Standards for Smokejumper Pilot Operations

Standards for Smokejumper Pilot Operations – Mar 2026

Approvals

This revision of the Standards for Smokejumper Pilot Operations is approved as follows:

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APPLICABILITY: This Bureau of Land Management and United States Forest Service (BLM/FS) operational document provides information and guidance to their respective employees and contractors. Where stated, the use of "will", "shall", or "must" is considered mandatory. The use of "should" or "may" is considered good practice, but not mandatory. Contract Smokejumper Pilot compliance is limited to those sections of this publication specifically stipulated in their contract.

ACCESSIBILITY: Electronic downloading is the primary means of distribution for this Interagency Guide: https://www.fs.fed.us/fire/aviation/av_library/

This Guide will be reviewed on a biennial basis. When updates are due, the Forest Service and the Department of Interior (OAS and BLM) will bilaterally facilitate updates and approve those updates through the NIAC approval process.

SUPERSEDES: 2018 Interagency Smokejumper Pilot Operations Guide (ISPOG)

WAIVER AUTHORITY: Waivers from this guide will be handled per the policy of the agency seeking the waiver.

SUMMARY OF CHANGES: This document has been substantially revised and must be completely reviewed.

Table of Contents

1.0 Introduction

1.1 Introduction

A smokejumper aircraft assigned to support wildland fire activity will be utilized in a variety of operations (e.g. transportation, reconnaissance, airdrop, jumper retrieval, etc.). These operations are usually short-range missions from a main operations base. It is common practice to preposition aircraft to airports adjacent to the dispatched area to be covered. Many of these airports are established seasonally or as spike bases.

1.2 Overview

This pilot guide has been prepared to establish standard procedures for operating smokejumper and paracargo aircraft in Alaska and the lower 48 states. Operations conducted in Canada will be determined in conjunction with Air Canada and the Canadian Smokejumpers upon request and will be in accordance with the International Mobilization Guide. Included is a training and evaluation chapter that complements the Smokejumper syllabus.

1.3 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 and Bureau of Land Management. Core duties of 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, grasslands, and rangelands.

2.0 Smokejumper Operations

2.1 General

Smokejumpers are considered a unique 'initial attack asset' due to their ability to respond quickly and staff fires. The Interagency Dispatch system exercises operational control of the deployment, employment, and demobilization of jumpers based on fire activity in relation to regional and national resource availability.

2.2 Communications

The Smokejumper Spotter is in control of the mission, while the Pilot-in-Command (PIC) is in charge of aircraft safety. This dynamic requires continuous clear communication and coordination between crew members. When missions and airspace become complex, the importance of being clear and concise becomes more critical. Aircrew should monitor assigned frequencies prior to arriving on-scene and anticipate higher complexity scenarios. Pre-briefing a communications plan allows fires to be staffed rapidly and efficiently while providing required air traffic separation with other incident aircraft. Establishing good crew communication techniques cannot be overemphasized; and directly equates to operational efficiency.

2.3 Roles and Responsibilities

Pilot(s):

1. Ultimate safety of flight responsibility.
2. Continually assesses and manages operational risk.
3. Aircraft preflight/postflight.
4. Weather, Notice to Airmen (NOTAMS), and Temporary Flight Restriction (TFR) planning.
5. Confirms firefighters and cargo are properly loaded / secured.
6. Navigation.
7. Communication with all Air Traffic Control (ATC) entities and non-incident aircraft.
8. May coordinate with incident aircraft as delegated from the spotter or mission coordinator.
9. Confirms airspace, Fire Traffic Area (FTA), clearance has been granted to the spotter / mission coordinator from the resource currently controlling the FTA (ATGS, ASM, IC, etc.).
10. Selects cargo drop pattern and gives the 'kick' command.

Spotter(s) (Compliments and Expands on the Standards for Smokejumper Operations):

1. Serves as Mission Coordinator for all aspects of jumper / paracargo flights.
2. Preflight equipment: door latches, static line / anchors, cargo, restraints, jump door, and boot edge.
3. Load manifesting.
4. Ensures pilot briefing and relevant comm / avionics checks are performed.
5. Takes requests from dispatch.
6. Ensures personnel and equipment are properly configured, loaded, and restrained.
7. Continually monitors personnel ground and flight safety (which may involve passenger transport if qualified per agency & aircraft guidelines).
8. Assists in navigation using available maps, and/or GPS.
9. Updates fire coordinates and provides fire size-up to dispatch.

10. Coordinates with ground resources, if applicable.
11. Selects jump spot, analyzes conditions, briefs jumpers, directs pilot over exit point, and gives jumpers the exit command.
12. Ascertains jumper welfare and inventories equipment.
13. Coordinates with pilot to deploy cargo in selected spot.
14. A qualified Smokejumper Spotter coordinates Smokejumper operations with on-scene aircraft over a fire until a qualified ATGS arrives (see Chapter 5 for further considerations).
15. Serves as the primary contact for clearance into the FTA. Coordination with on-scene aircraft may be delegated to the pilot(s) prior to entering an FTA.

2.4 Smokejumper Operations Procedures

Aerial delivery of personnel and equipment into small, open spots in steep, forested terrain requires pinpoint accuracy. Excellent crew coordination and sound judgment must be used if these activities are to be accomplished safely and effectively.

Aircrew should ready the aircraft as soon as possible after reporting for duty by completing preflight. Quick-turn checklists should be used whenever authorized.

Aircrew are required to travel and must be ready for assignments away from their duty station at all times. An initial attack order can develop into an extended stay at an outstation or another jump base.

2.5 Loading and Unloading Smokejumpers

The following procedures must be followed:

1. A qualified pilot must be in the cockpit if engine(s) is running.
2. The spotter directs Smokejumper loading but may delegate responsibility to ground personnel. The spotter should never leave the aircraft with jumpers on board or engines running without first informing the pilot.
3. For "Hot Loading" a qualified Fixed Wing Parking Tender or Smokejumper Spotter (Interagency Aviation Training) must be present (can be spotter supervising loading), and aircrew member escorts with both engines running / left engine feathered (see 351 DM 1.5).

2.6 En route

Flight crews should fly the most efficient route possible without compromising safety. Unless otherwise instructed by ATC, aircraft responding to, or operating over wildland fire operations shall use transponder code 1255. Unless delegated to the pilot, the spotter will make a radio call to other aircraft (or in the blind) at least 12 miles from the fire (see Chapter 5 for expanded discussion on Communications in the FTA). The pilot(s) shall ensure pulse lights are on, and complete mission checklists prior to reaching the fire.

Terrain Awareness & Warning System (TAWS) and/or Ground Proximity Warning System (GPWS) should be enabled and operating for all en route segments. Both systems may be silenced and/or disabled during Smokejumper or Paracargo operations upon arrival in the FTA. Smokejumper checklists are specific to aircraft type but shall include checking the status of these systems before entering and exiting the FTA.

2.7 Maneuvering

If an aircraft is equipped with an inflight door, prior to maneuvering the aircraft for jump spot selection, the pilot will notify the spotter when they can open the inflight door. The pilot must maneuver the aircraft in a manner to provide the spotter and Smokejumpers with an unobstructed view of the fire and surrounding area. This is usually best accomplished by establishing a left-hand orbit approximately 1,500 feet above the incident. The spotter selects the jump spot and then identifies it to the pilot. The pilot should plan the final approach into the direction of the wind unless terrain or visibility restrictions make this unsafe. Any change from a standard left-hand, into-the-wind pattern should be agreed on by the pilot and spotter. Left turns allow the spotter (and jumpers) to observe the intended jump spot, the behavior of streamers, and jumpers during their exit, descent, and landing.

Additionally, it helps orient jumpers in the aircraft to the location of the fire in relation to the jump spot and general lay of the country.

2.8 Low Pass or High-Low

There are two approved (pre-jump) observation pass techniques:

1. A Low Pass is a flyby offset to the right of a proposed jump spot at a moderate speed, and nominal altitude of 200 feet AGL.
2. The High-Low is the same as a Low Pass except; it is done no lower than 500 feet AGL. At the discretion of the spotter and the pilot the Low Pass or High-Low may be omitted.

Prior to a Low Pass or High-Low, a high recon must be completed and a safe escape route into descending terrain is determined and briefed.

The Low Pass or High-Low allows the spotter and jumpers to evaluate the jump spot and identify hazards in and around the jump spot. It also allows the pilot to evaluate air conditions and determine an approximate jump spot elevation. When over the intended jump spot the pilot must note the radar altitude and barometric altitude. Jump spot elevation is then calculated by subtracting the radar altitude from the barometric altitude.

2.9 Streamer Line Up

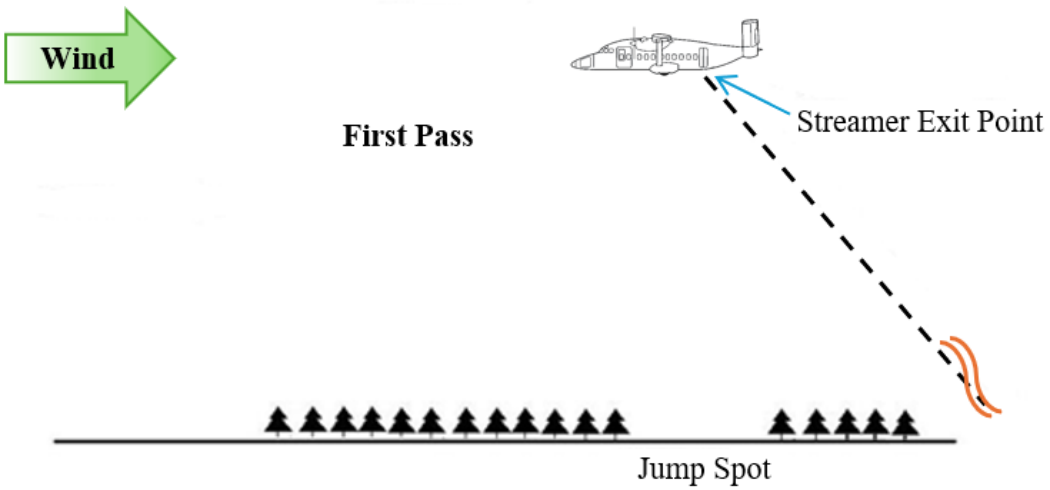
The pilot should plan turns so that the aircraft will be lined up wings-level on final at 1,500 feet AGL above the jump spot; optimally 10-15 seconds from drop. The spotter gives voice commands to initiate pilot corrections (e.g. "**left**" or "**right**"). In the absence of a specified number of degrees, when the spotter simply directs "**left**" or "**right**", the standard heading change is 5°. "**Hard left**" or "**hard right**" commands a 10° heading change. Heading changes greater than 10° will be given as "**left 15°**" or "**right 20°**" etc. All corrections will be executed using standard rate (coordinated) turns. The pilot should primarily use terrain references to align flight path, then backup with directional gyro. Altitude must be held constant throughout (See Figure 2-1).

2.10 Dropping Streamers

Wind direction and velocity is determined by dropping sets of crepe paper (drift streamers). The streamers are weighted to drift and descend at the same rate as the round parachute. The same set of streamers provide conservative data for Ram-Air parachutes.

At least two streamer passes are generally made. On the first streamer pass, normally referred to as "Initial Set" or simply "Initials", the spotter releases the streamers directly over the selected jump spot. The streamers will land downwind indicating wind drift and direction. The spotter reads the drift, then projects a round parachute exit point upwind from the jump spot equal distance to the streamer drift. To verify, a set of "check streamers", referred to as "streamers to spot", is then dropped over the exit point. If calculated correctly, they should drift back and land close to the jump spot. For Ram-Air jumpers, the exit point may be up to double the distance of the round exit point, depending on winds aloft. If the spotter determines the need to drop additional sets of streamers to refine the exit point, they will be referred to as "Check Sets", i.e. the pilot will call out "On final, 1,500, check set".

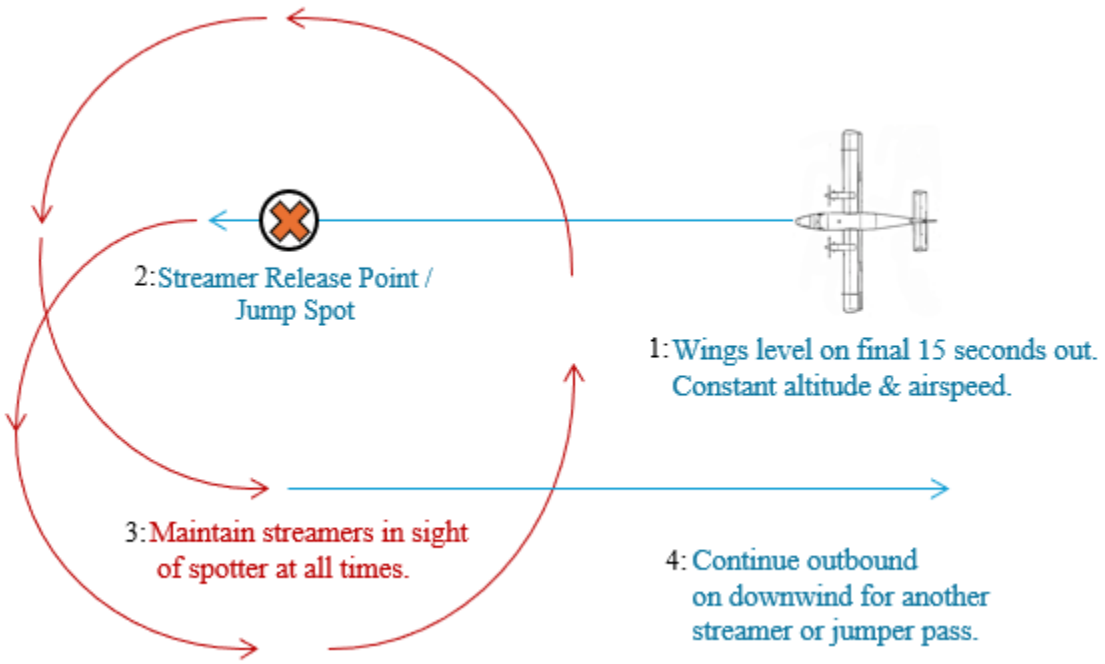
Figure 2-1: First Streamer Pass



For the Initial Set, at the spotter's "**streamers away**" call, the pilot immediately replies with the actual release altitude AGL by calling "####" (based on radar altimeter); then commences a left turn at a bank angle commensurate with aircraft type (approximately 30°, not to exceed 45°). See Figure 2-2. The pilot notifies the spotter that they see the streamers by announcing, **"I have the streamers" or "streamers in sight."** The pilot will also verify or determine the jump spot altitude if not previously completed.

