft and the accessories used.

Assistant Spotter -- A qualified smokejumper who assists the smokejumper spotter.

Auxiliary Parachute -- A reserve parachute that is part of a dual parachute system. It is used for an emergency when the main parachute malfunctions or cannot be used.

Booster Crews -- Smokejumper crews temporarily assigned to a smokejumper base as reinforcements during periods of high fire activity.

Breaktape/8-Cord -- A thread or tape tied between parachute components and intended to break during deployment under a pre-determined load.

Buddy Check -- A pre-jump equipment safety check performed for each smokejumper by another appropriately qualified smokejumper. If performed by appropriately qualified spotter it is referred to as a Spotter Check.

Burned Line -- A section of a parachute suspension line partially fused or melted by friction caused by the line being pulled rapidly across an object or another piece of material. The burned portion of the line usually is hard and looks glossy and discolored,

Canopy -- The part of a parachute assembly involving the suspension lines which supports the load to be delivered.

Cargo Parachute -- A parachute used to drop materials such as tools, food, water, and supplies.

Cargo Static Line Weak Link -- A tab or stitching incorporated between a cargo static line snap and the static line, designed to brake or release at a pre-determined load.

Container -- The part of a parachute assembly that contains a folded canopy and suspension lines.

Critical Emergency -- An emergency requiring immediate action to prevent or reduce the loss of life, limb, or property.

CRM -- Crew Resource Management.

Deployment Bag -- A container that provides sequential parachute deployment, retaining the canopy until the suspension lines are fully deployed.

Detail -- A prearranged assignment to another base or facility.

Door Boot -- An aircraft accessory that provides an unobstructed and smooth surface around the door of a smokejumper aircraft.

Door Fairing (Wind Deflector) -- An aircraft accessory installed on the forward side of a smokejumper door to deflect airflow.

Drift Streamer -- A weighted device dropped from an aircraft to predict wind drift and to estimate aircraft altitude above the drop zone.

Drop Zone -- A specified landing area on which personnel or cargo intend to land. See also "Jump Spot."

Emergency Parachute -- A parachute intended for emergency use only.

Exit Point -- A point determined by the spotter where the smokejumper receives the signal to exit the aircraft. It is sometimes referred to as the "Release Point."

Exit Tower -- The exit tower is utilized to teach smokejumpers how to attain proper body position while exiting the aircraft. It also simulates a parachute's opening shock. The tower should have accessories to teach all types of aircraft exits.

Floor Panels -- Durable materials installed over standard aircraft flooring to provide additional protection for heavy cargo and operational abuse.

Gore -- The area of a parachute canopy surrounded by two adjacent radial seams, the apex band, and the skirt band.

Handrail -- An aircraft accessory around the exit door that smokejumpers and spotter use as a handhold.

Hardware -- All metal parts associated with parachutes, parachute assemblies, and suspended loads.

Harness -- The part of a parachute assembly designed to carry the body or object and to attach the canopy to its load.

Helmet -- Protective headgear that smokejumpers and spotters wear.

High-Impact Cargo -- A method of paracargo delivery using a parachute with a rate of descent that exceeds conventional delivery methods, but does not reach the terminal velocity achieved in free fall.

“Hit it” drills -- A pre-jump exercise for suited up smokejumpers to review their emergency and malfunction procedures prior to a jump. Generally performed on the ramp outside of the aircraft. This exercise is generally led by the spotter.

“Hook up” -- A signal for smokejumpers to attach static line snap to the aircraft static line cable.

In-flight Door -- An aircraft door that can be opened and/or removed and secured in-flight to accommodate smokejumping and paracargo operations.

Injury -- MTDC injury definitions used for compiling smokejumper injury data. These definitions of “injury” are used for smokejumper statistical data only:

Serious Injury – Any injury which requires hospitalization for more than 48 hours; results in a bone fracture except simple fractures of toes or fingers; causes severe hemorrhage, nerve, muscle or tendon damage; involves an internal organ; and/or second or third degree burns or burns over more than 5 percent of the body.

Minor Injury – Any injury less severe than a Serious Injury.

Precautionary Report – Any incident that results in the completion of a CA-1, but is less severe than a Minor Injury (not off the jump list as fully functioning smokejumper).

Forest Service Mixed Load Document -- Developed as a reference guide for use by BLM and USFS smokejumper programs in order to provide guidelines for mixed-load parachute operations.

U.S. Forest Service National Smokejumper Training Guide -- Developed for the interagency training of smokejumpers and supervisory personnel in smokejumping operations, techniques, procedures, principles, and policies.

