

*November, 2001*

**Helicopter Rappel Program  
1972 to present**

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*The following Interagency Helicopter Rappel Guide was produced by the Rappel Guide Working Group.*

## Interagency Helicopter Rappel Guide

### MASTER REVISION LOG

Revision Number	Date of Issue	Revisions
001	7-6-99	<ol style="list-style-type: none"> <li>1. Addition of Chapter 7 “ Cargo Letdown Operations”</li> <li>2. Rewrite of Appendix B “ Model Specific Rappel Procedures”.</li> <li>3. Include Appendix C “ Helicopter Cargo Letdown Procedures” in Appendix B.</li> <li>4. Amend Appendix D-G to C-F. Appendix C “ Sample Forms Appendix D “Suppliers, Information, References Appendix E “Interagency Helirappel Training Appendix F “Interagency Helirappel Spotter Training</li> <li>5. Chapter 3-V-D “Cargo Deployment Equipment” to reflect cargo letdown accordion pack usage and packing procedures.</li> <li>6. Chapter 3-V-A “Carabiners” to reflect SMC Model 100001 Lite Alloy Steel Carabiners.</li> </ol>
002	5-13-00	<ol style="list-style-type: none"> <li>1. Amend physical performance requirements in Chapter 2.</li> <li>2. Copy/paste model specific, Chapter 2.</li> <li>3. Genie stickers, Chapter 3.</li> <li>4. Letdown line markings, Chapter 3.</li> <li>5. MTDC #s guards (scuff plates), Chapter 3.</li> <li>6. Added Language- movement of helpful hints, Chapter 7.</li> <li>7. Gunner strap definition/requirement, Chapter 1.</li> <li>8. Model specific cross training procedures for rappellers, Chapter 2.</li> <li>9. Breakaway straps, Chapter 3.</li> <li>10. Snub straps, Chapter 3, paragraph C.</li> <li>11. Bell 206 L series, appendix B, B-5, page 35 NOTE, page 38 2-E.</li> <li>12. Bell 407, appendix B, B-7, pages 48 through 56.</li> <li>13. MTDC drawings, appendix D, page 7.</li> </ol>

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003	11-30-2001	<ol style="list-style-type: none"> <li>1. Update check spotter, spotter and rappeller sections and fitness/performance based standards, Chapter 2.</li> <li>2. S-61 Model Specific Procedures, appendix B, B-7 page B-57.</li> <li>3. Gunner Strap, Chapters 1 and 3.</li> <li>4. Spotter and rappeller rope checks, all models in Appendix B.</li> <li>5. Bell medium hand signals, Appendix B, B-4.</li> <li>6. Bell L Series reference to floor anchor external cargo operations, Appendix B, B-5.</li> <li>7. Bell 407 reference about rappellers helping with cargo letdown operations, Appendix B, B-7.</li> <li>8. Astar references to checking seatbelts and miscellaneous wording changes, Appendix B, B-3.</li> <li>9. Bell L series external spotter checks, Appendix B, B-5.</li> <li>10. Figure 8 with ears, Chapter 3 reference about steel vs. aluminum, Chapter 4 documentation requirement and Appendix C Figure 8 Log removed.</li> </ol>

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CHAPTER 1

**INTRODUCTION**

**I. Authority**

Reference USFS, IHOG, and DOI Manuals and Directives that apply. Where requirements are not specific to a particular department or agency, it is so noted.

The Appendix at the end of the Interagency Heli-Rappel Guide (IHRG) provides the following specific information: new base start-up procedures; model specific rappel procedures; model specific cargo let-down procedures; examples of forms; an equipment source list; lists of references and recommended reading; and syllabus for rappeller and spotter training.

**II. Objectives**

The objective of the IHRG is to establish sufficient standardization in procedure and techniques to allow individuals or crews to be utilized for a variety of missions under varying conditions. To aid in this approach, methods are incorporated to cross-train personnel in more than one rappel system and more than one specific helicopter type.

**III. Policies**

*Example:* All fire rappel operations must be in compliance with the IHRG.

**IV. Responsibility**

An Interagency Helicopter Rappel Working Group has been established; its members include management representatives and specialists presently involved in the rappel program. The responsibility of the Working Group is to exchange ideas and techniques with all involved throughout the program. Any changes or deletions to the IHRG should be addressed through the agency aviation manager to the Working Group.