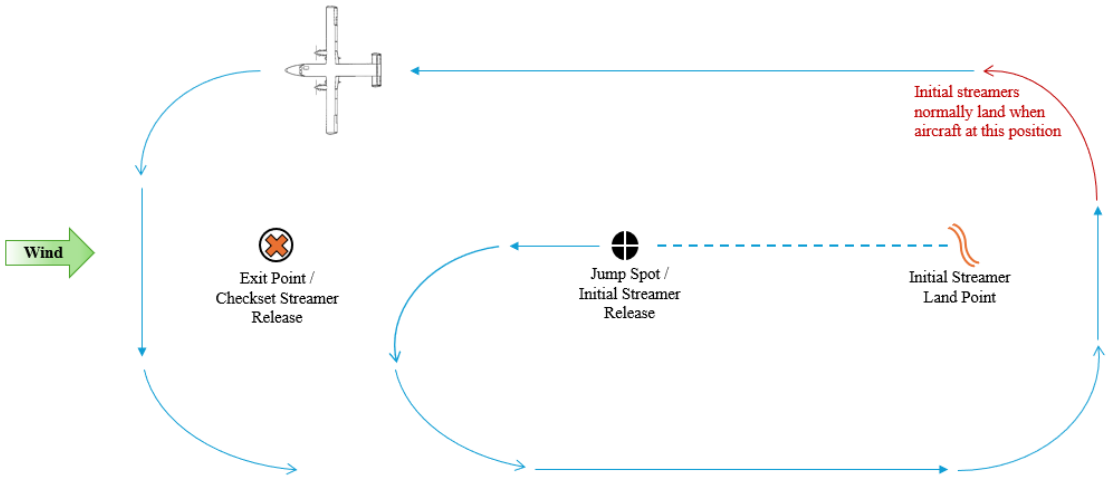
The spotter must be able to observe the streamers at all times in order to determine wind drift, vertical air currents, ground winds, and exit point. The pilot will be able to determine how to maneuver the aircraft "streamers to spot" by watching the streamers. Avoid or minimize steep turns not only for safety, but also because the low wing tends to mask the streamers from jumper view. If the view is blanked out by the wing or fuselage for longer than a few seconds, it may be impossible to relocate them. If the exact point of streamer impact cannot be determined, a pass is wasted. The pilot must be able to locate the streamer landing location for subsequent streamer and jump passes.

Figure 2-2: Standard Streamer Observation Profile



After the initial streamers land (and before flying *streamers-to-spot*), the spotter may request the pilot to **"Fly Parallel Around the Exit Point"** (Figure 2-3). When this request is made, the pilot will fly a line offset right of the initial set of streamers, into the wind, and extend past the estimated exit point. Once the pilot has flown slightly past the release point, the spotter will inform them that the release point has been selected, the pilot can turn crosswind to set-up for streamers-to-spot. The parallel flight and extending past the estimated release point will help the spotter in establishing the proper distance and precise release point. This is also a good opportunity to identify rising terrain upwind from the Jump Spot.

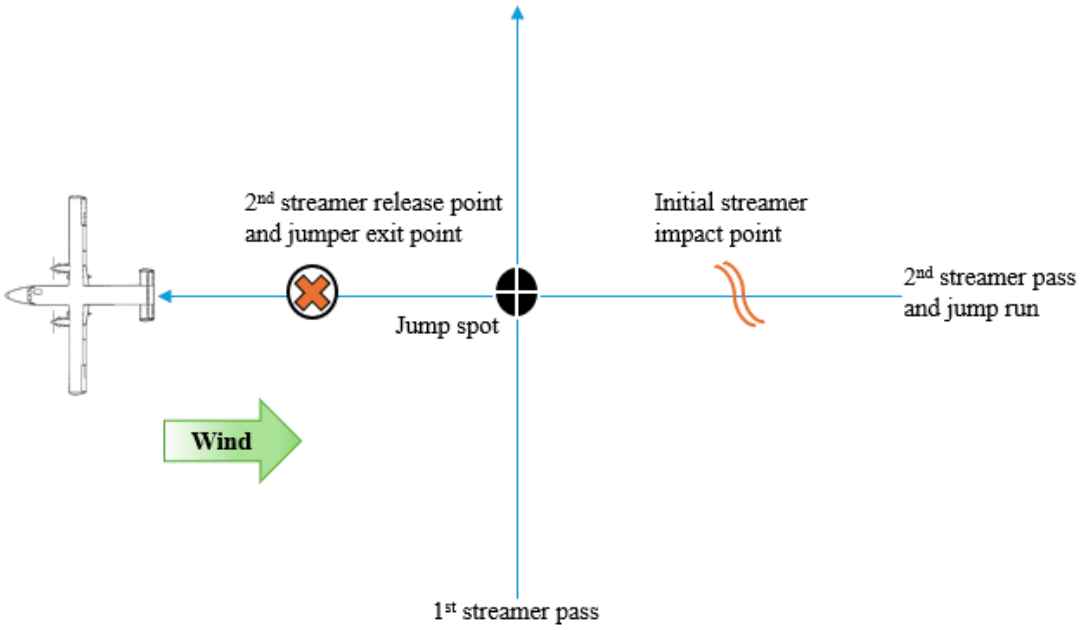
Figure 2-3: Fly Parallel Around the Exit Point



The pilot then turns downwind to set up for *streamers-to-spot*. Unless otherwise required for terrain (or requested by the spotter), pilots will maintain 1,500 feet AGL above the jump spot elevation for all streamer passes, to allow for accurate timing on the part of the spotters. This may mean that streamers are released higher or lower than 1,500 feet AGL above the release point due to variations in surface elevation. When crossing the jump spot, and at the spotters "**streamers away**" call, the pilot will note the Radar Altitude and call out either:

1. "1,500" if the streamer-to-spot / check set release point AGL and jump spot elevations are the same, or
2. The displayed Radar Altitude (if different than 1,500') along with confirmation that they're still flying 1,500 feet above jump spot (e.g., "**1,300' at release, 1,500' above jump spot**"). This raises awareness that ground is rising or falling away in the vicinity of the release point. In this case, the pilot will inform the spotter of the correction they intend to use when going live with jumpers, such as: "I'll increase jump altitude by 200 feet."
3. For ram-air parachutes, the spotter's visual release point is typically an additional 70% further upwind than the check set release point. The pilot will need to account for any additional rising slope and coordinate any additional increase in final ram air jump altitude with the spotter. Depending on urgency, available time, fuel, airspace complexity, etc., the pilot / spotter team should consider flying an extra pattern around the exit point (BLM procedure, see Fig 2-3) or utilize an alternate means of ensuring ≥3,000' AGL during jump operations. One example: Once the spotter has determined the appropriate ram air exit point, is to fly an additional pattern on the streamer-to-spot line. The pilot notes the Radar Altitude over the jump spot and the spotter announces, "Exit Point," when over the computed ram air exit point. The pilot replies with the Radar Altitude at the Exit Point as well as the jump spot as in paragraph 2, announcing and applying the appropriate altitude compensation to ensure 3,000 AGL for live jumpers. In such a situation, however, lee-side effects are possible, and the pilots should be attuned to unusually high power settings necessary to maintain altitude and airspeed, relaying the down-air to the spotter.

Figure 2-4: Second Streamer Pass in Relation to First



The spotter will be timing the descent of the streamers to measure vertical and horizontal air movement (usually 65-70 seconds in vertically calm air). Short descents may indicate dangerous downdrafts which may preclude dropping jumpers or necessitate changing the jump spot.

2.11 Dropping Jumpers

When the spotter is satisfied that all conditions are satisfactory, the spotter informs that they are ready to climb to #### MSL for jumpers. This is the pilot's cue to climb to an absolute minimum of 3,000 feet AGL (or 1,500 feet AGL for Round parachutes) above the jump spot or release point, whichever is higher, prior to dropping jumpers. This altitude is known as the drop altitude or jump altitude. Any increase in altitude should be briefed to the spotter. Since some radar altimeters don't register to 3,000 feet AGL, simple math must be used to calculate the proper barometric altimeter readout. All altitude callouts to the spotter are in AGL, with the two exceptions of jump spot elevation and drop altitude which is in MSL.

For Ram-Air operations, the spotter shall be notified by the pilot when the aircraft is "**stable/level at 3,000 feet**" AGL, to ensure jumpers arm their Automatic Activation Device (AAD) or confirm their Automatic Activation Device is armed. With the AAD system, it is important to be stabilized at 3,000 feet AGL for the jumpers to arm their AAD. If the aircraft is above 3,000 feet AGL when armed (e.g. rough air, bad math), do not descend back to 3,000 feet AGL; stay at the higher altitude. It is better to stay a couple hundred feet high than have the AAD think the jumper is already a couple hundred feet lower than they really are. Unless the altitude deviation is significant there is no need to descend back to 3,000' to rearm the system. If in doubt, communicate with the spotter to determine what constitutes a significant deviation.

Procedures for dropping jumpers are similar to that used for dropping streamers with the following exceptions: drop altitude, slowing on final to a minimum of 1.3 V_{so} or 90 KIAS (whichever is greater), and there is no need to call out the altitude as jumpers exit the aircraft.

A **Standard Pattern** can be established as illustrated in Figure 2-5. Occasionally, topographical hazards or FTA restrictions make it desirable to deviate from a normal, into-the-wind jump pattern. In some cases, a (nonstandard) **Crosswind** (see Figure 2-6), **Downwind** (see Figure 2-7), or **Right-Hand** into the wind pattern (see Figure 2-8) may be requested. However; regardless of pattern type, the exit point will remain the same.

Figure 2-5: Standard into Wind Pattern

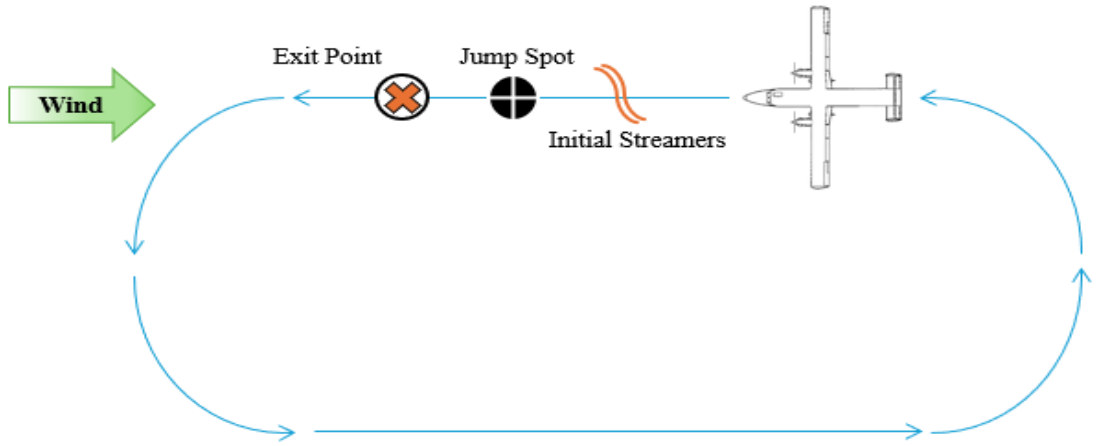


Figure 2-6: Crosswind Pattern (Nonstandard)