Inversion -- A parachute deployment in which the canopy has turned inside out.

IRPG -- Interagency Response Pocket Guide.

Jump Spot -- A specified landing area in which personnel intend to land.

LCES – Lookouts, Communications, Escape Routes, and Safety Zones

Letdown Line (Tape) -- Tubular nylon webbing that suspended smokejumpers use to execute a letdown or rappel from a tree landing.

Letdown Simulator -- An apparatus used to teach smokejumpers correct timber letdown procedures.

Loadmaster -- Works closely with the pilot of each aircraft and is the person responsible for aircraft manifesting including; weight, balance, loading, and unloading of personnel, equipment and paracargo.

Loft -- A facility used for storing, rigging, and maintaining parachute assemblies.

Low Pass -- The act of flying low over an incident or jump spot for the purpose of reconnaissance and/or identifying hazards.

Main (Backpack) Parachute -- The principle parachute of a dual parachute system that is worn on a smokejumper's back and used for intentional jumping.

Maintenance -- The inspection, overhaul, repair, and replacement of parachute equipment.

Major Repair -- Extensive repair or replacement of parachute equipment that may affect air worthiness if done improperly. Major repair includes replacing panels, lines, and hardware.

Malfunction -- Any parachute system abnormality that requires a reserve parachute activation.

Master Action Database -- A web-enabled, centralized database to track smokejumper activity that allows each base to generate reports for personnel such as Smokejumper Qualifications, Last Day Off, and Date of Last Jump.

Master Parachute Rigger -- A Federal Aviation Administration certificated parachute rigger who has the experience, knowledge, and skill required for a master rigger in Federal Aviation Regulations, part 65.

Minor Repair -- A parachute repair task that is less demanding and serious than a major repair, including stitching and repairing small tears and holes in canopies.

Missoula Technology and Development Center (MTDC) -- One of two Technology and Development Centers of the U.S. Forest Service. MTDC includes the U.S. Forest Service's Parachute Technology Project.

Mixed Load(s) -- Smokejumper flights that contain personnel equipped with a mix of square and round parachutes.

Mock-up -- A simulated aircraft fuselage used to practice loading, hook-ups and emergency exit.

Modification -- A change in a parachute assembly configuration.

National Smokejumper Program Manager -- Responsible for programmatic oversight of aerial delivery systems.

Non-Critical Emergency -- A situation that can be solved or mitigated without immediately resorting to extraordinary measures.

“On Final” -- For smokejumping, a term used to describe the final leg of an aircraft pattern when dropping smokejumpers or paracargo.

Paracargo -- Equipment and supply items intentionally dropped from an aircraft by parachute, drag chute, or free fall.

Parachute Assembly -- A device consisting of a canopy, harness, container, and accessories that retard the descent of a falling body.

Parachute Landing Fall (PLF) -- A maneuver executed by a parachutist to distribute impact forces during a parachute landing.

Parachute Landing Simulator -- An apparatus that provides the trainee experience in executing a proper PLF.

Parachute Maneuvering Simulator -- A computer simulator that is used to teach smokejumpers correct parachute maneuvering procedures and techniques.

Parachute System -- Term used to describe an overall parachute delivery system.

PG Bag (Personal Gear Bag) -- A bag attached to the smokejumper's harness during parachute jumping that usually converts to a gear pack for operational use on the ground.

Pilot Chute -- A small spring-loaded or hand-deployed parachute that accelerates the opening of a larger parachute.

Pin Check -- A safety check performed on emergency parachutes to ensure they are in safe, usable condition. This includes checking the ripcord pins, re-pack date, and overall appearance of the parachute.

Radial Seam -- A seam in a parachute canopy running radially from the circumference to the apex.

RATG – USFS Ram-Air Parachute Training Guide

RATM – BLM Ram-Air Parachute Training Manual

Release Point -- See Exit Point.

Reserve Knife -- A hook blade knife carried on top of the reserve parachute that the smokejumper uses for emergencies and letdowns.

Reserve (Auxiliary) Parachute -- The secondary parachute that a person making an intentional jump wears.

Re-tread -- A previously qualified smokejumper that refreshes in parachute training to become requalified.

Rigging -- The inspection, minor repair, and re-packing of parachutes, which includes fitting and adjusting harnesses.

Riser -- The part of a parachute assembly connecting the suspension lines to the harness. Risers usually are made from a length of webbing and are attached using connector links or canopy releases.

Roller Track System -- A mechanical roller device installed in the door of paracargo aircraft that facilitates cargo delivery.