**V. Acronyms**

**AGL** = above ground level

**BLM** = Bureau of Land Management

**DOI** = Department of the Interior

**FSH** = Forest Service Handbook

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**FSM** = Forest Service Manual

**IHOG** = Interagency Helicopter Operations Guide

**IHRG** = Interagency Helicopter Rappel Guide

**IHRSC** = Interagency Helicopter Rappel Working Group

**MTDC** = Missoula Technology Development & Center

**NFPA** = National Fire Protection Association

**OAS** = Office of Aircraft Services

**SDTDC** = San Dimas Technology & Development Center

**SPH** = special purpose helmet (or flight helmet)

**TDC** = Technology & Development Center

**USDA** = United States Department of Agriculture

**USDI** = United States Department of the Interior

**USFS** = USDA Forest Service

### VI. Definitions

**Anchor:** Means of attaching the rope to an object. For heli-rappelling, the anchor is an approved, "fail-safe" attachment point for the rappel ropes to the helicopter.

**Bight:** A V-shaped bend in a rope that comes back on itself, but does not cross.

**Booster Rappeller:** A qualified rappeller from another exclusive-use rappel base. *Booster rappellers* are used to augment the rappel crew capability at the host base when there is demonstrated need, or anticipated need.

**Core:** The inner part of a kernmantle rope. It consists of bundles of continuous, parallel fibers that contribute about 70 percent of the strength and mass of the rope, and determines its breaking strength and stretch.

**CWN Rappeller:** A qualified rappeller that is helitack qualified although is not a member of an exclusive-use helitack or rappel crew. Some examples would be members of engine crews or other fire personnel that have successfully completed training requirements for helitack and rappelling. *CWN Rappellers* are used to augment the rappel crew capability at a host exclusive-use rappel base when there is demonstrated need, or anticipated need.

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***Descent Device or Descender:*** A metal device through which the rope passes; designed to create friction, as needed, during a rappel. Tension from the brake hand provides the device with friction to control the rate of descent or stop.

***Double Rope Rappel:*** A rappel using two ropes, thus providing more friction at the descending device.

***Feed or Feeding:*** The act of pushing or sliding a rope through a descent device.

***Figure 8 Descent Device:*** A rappelling or descent device that resembles the numeral "eight." Available with ears.

***Glaze or Glazing:*** Heat generated during rapid rappels can overheat an area on a rope or webbing to the point of momentarily melting the nylon sheath fibers, which cool into a hard crystalline coating. When glazing occurs, it should be a concern for rope or webbing retirement!

***Gunner Strap:*** A restraint that keeps the rappeller tethered to the helicopter (Typically Type II helicopters) during the period between removing their seat belt and hooking up to the Sky Genie. (Shall conform to MTDC Drawing MTDC – 984)

***Helicopter Rappel:*** Any rappel performed in a controlled environment where the purpose of the rappel is training or proficiency, and not operational in nature.

***Helicopter Rappelling:*** The deployment of personnel from a hovering helicopter by means of an approved rope, descent device and supplementary equipment. Rappelling is comprised of a smooth, controlled, expeditious descent to the ground.

***Internal Abrasion:*** Damage caused by internal friction from dirt and grit particles trapped between fibers inside a rope. Use of a rope filled with these particles can severely damage the rope from the inside out.

***Operational Rappel:*** Any rappel performed for the purpose of accomplishing a task once the rappeller is on the ground; rappelling fire fighters, search and rescue, or law enforcement personnel to perform a specific task.

***Rappel Check Spotter:*** A qualified rappel spotter that has at least **two (2) seasons experience as a qualified rappel spotter** and has been approved by an agency specific Helicopter Operations Specialist to provide oversight in the rappel program and evaluate spotter candidates.

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**Rappel Height(s):** Rappels are generally categorized into three heights, as follows:

Low	Below 75 feet AGL
Medium	75 to 150 feet AGL
High	Above 150 feet AGL

**Rappel Spotter:** A person trained and certified, in accordance with Agency-specific policy and direction contained in the IHRG. Responsible for directing and managing rappel operations, providing instruction for initial rappeller candidates, spotter trainees, certifying rappellers and ensuring compliance with the IHRG.