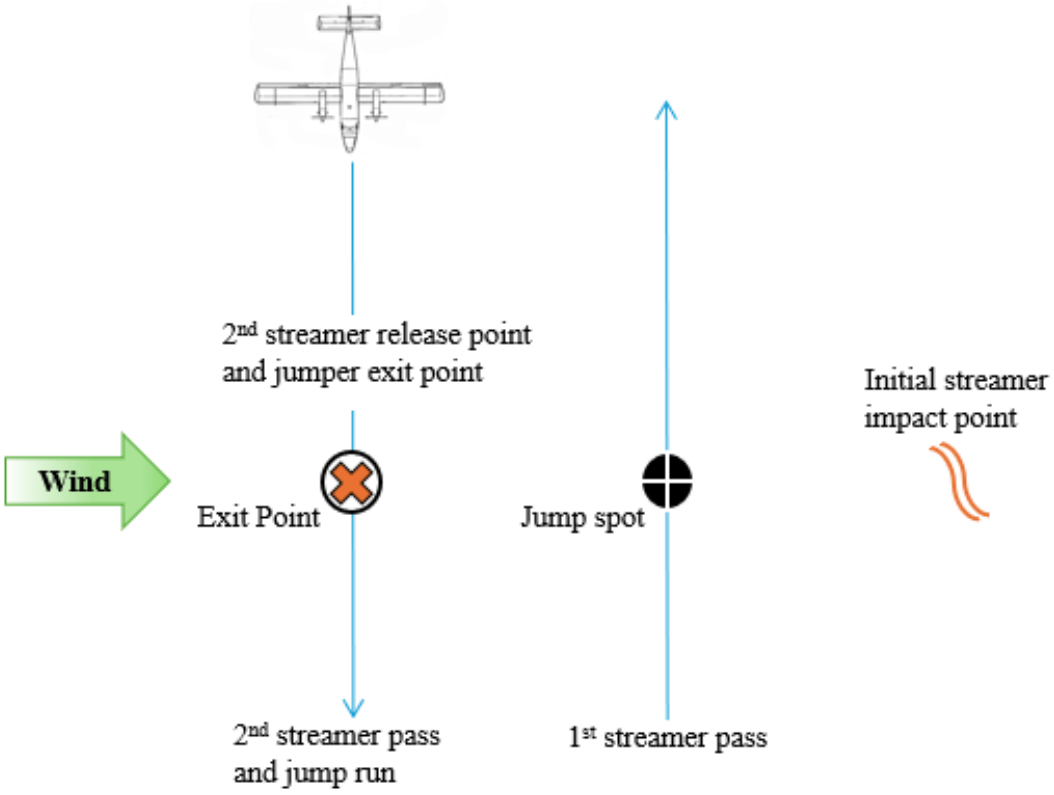


Figure 2-7: Downwind Pattern (Nonstandard)

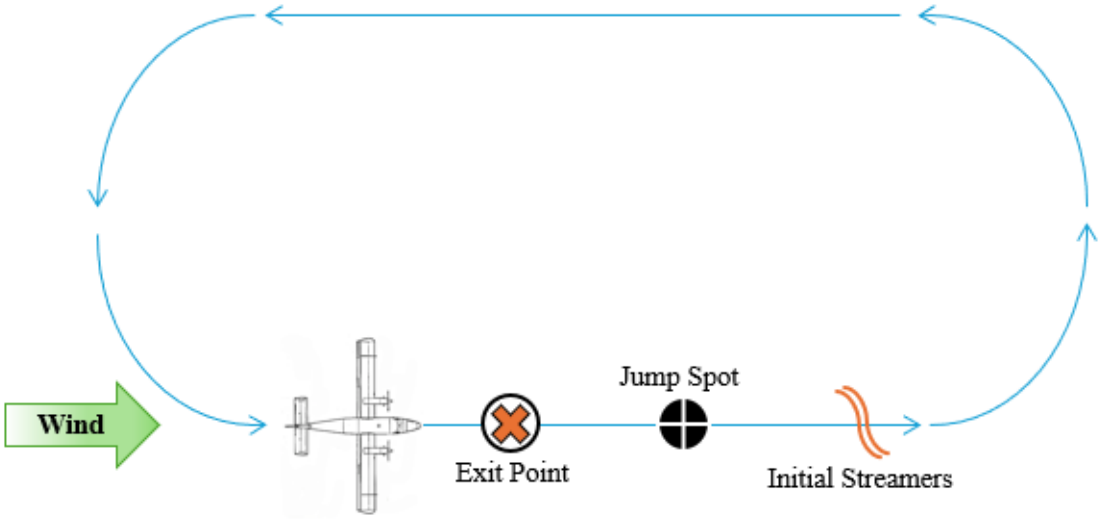
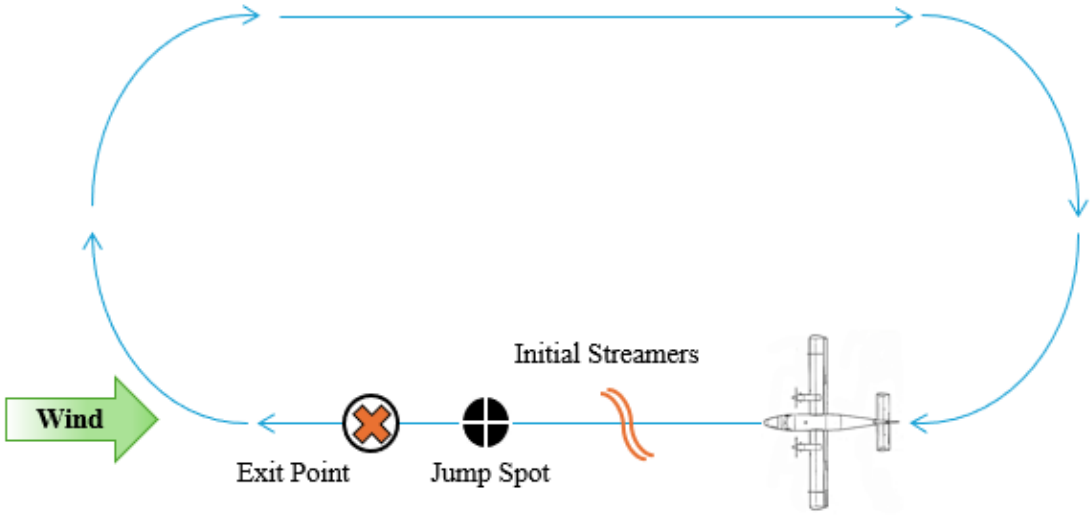


Figure 2-8: Right-Hand Pattern (Nonstandard)



The ideal pattern should allow for no more than a 30° bank with 10-15 seconds on final for the spotter to determine the correct line up and give corrections. The pilot calls "**downwind"** and "**turning base**" for spotter timing and awareness. The pilot should make the call "turning base" several seconds prior to making the turn, this allows the spotter to request that the downwind leg be extended if additional time is needed. When established on final, the pilot will call "**on final, 3,000, squares**" (for Ram-Air canopies) or "**on final, 1,500, rounds**" (for round canopies), as appropriate, noting that if dropping a mixed canopy load, the rounds will exit first. The spotter is not required to acknowledge standard callouts. The spotter calls "**jumpers away**" after each jumper or stick of jumpers has cleared the aircraft. The pilot maintains aircraft heading and airspeed until receiving this command. A turn to the downwind heading, using up to 30° of bank, is then initiated.

2.12 Checking Jumper Status

After the first stick of jumpers lands, the spotter may choose to establish communication with the jumper- in-charge (JIC), before dropping more personnel. This is to confirm: welfare, exit point suitability, anticipated winds, and identify unbriefed jump spot hazards.

After the last jumpers exit the aircraft, the pilot will stay wide on the jump pattern and above the highest jumper so that they can visually follow them to the ground. When the drop is complete and all personnel are on the ground, the spotter confirms with the JIC that there are no injuries. Occasionally, radios may be damaged in the drop, but it is rare that voice communication cannot be established. If necessary, ground visual signals may be used (e.g. orange panels forming the letter "L" indicating everything ok). In any case, communications must be established before commencing paracargo.

2.13 Multi-Jumpship Operations

It is possible that more than one jumpship is dispatched to the same incident during the same timeframe. This has potential to lead to confusion and impact overall safety and efficiency, particularly in a congested FTA. Basic mutual contracts are an effective means of reducing airspace time requirements; and contribute to a safer, more efficient multi-jumpship operation. This section prescribes the interagency considerations and tactics applicable only among

Smokejumper aircraft and is not incorporated in other guides. Therefore, do not assume Aerial Supervisors are proficient assessing or directing these tactics.

Aircrew should provide suggestions to the ATGS / ASM to assist them in sequencing multi-jumpship operations with other assets.

The plethora of scenarios for both initial and extended attack incidents is too great to prescribe nuanced tactics. Therefore, reliance on basic deconfliction concepts below, and inter-aircraft CRM communication is the overarching multi-jumpship plan.

Role Definitions:

- **Primary Jumpship (JS)** – the aircraft with maneuvering priority as well as final decision authority to mix various phases of jump operations.
- **Secondary JS** – the aircraft responsible for maintaining continuous visual deconfliction with the Primary JS.
- **Tertiary JS** – highly unlikely, but the aircraft will hold beyond 7NM when two jumpships are involved on the same incident, roles (Primary or Secondary) will be positively identified and established. Generally, role establishment is based on which aircraft was first over the fire. In the event two aircraft have essentially the same ETA, the aircraft with less loiter time available should be labeled the Primary JS. The aircrew of both jumpships will discuss and confirm their role over the radio. Approaching the fire, the Secondary JS will confirm they have the Primary JS in sight.

Based on the dynamic variables of each incident, either aircraft can suggest a multi-jumpship option that maximizes safety and efficiency. The aircrew on both aircraft must be in agreement to execute multi-jumpship operations; and the Primary JS will have final decision authority when more than one option is feasible.

When there is doubt of the tactical efficacy of both aircraft being in the jump pattern vicinity, the Secondary JS should hold out >7NM or coordinate with Aerial Supervision.

NOTE:

Tandem jump operations where Primary and Secondary JS are both dropping jumpers with minimal timing (less than 20 seconds) is NOT authorized. Tandem jump operations are suitable for round parachutes, but not Ram-Air parachutes.

Observation position (Figure 2-9 & 2-10): When operating in concert, the Secondary JS is responsible for aircraft separation from the Primary JS. The Secondary JS should pick up an "in trail observation position" (Figure 2-9) approximately 1,500' – 1NM behind and slightly right of the Primary JS to adequately allow continual visual monitoring. If ATGS assigned altitudes permit, the Secondary JS should fly 200-300' above the Primary, but never below. Maintaining position outside the Primary JS will typically require flying 10+ KIAS faster through the turns. Due to mission operational needs, the Secondary JS may instead pick up a position "opposite side of the orbit" from the Primary JS to adequately allow continual visual monitoring. In either case, the Secondary JS should continually assess wake turbulence and never be in a position to cause concern for jumpers exiting the Primary JS.