Section -- The area of a parachute canopy surrounded by diagonal and radial seams. Sections are numbered upward from the skirt to the apex. The section adjacent to the skirt is number one.

Senior Parachute Rigger -- A parachute rigger certificated by the Federal Aviation Administration as having achieved the experience, knowledge, and skill required for a senior rigger in Federal Aviation Regulations, part 65.

Signal Panels -- An orange colored length of material displayed on the ground in various patterns to convey a ground-to-air message.

SJSIA -- Smokejumper Safety Impact Analysis

Skirt (Lower Lateral Band) -- The reinforced hem surrounding the lower edge of the canopy.

Smokejumper Aircraft Screening and Evaluation Subcommittee (SASES) -- An interagency board of Forest Service and Department of the Interior aviation managers responsible for reviewing and recommending smokejumper and paracargo aircraft and aircraft accessories for evaluation and approval. Representatives from fire and aviation management organizations and smokejumper bases are on the board. Missoula Technology and Development Center (MTDC) personnel serve as technical advisors to the board.

Smokejumper Aircraft Step -- An aircraft accessory (a platform) the smokejumper uses when exiting the aircraft.

Smokejumper Base Manager -- The person who oversees and is responsible for all phases of a local smokejumper program including; administration, operations, loft operations, training, fire operations, aircraft, etc.

Smokejumper Check Spotter -- An experienced smokejumper spotter designated by their home base manager to train and qualify smokejumper spotters.

Smokejumper Loft Manager -- The person responsible for loft administration including; parachute rigging and training, manufacturing of equipment, maintain of loft supplies, parachute records, etc.

Smokejumper Operations Manager -- The person responsible for the daily operational functions of a local smokejumper program (including staffing, priorities, organizing work projects, and record keeping).

Smokejumper Spotter -- An aircraft crew member responsible for selecting jump spots, drop zones, directing delivery of personnel and cargo, navigating, and managing smokejumper and paracargo delivery missions. The spotter must be an active smokejumper and hold a squad leader position or above.

Smokejumper Suit -- Protective clothing worn by smokejumpers. Sometimes called a “jump suit.”

Smokejumper Training Manager -- The person responsible for planning and implementation of all training activities of a smokejumper program with the exception of parachute maintenance, rigging and repair.

Smokejumper-in-Charge -- The smokejumper designated to lead an activity or project, such as a practice jump, training activity, or work project.

Spike Base -- A site for conducting smokejumping operations on a temporary basis. Spike base operations may range from the pre-positioning of a crew of smokejumpers with aircraft and equipment on a one day assignment at a designated airstrip to the seasonal assignment of smokejumpers on a recurring schedule at predetermined locations.

Spotter Communications Panel -- An accessible aircraft audio panel that enables the spotter to communicate with the pilot, other aircraft, and ground personnel over intercom, FM, and VHF radio frequencies.

Spotter-in-Charge -- When multiple spotters are on board a smokejumper aircraft during a mission, a spotter-in-charge is designated to lead spotting activities.

Spotter’s Check -- A pre-jump equipment safety check performed for each smokejumper by an appropriately qualified spotter. If performed by another appropriately qualified smokejumper, it is referred to as a Buddy Check.

Spotting -- The act of determining wind drift, altitude, jump hazards, jump spot, exit point, and signaling the smokejumper to exit the aircraft.

Static Line -- A line attached to an anchor point or cable in an aircraft and to the parachute, which initiates deployment of the parachute as the load falls away from the aircraft.

Static Line Anchor -- An aircraft accessory, usually a cable or ring, to which static lines are attached to deploy personnel and paracargo parachutes. Static line anchors also restrain tethered personnel working near the open door of an aircraft.

Static Line Monitoring Device -- A device used to keep smokejumper static lines free and clear of entanglements during smokejumper aircraft exiting procedures.

Stick -- One to three smokejumpers who exit an aircraft during a single pass over the exit point.

Supplemental Type Certificate (STC) -- A Federal Aviation Agency term for modification, addition, or deletion to an aircraft appliance or structure that affects the original type certificate and requires supplemental approval.

Suspension Lines -- Nylon cord or webbing or other fabric that connects the parachute canopy to the risers or harness.

Tether Harness -- A harness that spotters and cargo droppers wear from which a line or tape is attached to an anchor point or auxiliary cable to keep personnel from falling out of the open door of an aircraft.

Tree Climbing Gear -- Equipment consisting of a belt, spurs, and a rope that smokejumpers use to retrieve cargo and parachutes from trees.

Vent -- The opening at the top of the apex of a parachute canopy.