**Rappeller:** A person trained and certified to rappel from a helicopter, in accordance with Agency-specific policy and direction contained in the IHRG.

**Trainee:** A designation attached to any position that denotes a person who successfully meets the training requirements, but has not been certified to perform operational missions in that capacity without direct supervision of a qualified rappel spotter.

### VII. Utilization

Rappelling expands the flexibility of the helicopter and crew and may enhance the safety of an operation. Rappellers can be considered a resource when formulating response plans for a Bureau, Region, Forest, Park, etc. Missions include:

- |  |   |
|--|---|
| ➤ Search and Rescue: <ul style="list-style-type: none"><li>• Team Insertion</li><li>• Equipment Deployment</li><li>• Victim Evacuation</li></ul> | ➤ Fire: <ul style="list-style-type: none"><li>• Initial attack</li><li>• Helispot Construction</li><li>• Hot-Spot Suppression</li><li>• Equipment Deployment</li><li>• Rescue</li></ul> |
| ➤ Law Enforcement  |   |

Initial response on an incident can be expedited where travel time by conventional methods is time intensive and arduous. Rappelling can be utilized under a variety of conditions:

- |                     |               |
|---------------------|---------------|
| ➤ Continuous Timber | ➤ Rock Slides |
| ➤ Steep Hillides    | ➤ Pinnacles   |
| ➤ Canyon Bottoms    |               |

CHAPTER 2

**RAPPEL QUALIFICATION**

**I. Pilot Requirements**

Pilots must comply with the following requirements:

- A. Meet the appropriate requirements of the contracting document.
- B. Pilot will be briefed and familiar with rappel operations by a qualified spotter. Pilot will be in attendance for all mock-up training.
- C. Final approval for rappel operations will be based upon:
  - Demonstrated ability to pilot the helicopter during a series of simulated rappels/cargo let down/short haul.
  - Demonstrated ability to coordinate with the rappel spotter.
- D. Upon meeting all of the above requirements, the pilot may be approved by a qualified agency Helicopter Pilot Inspector for rappel, cargo let down, or short haul.

**II. Rappel Qualifications and Training**

*The certifying official at each level may require additional training of rappeller, spotter and check spotter.*

**CHECK SPOTTER:**

**Duties:**

1. Initial spotter evaluation and certification.
2. Monitor and provide oversight for rappel training.
3. Monitor operations for standardization purposes.

**Position/Prerequisites:**

1. Must have been a qualified spotter for three seasons.
2. Must have been previously qualified as a spotter in multiple makes and models.
3. Must have been previously qualified as spotter in the aircraft they are conducting the evaluation in.

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### **Training:**

1. Must have demonstrated ability as an instructor and assisted in training at least two Spotters.
2. Certification of check spotters shall be approved annually by a Regional Helicopter Operations Specialist for Forest Service (USFS) rappel operations; by the State Aviation Manager for BLM operations; by the Area Manager for BIA operations; or by the Regional Aviation Coordinators for NPS. Other agencies and bureaus not listed above shall annually approve check spotters for their operations at a level in their organization commensurate with the positions above.

### **Proficiency:**

Each check spotter must make at least one error-free helicopter or simulator spot in any 14 consecutive days. If a simulator spot is used to maintain proficiency during any 14-day period, a helicopter spot must be completed during the next 14 day cycle. If proficiency is lost, an error-free simulator or mockup and helicopter proficiency spot must be completed prior to any operational spots. If two proficiency rappel periods pass (28 days), the Helicopter Operations Specialist or designee will insure the check spotter is capable of deploying rappellers through the use of mockups or training rappels.

**NOTE: Proficiency for rappellers and spotters shall refer to maintaining currency during the current season.**

### **Recurrency:**

Each year, to re-qualify, a check spotter must:

1. Meet fitness standards as outlined in prerequisites for rappeller candidates.
2. Attend and/or participate as an instructor at annual heli-rappel training. This shall include re-qualifying as a rappeller.
1. Complete deployment of three loads of rappellers with cargo from helicopter to the satisfaction of the appropriate agency certifying official (may be another spotter with experience in make and model being used).
3. Typical terrain shall be utilized for at least one of the three loads.