Figure 2-9: In Trail Observation Position

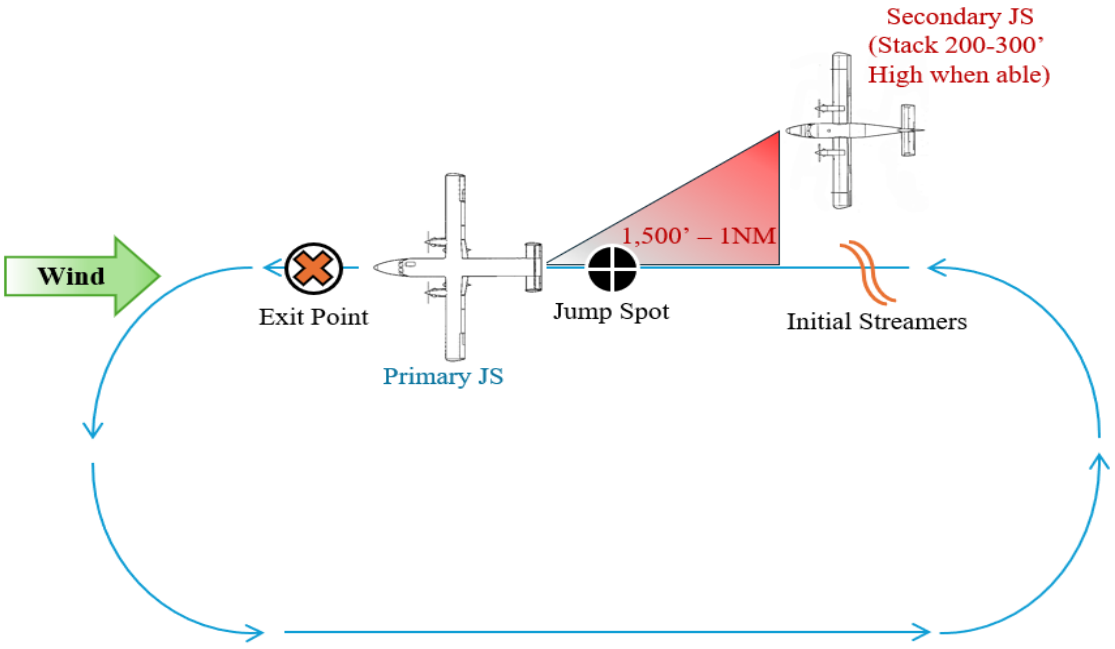
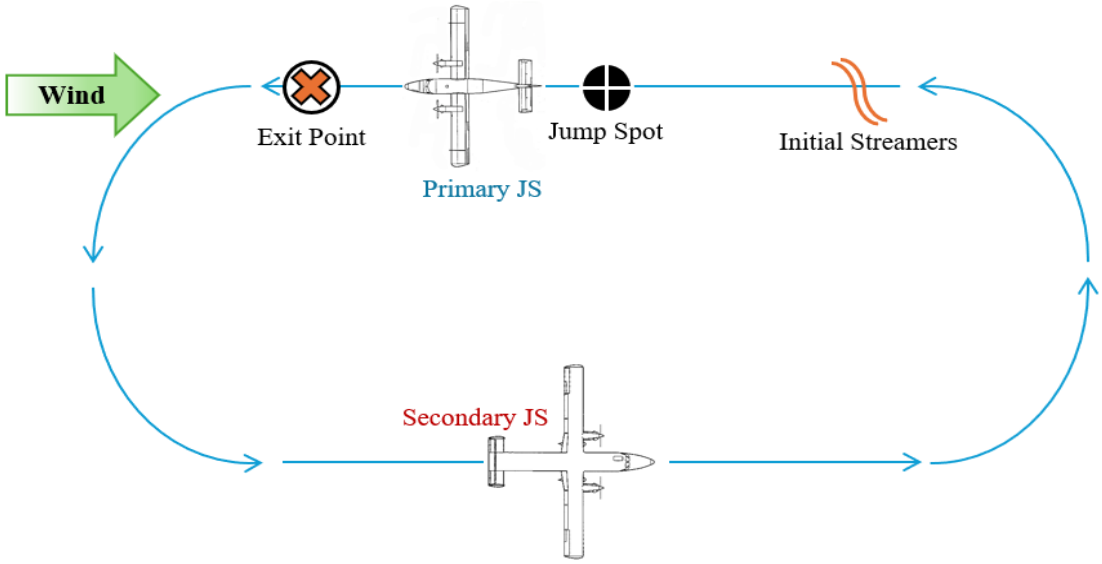
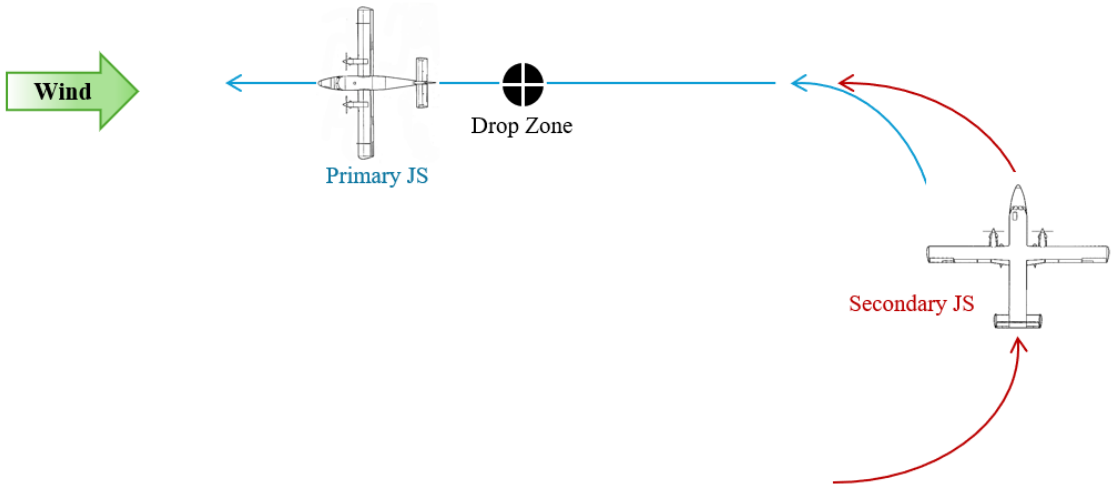


Figure 2-10: Opposite Orbit Observation Position



Cargo Trail Position (Figure 2-11): This position is only utilized for combined paracargo operations on the same cargo spot (see drop zone). The Secondary JS is responsible for aircraft separation from the Primary JS. Possible wake turbulence, challenging terrain, pilot comfort with tandem operations, etc., will dictate aircraft spacing in the pattern. Combined paracargo operations will only be conducted if both aircrews agree and environmental conditions and terrain allow for safe operations. Each jumpship will confirm that the cargo spot is clear of personnel prior to dropping live cargo.

Figure 2-11: Cargo Trail Position



Loss of Visual Contact:
Once roles have been established, the Secondary JS is required to continually maintain visual on the Primary JS. In the event the Secondary JS loses visual contact, the pilot should immediately call out "Jxx, lost sight of Jyy, and is at #### feet" (It may be worth adding which leg of the pattern, Ex: "J-01 lost sight of J-02. I am at 12 o'clock, turning base or on downwind, etc."). The Secondary JS will then initiate a climb to 500' above the Primary JS in orbit until visual contact is established. Once visual contact is re-established, normal tandem operations may resume.

2.14 Emergencies

Routinely, Smokejumper aircraft operate in demanding conditions such as high-density altitudes, tight canyons, low-level, and Short Take-Off and Landings. In these areas of flight, aircraft are operating at near maximum performance, and there is little margin for error in the event of an emergency. Pilots and spotters must have an emergency plan of action. Aircraft procedures can vary. Therefore, when working with new crew members, brief planned actions in the event an emergency should arise.

The *Standards for Smokejumper Operations* categorize emergencies into two categories:

1. Non-critical Emergency Exit. The pilot shall inform the spotter concerning 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 jumpers and for ensuring that the emergency exit is orderly and timely. Emergency exit procedures in a noncritical emergency usually are the same as those for an operational jump. In some cases, the spotter may even select a jump spot.

2. Critical Emergency Exit. The spotter must maintain control of the jumpers in a critical emergency to ensure that exits proceed as smoothly and quickly as possible.

For either type of agency reserve, 500 feet AGL is the absolute lowest altitude at which a jumper may reasonably expect a successful reserve deployment, and sufficient deceleration prior to impact.

2.15 Training, Proficiency, and Demonstration Jumps

Practice jumps for proficiency are common. It is required to coordinate with jumper liaisons, operations, or dispatch to ensure Parachute Jumping Exercise NOTAMs are filed with the local Flight Service Station. Demonstration jumps, for the USFS, must be requested through the Regional Aviation Officer for authorization separate from this NOTAM process (USFS FSH 5709.16 ch.30.13b). Ultimately, jump pilots are responsible for safety and operation of the aircraft under FAR part 91 and 105. While smokejumping is uniquely a government endeavor with little specific FAA oversight, Advisory Circular 105-2E can be referenced for transferable guidance.

Table 2-1: AC 105-2E Practice Jump Notification Chart

Practice / Demonstration Jump Airspace NOTAM Flow Chart				
Location of Jump	**Kind of Authorization Required**	**When to Apply or Notify**	**Where to Apply and Notify**	**FAR 105 Section Reference**
Over or into a congested area or **open-air assembly of persons**	FAA Form 7711-1	10 business days before the jump	FSDO having jurisdiction over the area where jump is to be made	§105.21
Over or onto any airport	Prior approval (verbal can be used)	Prior to jump	Airport Management	§105.23
In or into Class A, B, C, or D airspace	ATC authorization (verbal can be used)	Prior to jump	ATC facility having jurisdiction	§105.25
In or into Class E or G airspace	ATC notification	Between 24 hour and 1 hour prior to jump	ATC facility having jurisdiction	§105.25
Over or within restricted or prohibited areas.	Prior authorization (verbal can be used)	Prior to jump	Controlling agency as noted on sectional chart.	§105.25
This chart is from AC 105-2E				

3.0 Paracargo

3.1 General

The importance of carefully and accurately analyzing terrain, obstructions, and wind effect before committing to a low-altitude cargo pass cannot be over-emphasized. This 'terrain size-up' should commence immediately upon arrival over the fire. Each fire is different, and there are few occasions where conditions will be ideal.

Low level operations are intentional mission phases conducted less than 500 feet from the surface (not including takeoff, landing, or en route to an incident); and are regulated by 14 CFR Part 91.

3.2 Deviations and Waivers/Exemptions

Deviations:
Life-threatening emergencies may require deviation from Federal Aviation Regulations, Departmental Manual, and Forest Service policy. For in-flight emergencies, the pilot shall take appropriate action to ensure safety of flight. Deviations shall be reported as soon as possible to the appropriate authority and documented on a SAFECOM.

Waivers/Exemptions:
The Department of Interior and USFS (FSM 5700) have low-level waivers ('Grant of Exemption') from the FAA. The waivers are specific in nature and should be reviewed during initial training, and annually thereafter. There is no Servicewide waiver or exemption. Current waivers and exemptions may be found in each agency's directives.

3.3 Low Level Operation Requirements

Qualifications and Experience:
To operate low level, agency-employed pilots shall meet the special mission training requirements outlined in 351 DM 3.1D or FSM 5700/FSH 5709.16. Vendor PIC qualifications are listed in contract specifications.

Personal Protective Equipment:
All personnel on board aircraft participating in low level operations shall wear PPE in accordance with the Aviation Life Support Equipment Handbook as stated in agency policy or contractual language.

Drop Planning:
A low-altitude cargo pass should never be made into rising terrain. Pilots shall plan down-hill patterns so that the ground level falls away after cargo is 'kicked'. In steep-wall topography, consider a down-ridge (parallel) pattern to prevent short / long cargo 'kicks' from floating into canyon bottoms.

Cargo drops are often required in the bottom of steep and winding canyons where a turn into the wrong drainage could result in a dead end. Always leave a way to turn out in case of down drafts, turbulence, engine failure, or the rare case of cargo in tow.

Cargo run finals should not be flown towards vehicles, structures, crews, etc. A parachute malfunction or a late kick could have tragic results. If ground resources are seen approaching the

cargo spot, aircrew should confirm that they are clear prior to dropping cargo. Consideration should be given to impact points on bundles being cut away from cargo in tow.

Specially rigged parachutes, turbulence, restricted visibility, timberlines or other terrain features and other considerations may dictate changes to standard patterns and altitudes.

Procedures:
Normally, paracargo operations will not commence until the status of all jumpers is known, and the JIC confirms that they are ready to receive cargo.

After the last jumper has exited, the spotter readies the cargo for dropping. The standard cargo spot is the jump spot. Tactical considerations may dictate utilizing a different cargo spot. The aircrew and JIC must all reach consensus on the desired and most practical place to drop paracargo. The pilot shall carefully analyze the terrain and conditions in relation to the desired drop area and may make a dry run in all but the easiest drop areas. The spotter will normally inform the pilot of cargo type and number of bundles to be dropped. If heavier than standard paracargo is being dropped, it's good practice to specify the size of the canopy. Airspeed is at the discretion of the pilot but cannot exceed the limitations of the parachute.

To assist the spotter's cargo-prep timing & spatial awareness, pilots should use standard pattern callouts (i.e. "**downwind"**, "**turning base"**, and "**on final**") over intercom. The pilot should make the pattern size commensurate with spotter's ability to access and ready the cargo. Pilots employ a cadence ("**short final…standby…kick**") to establish a release rhythm for the spotter. Normal cadence is 2-3 seconds prior to arriving at the release point cargo spot. The spotter will call out "cargo away" once the cargo has cleared the aircraft.

Pilots must continually strive for cargo accuracy. Terrain can be very difficult for jumpers to walk in; and major exertion is required to pack a 90+ lb. cargo bundle. Consider that at 90-100 KIAS the aircraft travels approximately 150-185 feet per second. One second too soon or too late can easily put cargo in the trees.

Cargo drops are usually made between 200-250 feet AGL. Cargo will not be dropped lower than 150 feet AGL. Radar altimeters do not account for tree height. Chutes need time to fully open and to decelerate. At the discretion of the pilot, the cargo may be dropped at a higher altitude. The spotter may also request that the pass be made at a higher altitude in order to give the parachute more time to deploy. At higher altitudes cargo may drift significantly making precise placement challenging.

The pilot shall devote full attention to flying the aircraft in order to clear obstructions and shall not attempt to see where the cargo landed until at a safe altitude on crosswind, downwind or final portion of the pattern.

3.4 Free-Falling Cargo

Free-falling cargo may include sleeping bags, various hand tools, and most often, climbers. If the cargo is hung in the trees, climbing spurs are dropped by free fall. Free-fall items are sometimes attached to small stabilizing parachutes that slightly affect the trajectory.

The technique is basically the same as paracargo deployment, except dissimilar trajectory must be factored along with considerable post-impact ground travel.

Free-falling cargo is extremely hazardous to ground personnel. In particular, climbing spurs may possibly ricochet in heavy timber. It is incumbent upon the pilot to get drop clearance from ground personnel in advance; and suspend operations if anything looks unsafe. If the cargo does not have a small stabilizing parachute, it is good technique to drop from a slightly higher altitude to dissipate horizontal trajectory.

3.5 Cargo-in-Tow emergency

A malfunction in static line deployment could generate a cargo-in-tow scenario. This is considered an emergency situation that could interfere with flight controls, and/or cause aircraft structural damage. Unless prebriefed otherwise, the standard immediate response prescribed in the Standards for Smokejumper Operations is for the spotter to cut it away. It is essential that prior to commencing paracargo, pilots visually clear the area beyond the cargo spot to ensure no hazards exist. If a spotter does not respond with "cargo away," the pilot will need to confirm that the cargo has been deployed. Although it is a rare circumstance, the spotter's lack of immediate response may be because they are performing a cargo in tow emergency procedure. The aircraft should be flown in a manner as to minimize turns and G forces on the spotter while the emergency situation is being handled.

3.6 Joint Precision Air Drop System (JPADS)

Before conducting any JPADS mission, a thorough briefing with spotters and pilots is necessary. Spotters should discuss the Mission plan outputted from the Android Team Awareness Kit (ATAK) or other applicable mission planning solutions.

Discussion points should include:

Predicted winds:

What is the predicted wind direction and velocity for winds at drop altitude. Pilots should take note of this and verify accuracy of this prediction once over the drop zone (DZ) in case an adjustment needs to be made. Small differences between the predicted and actual windspeed and direction are to be expected but bigger differences (>10 mph and >60 degrees in direction) may need to be addressed and corrected for in flight. Note that differences in wind direction are more critical at higher windspeeds but may not be an issue if winds are lower (10mph or less).

Release Point:

Establish the direction and distance of offset between the release point and DZ. The release point should be plotted on an aerial mapping app such as Google Earth and evaluated for hazards such as values at risk such as structures, highways, power lines, etc., for the area of the release point and between the release point and DZ. At higher windspeeds and higher drop altitudes, release point offset may be 1-3 miles.

Terrain:

Evaluate the terrain around the DZ and between the release point and the DZ. If there is a significant terrain feature such as a large ridge between the release point and DZ, crew may need to consider dropping from a higher altitude or adjusting the release point distance or direction to avoid the terrain. Difficult terrain features directly adjacent to the DZ such as bodies of water or very steep terrain may increase the likelihood of the JPADS unit landing in an area that is very difficult or impossible to recover. This may be alleviated by adjusting location of release point or AGU heading settings.

Hazards:

The ATAK mission plan program will determine a Guidance Failure Footprint (GFF) for the given release point. This is the maximum radius that the unit could fly uncontrolled with the predicted winds. This should be evaluated for values at risk in the event of guidance unit failure.

Airspace conflicts:

Pilots and spotters should discuss how the airspace around the JPADS operation will be controlled during the mission. If JPADS are being considered, it is often because of poor visibility due to smoke or low cloud cover. If dropping over a smaller IA incident, consider having a TFR activated over the DZ to keep out any general aviation. If on a larger fire with aviation resources assigned, then spotters or pilots shall contact ATGS or the Air Operations Branch Director prior to the mission to determine the best way to manage the airspace over the DZ. The best option is often to try to conduct the mission during a time when other aircraft are not over the fire, either early morning or later in the evening (if visibility is too restricted over the fire, then other aircraft may not be able to fly anyway). If the mission must be conducted with other aircraft in the FTA, then discuss with ATGS how to keep other aircraft well away from the JPADS operation while the guidance units are in the air. This distance should extend beyond the GFF. The total diameter of the GFF may be several miles if dropping from higher altitudes.

For proficiency missions with good visibility, a NOTAM needs to be filed for general aviation awareness.

Deployment Constraints

Hazards:

Once a Mission Plan is developed with ATAK the GFF should be evaluated for any values at risk. The two most critical areas will be, directly adjacent to the DZ which is usually located near the center of the GFF, and the release point in the event of a deployment failure of the JPADS parachute. Critical values such as homes, highways, or large power lines may necessitate adjusting the DZ or release point locations.

Winds:

Higher winds will decrease the accuracy and efficacy of JPADS. Windspeed is more important as the system gets closer to the ground. Winds above 18 mph on the ground are often a good cutoff point for cancelling a JPADS mission; however, if there is complex terrain around the DZ, this cutoff may be lower. Higher windspeeds at drop altitude of even 30mph+ may be acceptable if winds in the lower couple thousand feet are 10mph or less.

Drop Altitude:

The lowest acceptable altitude for JPADS to be deployed is 3500 ft AGL. At this altitude accuracy may decrease because the unit has less time to gather GPS and evaluate conditions when deployed. Higher altitudes will help increase accuracy but will also increase the area of the GFF. This could happen from a loss of power, broken steering lines or improperly programed Impact Point settings in the AGU. A good happy median drop altitude is around 5000-7000ft. (We have not dropped anything above 10,000 ft AGL although the DOD drops from much higher.)

There are basically two types of deployment failure with JPADS: Failure of the parachute system to properly deploy, or failure of the guidance system to properly steer parachute to the DZ. In either case, not much can be done to alleviate the situation once the system has left the plane. Good practice is to carry a Bridgelink ground unit on the plane to track the location of the AGU to aid in recovery. It is not advisable to try to steer the AGU from the plane using the Bridgelink. The one deployment failure that you may be able to fix once the unit is in the air is a unit that fails to go into auto-flight mode. This could occur because of a broken activation cable or failure to attach the activation cable lanyard. In this case, the Bridgelink may be used to conduct a "Force Exit." This will tell the unit to go into Auto-flight mode.

4.0 Reconnaissance and Detection

4.1 Reconnaissance or Detection Flights

Local fire managers may request detection flights utilizing smokejumper aircraft with Initial Attack (IA) jumpers onboard.

Knowledge of mountain flying techniques, convective & mechanical wind hazards, and weather radar interpretation are required. Familiarity with the assigned area (i.e. sectional study, hazard map analysis, consulting with local resources, etc.) is critical.

The pilot and observer(s) should collaborate with the local unit on establishing detection flight routing and altitudes to efficiently observe the assigned area of interest. Select an appropriate course offset and/or altitude that allows the observer(s) the best possible field of view. Anticipate observers' needs and maneuver the airplane rather than forcing observers to constantly shift position. Observers should be encouraged to direct the pilot on desired flight path and altitudes to meet their objectives. Strive to find smooth air, and maneuver predictably to maximize effective scan and minimize stress. Make early decisions to use alternate routes to avoid hazardous weather and moderate or greater turbulence.

Flight altitude is determined by a minimum safe altitude, haze layers, width of observation strip, topography, cloud & hill shadow, sun angle & direction, and turbulence. Under most circumstances, reconnaissance is optimized at an intermediate altitude (1,500-5,000 feet AGL).

Reconnaissance / Detection flights **shall not be** conducted at less than 500 feet AGL. When dispatched to a specific incident, comply with all regulatory and NOTAM minimum altitudes such as overflight of congested areas and published TFRs. A good technique to obtain optimum visual coverage is to select an altitude that clears all terrain over the flight path with minimum maneuvering. Above 3,000 feet AGL, standard VFR hemispheric cruise altitudes should be used. Both high and low cruise speeds have advantages depending on conditions and observation objectives.

5.0 Communications, Fire Traffic Area, Resource Tracking and Flight Following

5.1 Communications

Smokejumper Aircraft (agency & contract) require audio control panels to be installed and operational at the pilot, copilot, and spotter positions. This enables spotter(s) to communicate directly with ground personnel, or other aircraft as necessary. The required FM radio is a dispatch, ground, and aircraft communications link for all fire activity. With the exception of California, VHF transceivers are normally used for air-to-air communications. It is essential that pilots are proficient in the operation of audio control panels, and all radios. When a fire is located within a TFR, no participating aircraft (agency, contract, cooperator, news media, or military) will be allowed to operate (or continue to operate) over any fire without an operational radio capable of maintaining clear communication on assigned frequencies.

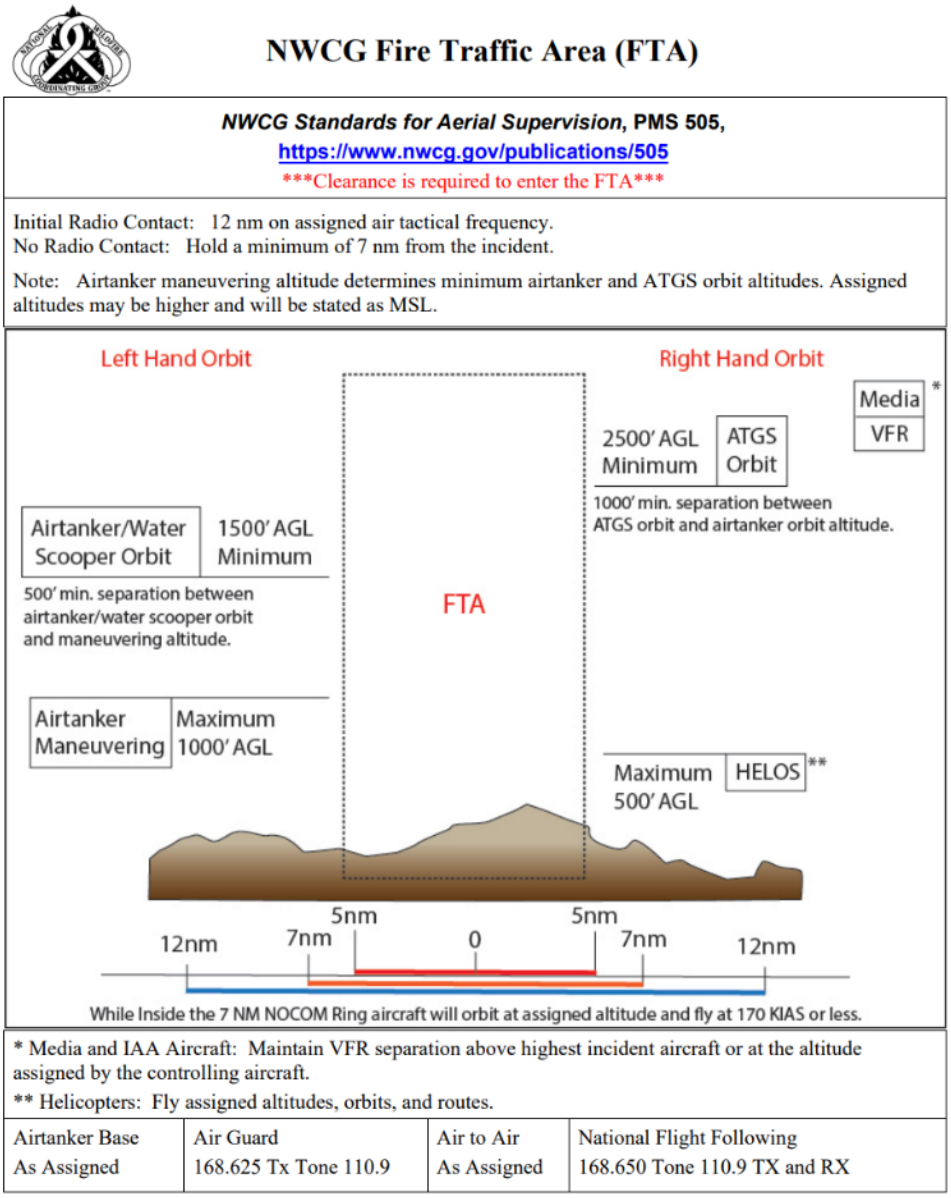
Pilot-in-Command (PIC) legal responsibilities must be balanced with spotter mission coordinator responsibility. This makes aircrew communication protocols & expectations an important pre-brief item. Normally, pilots handle all communication & position reports associated with FAA facilities; while the spotter handles communications with dispatch (position reports), and ground contacts. Pilots are directly responsible for ensuring all flight following requirements are met. En route, pilots will communicate with non-participating aircraft when possible. The spotter typically handles agency flight following either by confirming they are positive on AFF or with 15-minute position checks for the lower 48, or 30-minute position checks when operating in Alaska. Clear, concise communications within the FTA is paramount to safety. Either the pilot or spotter may handle interactions with other fire-assigned aircraft. Therefore, a mutual understanding of which aircrew member is responsible for air-to-air communications is essential prior to operating in an FTA. Some dynamic factors to consider when assigning air-to-air communication responsibilities include: presence (or not) of an ATGS, pilot FTA experience, spotter FTA experience, spotter qualification as ATGS, tactics, crew member task saturation levels, holding aircraft out vs actively engaged, and synchronized operations (e.g. paracargo with helicopter drops). It is permissible to swap air-to-air radio responsibilities based on phase of mission, but aircrew must positively acknowledge the change. If any aircrew member is concerned or uncomfortable with the status of air-to-air communications (and subsequent deconfliction), it is the obligation of the pilot to safely exit the FTA until the situation resolves.

An intercom system allows the pilot and spotter to communicate while in flight and monitor other frequencies at the same time. Prior to entering the FTA, pilots and spotters shall brief radios they are monitoring. As mission phases and/or needs evolve, advise fellow crew members of changes to ensure all mission frequencies are continually being monitored.

5.2 Fire Traffic Area

Aviation activity over a fire can quickly become congested thereby necessitating proper traffic and communication management. The Fire Traffic Area (FTA) is an interagency airspace procedural control measure that is always assumed in effect over a fire regardless of the number of aircraft. The FTA is not formally recognized by the FAA but is closely modeled after Class D airspace.

Figure 5-1: Fire Traffic Area



Dispatch should provide incident air and/or ground contact frequencies to the aircrew. Per FTA procedures shown above, aircraft must receive permission to enter an FTA or hold out of the FTA (7NM) or over a specified location. Always assume other aircraft are present in the FTA. While initial contact should be attempted no later than 12 miles from the fire, it is good operating practice to monitor the assigned frequency and activity as far out as possible. A 12-mile call will be made in the blind to help ensure no other resources are on the fire. Utilize all available information to assess if your aircraft is first on scene: Resource order/dispatch form indicates a new incident, no other radio traffic is present on assigned frequency, TCAS shows clear at the approximate fire location, and see and avoid techniques. If no communications are received and all indications show that your aircraft is first on scene, proceed inside the FTA exercising vigilance. If other aircraft are noted present over the fire but the pilot or spotter is unable to establish positive clearance into the FTA, hold 7 miles out from the incident while establishing radio contact.

If unable to establish contact with the Air Attack, Leadplane, or other aircraft over the incident, attempt contact on alternate frequencies or reconfirm the correct frequency with the applicable dispatch office. As a last resort, air guard may be used to make initial contact and confirm working frequencies. The bottom line: **No aircraft is to enter a fire traffic area without establishing radio contact with other aircraft working on the same fire.**

On larger incidents with multiple airborne resources, Aerial Supervision (in sync with Operations) will drive priorities and tactics. Drop priority is usually given to Airtankers if they arrive over the fire at the same time as other aircraft. Smokejumper aircraft will normally enter at the Airtanker orbit altitude or as assigned by Aerial Supervision and may be stacked on top of or with Airtankers. If the Smokejumper aircraft is in the process of dropping jumpers, it will normally be allowed to continue until all personnel are safely on the ground. At that time, a pause may be prudent to confirm follow-on priorities with Aerial Supervision. Based on the operational dynamic, the jumpship may be asked to pull out of the area or change altitude to allow retardant aircraft to drop, and then subsequently return to deliver the cargo. Ensure Aerial Supervision is aware of limiting fuel factors, if applicable.

If a jumper is injured in the drop, the jumper aircraft has priority over other aircraft to provide emergency assistance (drop medical supplies, become radio relay, or drop additional EMT qualified jumpers if still onboard). The emergency needs to be announced to clear the proper frequencies for uninterrupted communication. Personnel on the fire (air and ground) shall be notified of the seriousness of the emergency: life or non-life threatening.

5.3 FTA without Aerial Supervision

As initial attack aircraft, Smokejumper aircraft may be the first ones on scene. The most critical situation is during the initial attack phase of an emerging fire when several aircraft arrive over the scene at almost the same time.

In many situations, combinations of air activities can be accomplished safely on the same fire. Examples include: Airtankers and helicopters are needed on opposite sides of the fire, traffic patterns can be flown well clear of the other activity, and good communication is maintained between all aircraft.

While it is ultimately the pilot's responsibility to "see and avoid" traffic, the order of authority for air traffic coordination, mission priorities, and aircraft tactical priorities is as follows:

1. ATGS
2. ASM
3. Leadplane
4. Spotter

If #1, #2 or #3 above are not present, the spotter shall develop a plan on how to manage the airspace. The spotter will discuss the plan with the aircrew. The plan will include traffic separation and mission priorities with on-scene aircraft over the fire. If any aircrew members have concerns, or suggestions on how to modify the plan they should be addressed during this discussion. The spotter will be responsible for coordinating the FTA until a higher qualified aerial supervisor arrives. Tasks associated with managing the FTA can be delegated to other aircrew members, but the responsibility will reside with the spotter.

Pilots and spotters must have a clear understanding of each other's capabilities and priorities. Good CRM is crucial to conducting safe and efficient operations within the FTA. If any

individual within the aircrew is not comfortable with a situation, they have the full authority and the responsibility to exit the FTA to a safe area and if the risks cannot be mitigated to everyone's satisfaction, the mission should be terminated.

Interagency Standards for Fire and Fire Aviation Operations (Red Book): Incidents with three or more aircraft flying missions at the same time must have aerial supervision in the form of ATGS, ASM/leadplane or HLCO ordered by the unit maintaining operational control (operations may be continued while the aerial supervisor is en route to the incident or operations can be continued if the resource is not available and assigned resources are notified). During times of aerial supervision absence, aircraft shall coordinate with each other to implement tasks and objectives as prioritized by the official in charge (i.e., IC or operations). A qualified smokejumper spotter (senior smokejumper in charge of smokejumper missions), may coordinate their respected operations with on-scene aircraft over a fire until qualified aerial supervision arrives.

5.4 Temporary Flight Restrictions

TFRs are recognized FAA airspace and specific clearance to enter them must be obtained by the **spotter/mission coordinator or Pilot-in-command (if delegated from the spotter)** in the following order:

1. Aerial Supervision; ATGS, ASM, Leadplane, in that order.
2. If no Aerial Supervision, make sure clearance is obtained from the official in charge (14 CFR 91.137) and coordinate with any other aircraft working the fire within the TFR following the NWCG Standards for Aerial Supervision (PMS 505).
3. If no other aircraft are present, from the Incident Commander or his/her Air Operations branch.
4. If no contact from the IC, from the Dispatch with jurisdiction over the TFR.

NOTE:

"Clearance to enter will be obtained prior to the TFR boundary, but no later than the standard 7-mile call from the actual incident coordinates. If no other aircraft are on scene, make the standard FTA blind calls at 12 and 7 miles from the Incident coordinates."

5.5 Resource Tracking and Flight Following

Flight following is an important resource accountability mandate conducted in accordance with the National Interagency Standards for Resource Mobilization Guide Ch. 50 "Flight Following."

It is the responsibility of the PIC to ensure proper flight following; whether it is: FAA, International Civil Aviation Organization (ICAO), or an agency/bureau-approved flight following method. Agency flight following duties are commonly performed by the spotter. Local agency dispatch centers are the most common form of flight following during Smokejumper missions. The use of Automated Flight Following (AFF) is the preferred method of interagency flight following. In the event AFF is unusable, the flight crew can revert to radio position reports to dispatch every 15 minutes. When local dispatch centers are closed or not staffed, the pilot must revert to an FAA Flight Plan / flight following methods.

6.0 Mountain Flying

6.1 Introduction

Flying missions in mountainous terrain requires special knowledge, experience and techniques to reduce the inherent operational risk. Rugged terrain, lack of suitable emergency landing areas, and adverse weather conditions add to the hazards.

6.2 Density Altitude

Aircraft operations at higher than standard temperatures well above sea level are commonplace in the Western United States. Such operations result in drastic reduction of airplane performance due to high-density altitudes.

Density altitude is a measure of air density. It is not to be confused with pressure altitude, true altitude, or absolute altitude. It is not to be used as a height reference, but as determining criteria for the performance capability of an aircraft. Air density decreases with increase in altitude. As air density decreases, density altitude increases. The further effects of high temperature and high humidity are cumulative, resulting in an increasingly high-density altitude condition. High-density altitude reduces all aircraft performance characteristics. This means that normal horsepower output is reduced, propeller efficiency is reduced, and a higher true airspeed is required to sustain the airplane throughout its operating range. It means an increase in runway length requirements for takeoff and landing, and a decreased rate of climb.

Density altitude can be easily computed on most flight computers. Density altitude is pressure altitude corrected for nonstandard temperature. After computing density altitude, consult the manufacturer's performance data for your particular aircraft and do not operate outside the performance parameters.

6.3 Mountain Winds

Mountainous terrain interferes with the steady flow of air, which causes it to lift and sink in somewhat logical patterns. The shape of the terrain in relation to the wind, heating of sun-exposed slopes, and steeply sloping ridges with jagged cuts (i.e. mountain passes), all cause predictable shifts in wind direction and speed. Moving air masses surge up and over terrain causing updraft on the upwind side of a ridge and sometimes extreme downdraft on the lee side as the air mass follows the terrain similar to the way water flows in a riverbed. A rule of thumb for intermediate strength winds (10 to 20 knots) is that turbulent eddies are carried at least five times the distance downwind as the height of the obstacle that created them and 10 times for winds stronger than 20 knots.

Any abrupt change in angle between the terrain and wind flow can be expected to generate moderate to severe turbulence and wind shear, thereby potentially jeopardizing aircraft structural integrity. Generally, the strongest wind flow will be found at higher altitudes. The heating of slopes causes thermal convection, with resultant lift followed by downdraft as the thermal cools and disperses. Mountain passes create a venturi effect as the air is forced through small areas and accelerated.

Pilots should proceed with caution when ridge level winds in excess of 20 knots are known or forecast. When they are 30 knots or more, consider staying on the ground or altering route of flight. A mountain ridge line should be crossed at an angle to allow the pilot to turn away from the

ridge with the least amount of turn required should down-drafts be encountered. Winds aloft in the mountain-west are predominantly westerly; however, surface winds may tend to flow up canyon from about noon until late in the evening, due to the unequal heating of the sunny slopes and shaded canyons. Early morning and late evening flights will generally be less turbulent and can be made closer to the ridge line than during the heat of the day. During reconnaissance flights in the heat of the day, special care should be taken near ridge tops and extra altitude should be used as needed. (See section on reconnaissance). Always know where you are, where the nearest airstrip is, and how to reach the nearest terrain suitable for emergency landing.

Anticipate constantly changing winds. Do not rely exclusively on smoke drift or cloud shadows for surface wind direction. Never rely on riding an updraft to obtain sufficient altitude to clear the terrain. It could unexpectedly turn into a downdraft.

6.4 General Operating Procedures

When operating at altitudes below the ridgetops, flying down drainage is generally the best practice. When required to fly up drainage, ALWAYS rate the topography ahead and maintain proper position and sufficient altitude to turn around. The grade of the canyon may climb faster than your aircraft is capable. Keep to one side to observe potential emergency landing sites in the canyon bottom, safely complete a 180° turn for an emergency exit, and take advantage of rising air on the upwind side of the canyon.

Use caution when operating in the vicinity of weather. Do not be lulled into complacency by a weather report giving the ceiling at 1,500 to 2,000 feet. Mountains 2,000 to 5,000 feet higher may surround the reporting station. Insist on adequate visibility as well as ceiling when flying in mountainous areas. Snow and rain can quickly reduce forward visibility to zero. Shadowing often blends in perfectly with the color of the mountain, which may appear to be just another dark section of the sky.

Never go into any type of cloud while flying at low altitude in the mountains. Avoid unplanned IMC at all costs by seeking out PIREPS on Multicom (122.9), always having an exit plan, setting decision points ahead of the aircraft, and lastly utilizing GPS and TAWS. Long before encountering IMC in the mountains, the pilot should brief the crew (if applicable) on the Sectional Maximum Elevation Figure (MEF). When weather permits, make an early decision to ‘circle-up’ above the MEF while still in VMC conditions. If ceilings do not allow for a controlled VMC climb, abort the route by turning around well before IMC is encountered.

Key Factors to Consider:

- **Proper flight following is especially critical when operating in the mountains**. If you go down, it may be a long time before help arrives due to the remote nature of wilderness.
- **Be familiar with the destination airport.** In advance of the flight, review available charts for altitude, length of runway, and obstructions.
- **Remember that spotting landmarks may be difficult**; a mountain shown as 8,000 to 9,000 feet on the charts may appear as a small knoll if the peak rises out of surrounding terrain having an elevation of 5,000 or 6,000 feet.
- **Always be on the lookout for wires and cables across canyons.**
- **Don’t operate into or out of high mountain areas with a tight schedule.** Give yourself plenty of time; weather must take precedence over any schedule.
- **Fly equipped with an emergency survival kit.** In the event of a forced landing, the general rule is to stay with the airplane.

7.0 Training and Evaluation

7.1 General

This chapter outlines basic training requirements for Smokejumper Pilots and is provided as a resource for development of a structured and standardized training program of ground and flight instruction for both agency and contract Smokejumper Pilot candidates. Any locally generated syllabus must meet the intent of this chapter but can add additional training to meet the local needs.

Applicable Texts:

- Standards for Smokejumper Pilot Operations
- Special Use Mission – Airplane Interagency Mission Certification Standards (IMCS)
- Departmental Manual (BLM)
- FSM 5700 (USFS)
- FSH 5709.16 (USFS)
- Aircraft specific Flight Manual
- National Smokejumper Training Manual (Spotter Training) (USFS or BLM)

Videos:

- Professional Smokejumper Pilot Video
- Smokejumper Spotter Video

Goals:

1. To become an integral part of a crew that safely delivers Smokejumpers by either the BLM or USFS parachute delivery systems and subsequently delivers paracargo at low levels in support of that or other missions.
2. Safely plan and execute Smokejumper missions.
3. Safely plan and execute paracargo missions.
4. Standardize Smokejumper Pilot training and operations.

Requirements:

- Annual Equipment Ground School
- Annual Equipment Check
- 14 CFR 61.57 current
- Initial Operating Experience (25 hours IOE for aircraft requiring a type rating)
- 25 Hours in Make and Model (Hours may be accomplished during equipment and Smokejumper Pilot training)

Evaluation:

- Designated Inspector (DOI) or Check Airman (USFS)

7.2 Phase Training

Each phase of the training syllabus may encompass multiple ground and flight sessions. The program calls for a Smokejumper Instructor Pilot (IP) and a spotter to work as a 'training team' for a pilot candidate.

The spotter determines spot location, patterns, and altitudes relevant to the parachutes/paracargo being dropped. The IP monitors power, configuration, attitude, airspeed, altitude, safety, and cargo patterns. The IP may provide the spotter with change inputs in order to drive learning objectives in accordance with student progression.

Each ground instruction session will be conducted by the training team and will include an in-depth brief of the upcoming flight. The objectives for each lesson will be clearly defined for the candidate. Specific **area of operation tasks** being developed will be framed as: **knowledge, risk management, and skills**.

7.3 Phase 1 Ground - Introduction to Smokejumper Operations

1. Phase 1 Indoctrination:
    a. Professional Smokejumper Pilot video
    b. Professional Smokejumper Spotter video
2. Smokejumper mission
    a. Initial attack, varied duties
    b. Additional jobs - resupply, heavy cargo, backcountry retrieval
    c. High training standards for jumpers and pilots
    d. Safety standards and concerns regarding the mission
    e. Reconnaissance
3. Smokejumper equipment
    a. Tour of the loft
    b. Basic Smokejumper equipment
        i. Jump gear and parachute - rounds and squares
        ii. Fire packs
        iii. Cubies
        iv. Saws
        v. Spurs
        vi. Radios
        vii. Cargo delivery system
            (1) High and low impact
            (2) Different size chutes
4. Spotting
    a. What is a spotter - expertise required
    b. Spotter responsibilities - picking the spot, etc.
    c. Pilot/spotter relationship
5. Operational Procedures
    a. Jumpship patterns (standard and downwind, crosswind, turns and banks)
        i. Corrections (standard/non-standard)
        ii. Pattern call-outs
    b. Streamer patterns
        i. Determining jump spot, pattern direction
        ii. Initial, standard, crosswind, downwind
        iii. Altitude/airspeed

iv. Streamers away
v. Streamer visibility - spotter and pilot
vi. Selecting exit point
vii. Streamer check set - why
viii. Check set final (i.e., streamers to spot)
ix. Common errors

c. Jumper drop pattern
   i. Altitude/airspeed/flap settings/power application
   ii. When and how to abort
   iii. Pilot to spotter communication of conditions
   iv. Jumpers away
   v. Climb to 3,000 feet AGL for ram airs
d. Cargo
   i. Cargo spot selection
   ii. Altitude/airspeed
   iii. Dry run
   iv. Calls
   v. Lead/drift
   vi. Commands - “short final, standby, kick “
   vii. Aborting cargo run - why, call-outs
   viii. Accuracy - communication with ground and kicker
   ix. Accuracy is always sacrificed for safety
e. Emergency Procedures

7.4 Phase 1 Flight - Basic Smokejumper Flight Procedures

Objective:
To introduce and develop skills necessary to basic mission maneuvers and operational procedures. The student is left seat, IP in the right seat, and spotter in the door. The initial lesson is conducted over flat, open terrain with easily identified spots. The candidate should be able to fly streamer observation and jump patterns from any direction without having to concentrate on terrain avoidance. **Emphasis items:** Understand the purpose of each maneuver, requirements for the spotter to do his job, clear / concise communication, effective operational coordination with the spotter, smooth coordinated maneuvering, altitude, airspeed, and heading control.

1. Spotter calls for straight flight along a road, power line, etc., with left and right corrections which should result in standard 5 degrees of turn. Turns will be smooth and coordinated; no rudder turns. Watch for a tendency to drift back to the original line after a correction is made. Don't let the candidate rely exclusively on the directional gyro or heading bug to hold their line. Have them make use of ground reference points and a point on the horizon.
2. Streamer patterns
    a. Proper positioning on observation pattern
        i. Keeping spotter in position to observe streamers
        ii. Pilot observation of streamers to the ground (where to look)
        iii. Streamers to spot Bank angle should not exceed 30°. Monitor airspeed and altitude control. Good communication with the spotter is important. Streamer-to-spot-to-exit point line should employ ground reference points to hold the line; the exit point could also be a timed count and not a landmark. Emphasize pilot awareness of exit point.
3. Jump patterns
    a. Consistent line on final
    b. Proper size pattern
    c. Proper altitude and airspeed

NOTE:

The candidate should be using ground and horizon reference points to turn on line and maintain it along with the directional gyro. Altitude and airspeed control is crucial along with power management at jumper exit. Turn off final should not be made until "jumpers away" call.

4. Cargo dropping
    a. Cargo spot selection
        i. Communication with spotter regarding the cargo spot - may need to be different from jump spot. Type of cargo and chute size.
        ii. Good entry and exit routes
        iii. Down canyon and down sun
        iv. Lead in points
        v. Dry run
        vi. Commands
        vii. Lead/drift for accuracy
        viii. Aborting a live run
        ix. Safety
        x. Aircraft configuration: Flaps and Power settings, airspeed control, clean up during exit
        xi. Cargo in tow

7.5 Phase 2 Ground - Advanced Smokejumper Operations

1. Observation pass
    a. Low pass or high/low pass at spotter's option
        i. No pass lower than 200 feet AGL
    b. Why the spotter would request a low pass
2. Jump spot selection
    a. Hazards and terrain considerations in selecting a spot and a jump pattern
    b. Alternate spots
3. Jump altitude
    a. Minimum altitude and why - rounds vs. squares ("on final 1,500 or 3,000')
    b. Jump altitude is over the exit point not the jump spot
    c. Determining altitude
        i. Timing streamers
        ii. Radar altimeter
        iii. Observation pass
4. Determining wind drift/velocity
    a. Accurate release of streamers over jump spot - why?
    b. Selecting exit point
    c. Terrain factors
        i. Needs to see streamers all the way to the ground to determine wind line
        ii. Understand the spotter's counting method to exit point (affected by wind speed and the need to determine the exit point), the importance of maintaining airspeed on the jump run. The Wind Cone concept and parachute performance parameters - spotter.
5. Jump patterns
    a. Non-standard patterns
        i. Downwind pattern terrain and ground speed considerations
        ii. Crosswind pattern - same
        iii. Right hand patterns
        iv. Spotter guiding pilot onto proper pattern
    b. Changing line on final
        i. Offsetting the line left or right to parallel original line
    c. Pivoting the line left or right with the jump spot as pivot point (clock method).
    d. Emergencies
        i. Critical (Mass exit, Jumper in tow - spotter/pilot comm.)
        ii. Non-critical
6. Cargo dropping
    a. Cargo spot selection - terrain factors
        i. Ridge top
        ii. Side hill
        iii. Canyon bottom
    b. Considerations with different bundle weights and chute size
        i. Free fall delivery
        ii. High altitude dropping
    c. Variations with different kickers
        i. Pilot makes corrections not the kicker
    d. Importance of smooth maneuvering
        i. Impact of steep turns and high "G", maneuvers and pull outs on cargo kickers in the back of the airplane
    e. Feedback
        i. Ground Contact

7.6 Phase 2 Flight- Advanced Smokejumper Flight Procedures

Objective:
Develop the pilot candidate's skills to the operational level by introducing successively more difficult steep terrain for jump spots and cargo spots, non-standard patterns, and emergency procedures. Student will be able to work effectively and efficiently with the spotter in streamer observation and jump patterns. Cargo dropping will emphasize safety and planning for emergencies in the more difficult terrain. Emphasis will be on situational awareness in typical terrain and technical skills needed to fly the Smokejumper mission in mountainous terrain. Smooth, coordinated maneuvering and maintaining correct airspeed, altitude and heading should be developed at this level to where the IP has little need to direct corrections.

1. Observation pass
    a. Observation pass at no less than 200 feet AGL
        i. Put spotter in proper position to see jump spot
        ii. Communicate pilot observation of atmospheric conditions - wind, turbulence, up and down drafts
2. Streamer patterns
    a. Proper observation pattern
    b. Throwing check streamers for non-standard patterns; downwind and crosswind
        i. Good communication between spotter and pilot of pattern changes
3. Jump patterns
    a. Standard and non-standard
    b. Spotter changing final line
    c. Terrain factors
    d. Emergency procedures
4. Cargo dropping
    a. Recon and dry run
    b. Planning entry and exit routes with emergencies in mind
    c. Changing pattern for safety and accuracy
    d. Smooth flying - no hard turns of "G" loading on pull out if possible
    e. Emergency procedures
    f. Test standard for accuracy (in accordance with IMCS grading criteria)

Spotter will set up successively more difficult jump scenarios. Spotter will set up jump pattern and corrections, but the student pilot will recon the cargo spot (consider both the jump spot and an alternate spot) and determine an appropriate cargo pattern. Emphasize safety and good judgement in all phases; particularly selecting and flying cargo patterns.

7.7 Phase 3 Ground - Smokejumper Mission Topics

1. Pilot and spotter responsibilities
    a. Flight and jumper safety
2. Radio communications
    a. Pilot to spotter system in the aircraft
    b. VHF and FM communications - who is responsible for what
    c. Current frequency lists
3. Programing
    a. FM radio
    b. GPS
4. Flight planning
    a. Navigation - familiarity with long range navigation equipment
    b. Fuel-jumper load with required reserve
    c. Check NOTAMS, TFRs and Hazards maps
5. Standby and Dispatch
    a. Daily base operations, including pilot/spotter briefings.
    b. Dispatch procedure - check-ins
    c. Duty limits, flight time limits, mandatory days off
    d. PPE - Nomex
    e. Agency regulations, forms and paperwork
    f. Loadmaster/Flight Attendant role
6. Other missions
    a. Crew hauls
    b. Paracargo
    c. Jumper retrieval
    d. Point-to-Point cargo
    e. Reconnaissance
7. Practice jumps
8. Fire Protocol
    a. Air Attack roles
    b. Mission priority
    c. Radio communications/ dispatch and required check-ins
    d. Multiple aircraft on site
    e. Lights
    f. Fire Traffic Area (FTA)
9. SAFECOM procedures

7.8 Phase 3 Flight - Prep for Evaluation and Live Cargo Drops

Objective:
This phase will prepare the candidate for the final evaluation with a W.O. Final Evaluator (USFS) or Agency Inspector Pilot (DOI/BLM). The spotter will simulate a real jump request. The candidate will be familiar with aircraft performance charts and be able to determine if mission can be accomplished under conditions of the simulation. IP input and corrections should be minimal at this point.

1. Observation pass, streamer passes
2. Jump run
3. Cargo run
4. Simulated emergencies (deploying jumpers after takeoff, engine loss with jumpers and on cargo runs, cargo hung up, etc.). Potential emergency situations requiring Smokejumper bailout are varied and detailed procedures for every conceivable situation are not possible. General bailout procedures for non-critical situations (such as landing gear malfunction) and critical emergencies (such as engine failure due to contaminated fuel) will be discussed in classroom training. Appropriate action then gets started with the spotter in control and the pilot free of aft CG problems. The candidate should be able to perform all operations to mission ready standards. Live cargo drops should be practiced for accuracy. Live drops can be in an area where cargo retrieval will be fairly easy.

7.9 The Evaluation

This guide along with the IMCS are the evaluation standards for Smokejumper/Paracargo evaluations. The proper agency form in Appendix A will be used by the check pilot. The candidate will be required to take either a written or oral exam based on this guide and calculate a Smokejumper related weight and balance. Should the check airman elect to conduct in-flight simulated emergencies during special use missions, engine failures shall only be simulated by retarding a power lever or throttle. Mission oriented emergencies will be **preplanned** with the spotter.

7.10 Interagency Mission Certification Standards (IMCS)

See the *Interagency Mission Certification Standards* at:
https://www.doi.gov/sites/default/files/documents/2024-11/interagency-mission-certification-standards.pdf

8.0 Flight Crew Qualifications

8.1 Smokejumper Flight Crewmember Qualifications Table

Requirement	Smokejumper Flight Crewmember Qualification Table			
	Position	Position	Position	Position
	Second In Command (SIC)	Pilot In Command (PIC)	Instructor	Inspector/Final Evaluator
Annual Ground School				
Annual Equipment Evaluation				
PIC: Annual Mission Evaluation SIC: Annual Mission Evaluation SIC Initial: 5 jumps as SIC				
Instrument Currency				
Mission Recurrent - 1 refresher flight with paracargo				
Initial Operating Experience (IOE) 25 hours in make and model of large aircraft				
Initial (one time) Mission Check in each airframe as PIC				
Designated by the Natl FW Standardization Officer or OAS for the BLM Natl Aviation Office Concurrence				
100 hours in make and model - Instructor Only				**Instructor Only**
Standardization Evaluation and/or National Office designation				
CFI, CFII, MEI				
PIC Smokejumper and cargo mission experience in a variety of terrain, fuel types and geographic areas. Experience working with other aircraft during jump operations.				
Inspector/Check Airman Biennial Standardization Workshop				
3 Years Smokejumper PIC (agency or vendor) Experience				**FS Only**
1 year designated as a Smokejumper Pilot Instructor				**FS Only**
2 years of Instructor qualification				**FS Only**

8.2 Pilot Qualifications and Carding

All agency employed and contract pilots must have a current mission evaluation documented within the previous 12 months in order to conduct Smokejumper/Paracargo missions. Contract and BLM agency pilots are issued (and must be in possession of) a current Interagency Pilot Qualification Card.

Special Circumstance: FS and vendor pilots who are qualified as Smokejumper mission PIC of large aircraft (over 12,500lbs) AND have less than 250hrs of PIC in large aircraft, must receive one-time DOI/OAS written approval prior to carrying BLM personnel. The PIC will maintain a personal copy of this approval until such time as he/she has greater than 250 PIC hours in large aircraft.

8.3 Flight Crew Experience Requirements

The OPM Operating Manual for Qualification Standards for General Schedule Positions, for Aircraft Operation Series states:

"Minimum eligibility requirements for positions in the occupation are based on:

1) Possession of the appropriate Federal Aviation Administration (FAA) pilot certificates and/or appropriate military ratings,
2) Meeting the applicable flight hour requirements, and
3) Possession of the knowledge and skills required for the positions."

In order to meet the letter and intent of the three conditions outlined in the statement above, all USFS and DOI PICs must meet the following minimum requirements:

1. A current FAA ATP pilot certificate with appropriate type rating.
2. The following flight hours:
    a. 1,500 hours Total Time
    b. 1,200 hours Pilot in Command
    c. 500 hours Multi-engine
        i. 250 hours multi-engine PIC experience
        ii. 100 hours heavy multi-engine PIC experience, **USFS only.**
        iii. 250 hours heavy multi-engine PIC experience, **DOI only.**
    d. 75 hours Instrument – actual or simulated
    e. 50 hours Instrument – in flight
    f. 100 hours Night
    g. 100 hours Turbine Engine Experience (PIC or SIC)
    h. Annual Smokejumper Pilot Evaluation.
3. Possession of the required knowledge and skills.

For the purposes of this document, the following definitions will apply:

1. **Pilot in Command experience -** that flight time logged as defined in FAR Part 1: Definitions and Abbreviations,
    - Pilot in command means the person who:
        - Has the final authority and responsibility for the operation and safety of flight;
        - Has been designated as pilot in command before or during the flight; and
        - Holds the appropriate category, class, and type rating, if appropriate, for the conduct of the flight.
2. **Large Aircraft -** aircraft of more than 12,500 pounds maximum certificated takeoff weight or requires a type rating to be pilot in command.

8.4 Currency Requirements

1. All (active) Smokejumper Pilots must have an annual mission evaluation to remain current.
2. Instructor and Inspector pilots must be current Smokejumper Captains in order to conduct mission training or evaluations. **Note:** DOI does not require mission evaluators to be current Smokejumper Captains.
3. All pilots must attend an approved CRM course every three years.

8.5 Designation of Instructors and Inspectors / Check Airmen

Refer to:

- FSH 5709.16
- OAS Instruction 202

8.6 Inspector / Check Airman Alternate means of Compliance (AMOC)

In the event an inspector misses a workshop, they must follow agency direction for compliance.

Recommendation for compliance:

1. Review and discuss workshop minutes, Standards for Smokejumper Pilot Operations, agency policy, the IMCS, and perform training and evaluations with a current Inspector Pilot.
2. Have completed a mission evaluation within the past 12 months. **Note:** DOI does not require mission evaluators to be current Smokejumper Captains.
3. Observe an evaluation flight given by a current and qualified Inspector.
4. In addition, if regaining Inspector qualification currency, conduct one mission evaluation as an Inspector under the supervision of a current Inspector Pilot.

The non-current inspector is responsible for coordinating the above steps and will work with the USFS WO Standardization Pilot / OAS National Fixed-Wing Specialist as appropriate to arrange the assignment of an inspector to comply with the conditions above. Failure to satisfy the requirements above by May 31st of the year of the workshop will result in expiration of inspector qualifications until all conditions have been met.

To regain qualification after missing two consecutive biennial workshops, an inspector must attend the next workshop, and complete steps 2-4 above.

8.7 Airline Transport Pilots (ATP) Giving Flight Instruction

ATPs who do not hold a current (and appropriate) CFI certificate may not give aircraft or smokejumper operational flight instruction; nor endorse logbooks or other training records without holding a designation as Evaluator or Final Evaluator as appropriate.

Glossary of Terms

AAD - Automatic Actuating Device.

AFF - Automated Flight Following.

AGL - Above Ground Level.

AIR TACTICAL GROUP SUPERVISOR - See ATGS.

AIRCREW: - A person trained with the flightcrew, who is qualified in, and assigned to perform duties onboard the aircraft, and essential for the safe operation of the mission, to include: rappel spotter, short-haul spotter, smokejumper spotter, Air Tactical Group Supervisor or Air Tactical Supervisor.

ASM - A federal designation for an Aerial Supervision Module platform with an Air Tactical Pilot (Leadplane) and Air Tactical Group Supervisor (ATGS) on board. This module can perform Aerial Supervision and low-level operations including the lead profile.

ATGS - Air Tactical Group Supervisor. This ICS position is responsible for directing and coordinating airborne aircraft operations and management of an incident's airspace and reports to the Air Operations Branch Director, or Incident Commander.

BLM - Bureau of Land Management. A Bureau of the Department of the Interior, which among other responsibilities, is responsible for suppression of wildfires.

BURNING CONDITIONS - The combined conditions of fuel moisture, temperature, wind, humidity, etc., which affects how intensely wildfires will burn on a given day. Burning conditions, along with lightning forecasts, directly affect the degree of readiness maintained by the Smokejumper project, specifically standby assignments.

CANOPY - The material and lines that make up what is usually identified as a parachute. Does not include container, D-bag, and other components of a parachute system.

CARGO DROP AIRSPEED - The airspeed an aircraft must fly to safely drop cargo.

COORDINATES - Latitude and longitude locations to the nearest hundredth of a minute which is the primary method used to describe the location of fires.

CORRECTION - Left or right changes in aircraft heading accomplished with bank turns in 5-degree increments, at the direction of the spotter on final approach to the jump spot or exit point. Corrections of greater magnitude than 5 degrees are accomplished with quick banked turns when requested.

DETECTION - Activities that focus on locating new fires at the earliest possible moment.

DOI - Department of the Interior.

DRIFT - The distance streamers drift downwind from their release point.

DROGUE - A static-line deployed stabilization parachute used with ram air canopies.

DROP ZONE (DZ) - Term used in reference to cargo drop areas.

DRY RUN - Term used during paracargo when the pilot makes a practice run without dropping cargo, for the purpose of evaluating the terrain and suitability of the pattern before going live. May also be used to refer to a Smokejumper mission that did not drop jumpers on a fire.

DZ - see Drop Zone.

EXIT POINT - For round parachutes, a point equal distance upwind of the jump spot as the streamers landed downwind and over which the jumpers must exit the aircraft to compensate for the wind drift. For square parachutes this may be up to twice the distance upwind as determined by the spotter.

EXIT - The procedure used by Smokejumpers to jump from an aircraft.

FAR - Federal Aviation Regulation

FIRE PACK - A pre-packed box containing food, shelter, and firefighting tools for two Smokejumpers pre-rigged for cargo drop. Also called a FIRE BOX.

FLIGHTCREW: A pilot, flight engineer, or flight navigator, certified by the FAA or military designation, assigned to duty in an aircraft during flight time.

GO AROUND - An aborted live cargo or jumper run.

HIGH-LOW - An observation pass made alongside a fire or jump spot to help the spotter size-up the fire or select a jump spot, flown no lower than 500 feet AGL.

HLCO - Helicopter Coordinator.

IC - Incident Commander.

IMC - Instrument Meteorological Conditions

INITIAL ATTACK - The critical first attack on a new fire with the objective of containing it while it is small.

JUMP SPOT - The area on the ground selected by the spotter as the most desirable area for Smokejumpers to land from the standpoint of safety and tactical advantage to attack the fire.

KICKER - A Smokejumper assigned in charge of paracargo missions to accomplish the actual dropping of cargo bundles out the open door of the aircraft.

LEADPLANE - An airplane crewed by a qualified Leadplane Pilot tasked to lead Airtankers in low-level drop runs.

LIVE RUN - A flight pattern on which jumpers or cargo will be dropped after streamer runs or dry runs.

LOAD - The crew of Smokejumpers carried by Smokejumper aircraft with a standard amount of initial attack cargo.

LOFT - The facilities used for packing and repairing the parachutes. Consists of packing table room, drying tower, and sewing machines.

LOW PASS - An observation pass made alongside a fire or jump spot to help the spotter size-up the fire or select a jump spot, flown no lower than 200 feet AGL.

MAIN - Primary parachute used for intentional jumps.

MISSION COORDINATOR - A qualified spotter or check spotter who provides leadership in the planning, coordination, and management of flight operations.

MSL - Mean Sea Level.

NOTAM - Notices to Air Missions. FAA notices to pilots that may affect safety of flight.

OBSERVATION POSITION - During multi-jumpship operations, a known position flown by the Secondary Jumpship approximately 1,500' – 1NM behind, and slightly right, of the Primary JS to adequately allow continual visual monitoring. If ATGS assigned altitudes permit, the Secondary JS should be 200-300' above the Primary JS, but never below. The Secondary Jumpship may also pick up an observation position on the opposite side of the orbit from the Primary Jumpship to adequately allow continual visual monitoring based on mission needs.

PRIMARY JUMPSHIP - During multi-jumpship operations, the aircraft with maneuvering priority as well as final decision authority to mix various phases of jump operations.

RESERVE - Auxiliary chest-mounted parachute for use in the event of a malfunction of the main parachute.

RETARDANT - Liquid chemicals dropped from Airtankers to slow the spread of a fire.

SECONDARY JUMPSHIP - During multi-jump operations, the aircraft responsible for maintaining continuous visual separation with the Primary Jumpship.

SMOKEJUMPER DROP AIRSPEED - The airspeed the aircraft must fly for safe jumper exits and parachute deployment. Use the greater of 90 KIAS or 1.3 VSO for the configuration being used.

SMOKEJUMPER DROP ALTITUDE - The altitude AGL that the aircraft must fly to safely drop jumpers.

SMOKEJUMPER - An experienced professional firefighter who is trained to parachute into remote areas and in rugged terrain.

SPOTTER - A senior Smokejumper who trained to be in-charge of Smokejumper missions.

STANDBY - Standby is assigned to pilots by operations at the request of FMOs and is determined by burning conditions and lightning forecasts.

STATIC LINE - Line attached from the main parachute to the static line cable in the jump aircraft which activates the parachute as a jumper falls away.

STREAMERS - Twenty-foot-long weighted crepe paper strips that descend at the same rate as a personnel parachute that is used by a spotter to help determine wind drift.

TAWS - Terrain Awareness Warning System, a GPS-based Ground Proximity Warning System required on all Turbine aircraft by March of 2005.

TCAS - Traffic Collision Avoidance System, required on all Smokejumper Aircraft.

TERTIARY JUMPSHIP - During multi-jumpship operations, the 3rd jumpship who will hold beyond 7NM or above the FTA until either the Primary or Secondary Jumpship depart the incident.

CARGO TRAIL POSITION - During multi-jumpship paracargo operations, a known position similar to the Observation Position with the exception that spacing will be looser at 3,000' – 2NM. In no case should the Secondary Jumpship be forward of the Primary Jumpship.

VMC - Visual Meteorological Conditions.

Glossary of Standard Callouts

After departure but before the spotter makes the initial call to dispatch, let the spotter know the ETA to the fire and the amount of fuel on board.

"20 minutes out" – said when 20 minutes from the fire so jumpers can perform a primary equipment check.

"Five minutes out" – said when five minutes from the fire so ram air jumpers can perform a secondary equipment check.

Flying the Low Pass or High Low:

- **"Downwind" –** When on downwind.
- **"Turning base" –** Immediately prior to turning base.
- **"On final, low pass" –** When on final for a Low-Pass.
- **"On final, high low" –** When on final for a High-Low.
- **"Jump spot elevation [#### feet]"** – Calculated jump spot elevation in MSL.

Dropping Streamers:

- **"On final, 1,500, streamers"** – When on final for the Initial Set of streamers. This tells the spotter he can now give course corrections to the pilot.
- **"On final, 1,500, streamers to spot"** – When on final for streamers to spot. This tells the spotter he can now give course corrections to the pilot.
- **"On final, 1,500, check set" –** When on final for additional check sets following streamers-to-spot. This tells the spotter he can now give course corrections to the pilot.
- **"Streamers away"** – Said by the spotter when the streamers are released.
- **"[####]"** – AGL height based on the radar altimeter reading above the jump spot, said right after the spotter calls "streamers away."
- **"I have the streamers"** – When acquiring visual contact with the streamers as they fall.

In the jumper pattern:

- **"3,000"** – For ram airs, notify the spotter when reaching 3,000 feet AGL so the jumpers can arm their AAD (Automatic Actuating Device).
- **"Downwind"** – When on downwind.
- **"Turning base"** –Immediately prior to turning base. If jumpers are to be dropped, the spotter should respond with something like "jumpers ready" or "two in the door" to indicate that the pilot should continue in the drop pattern. If the spotter is not ready, the spotter should say "extend the downwind".
- **"On final, 1,500/3,000, rounds/squares"** – When on final. This tells the spotter he can now give course corrections to the pilot.
- **"Jumpers away"** – Said by the spotter to let the pilot know it is ok to turn the aircraft to the crosswind leg.

In the cargo pattern:

- **"Downwind" –** When on downwind.
- **"Turning Base" –** Immediately prior to turning base.
- **"On Final" –** When on final.
- **"Short final… standby… kick"** – Phrase when approaching the cargo spot.
- **"Dry Run"** – Practice pass used to evaluate hazards before going live.
- **"Live Run"** – Used to verbally differentiate for spotter and jump spot when dropping cargo.

Appendix A _ Forms

Training and Evaluation Forms are provided for convenience on the following pages:
Interagency Mission Certification Standards:
https://fs-prod-nwcg.s3.us-gov-west-1.amazonaws.com/s3fs-public/2025-05/nassu-imcs-interagency-mission-certification-standards.pdf?VersionId=LUcgGDqGLbEMg.yook1Uih04Z9EoPCg4
or
https://www.doi.gov/sites/default/files/documents/2024-11/interagency-mission-certification-standards.pdf

BLM
OAS-64A Interagency Airplane Pilot Evaluation Application (Form & Instructions)
- Fillable: https://www.doi.gov/sites/doi.gov/files/uploads/oas-64a.pdf

OAS-64D Airplane Pilot Flight Evaluation Application
- Fillable: https://www.doi.gov/sites/doi.gov/files/uploads/oas-64d.pdf