### **Model Specific:**

1. Briefing and familiarization on rappel anchor and hard points for the specific model.
2. Seating arrangement for rappellers and spotters.
3. Rappel cargo placement/ location and deployment sequence and method.
4. Exit procedures, sequences, and emergency procedures.

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5. Perform a minimum of six ground mock-ups in the helicopter model to be used including:
  - a. rigging helicopter for rappel mission;
  - b. deploying cargo; and
  - c. deploying rappellers.
6. Briefing by pilot on any peculiarities of the specific model.
7. Perform a minimum of three training rappel cycles (one low, one medium, and one high) with a full load of rappellers and cargo deployment.
8. Rappel Height(s): Rappels are generally categorized into three heights, as follows:

Low -- Below 75 feet AGL

Medium -- 75 to 100 feet AGL

High -- Above 150 feet AGL

If conducting an evaluation from a platform they have never been qualified in, the check spotter must complete model specific training prior to evaluating the spotter candidate. If previously qualified in the make and model they are doing the evaluation in but not current, the check spotter must complete all of the items required for model specific training EXCEPT the 3 live rappels.

**Note: There is no time expiration time on check spotter qualifications. To regain currency in a particular make and model, refer to model specific procedures.**

### **RAPPEL SPOTTER:**

#### **Duties:**

Monitor local rappel program, ensure compliance with fit to work and performance based rappel standards, provide instruction for initial rappeller candidates and spotter trainees, and certify rappellers.

#### **Position/Prerequisites:**

1. Meet the training, experience, and certification requirements for a helicopter manager as stated in their agency policy and have one season of rappel experience, or have two seasons of rappel experience and be under the direct supervision of a qualified helicopter manager or rappel spotter.
2. At least 20 live helicopter rappels, with four of those being operational.
3. Assist in instruction of rappel training.
4. Fire program spotter's must meet the requirements for a fire helicopter manager as stated in their agency policy.

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5. For a new program initiated within a bureau or agency, it will be the responsibility of the certifying officials and local managers to designate initial spotter trainees.
6. Meet the Fit to Work Standards as presented by MTDC, at the firefighter level for wildland fire operations. This guide shall be adhered to as it is written. **Program managers are encouraged to have fitness programs that exceed the minimum standards.**

### **Training:**

1. Shall demonstrate and exhibit knowledge of proper utilization and care of rappel related equipment, including PPE.
2. Shall attain skill level and proficiency necessary to successfully spot and direct rappels at all levels of elevated platform training.
3. Shall spot 20 complete rappel cycles (e.g., if a simulator accommodates two rappellers, then that would count as one cycle) from the high tower or platform level. Five consecutive loads shall be accomplished without procedural error and shall include cargo letdown.
4. Shall spot a minimum of eight mock-up cycles without procedural error.
5. Under supervision of check spotter, shall spot a minimum of 10 live rappel cycles through the low, medium, and high height progressions without procedural error. Five of these must be in typical terrain, and three shall include cargo.
6. Rappel Height(s); Rappels are generally categorized into three heights, as follows:
  - Low -- Below 75 feet AGL
  - Medium -- 75 to 100 feet AGL
  - High -- Above 150 feet AGL
7. Shall demonstrate ability to effectively communicate both verbally and non-verbally.
8. Shall demonstrate competency in the execution of all aspects of emergency procedures without error as outlined in chapter 7 of the IHRG.
9. Shall ensure timely and accurate rappel documentation as outlined in Chapter 4 of IHRG.
10. Shall ensure compliance with all applicable agency and/or interagency policies and procedures.

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### **Proficiency:**

Each spotter shall make at least one error-free helicopter or simulator spot in any 14 consecutive days. If a simulator spot is used to maintain proficiency during any 14 days period, a helicopter spot must be completed during the next 14-day cycle. If proficiency is lost, an error-free simulator or mockup and helicopter proficiency spot must be completed prior to any operational spots. If two proficiency spot periods pass (28 days), the check spotter will insure the spotter is capable of performing the spot through the use of mockups or training spots.

**Note: Proficiency for rappellers and spotters shall refer to maintaining currency during the current season.**

### **Recurrency:**

Each year, to re-qualify, a rappel spotter must:

1. Meet fitness standards as outlined in rappeller candidate prerequisites.
2. Attend and/or participate as an instructor at annual heli-rappel training. This shall include re-qualifying as a rappeller.
3. Complete deployment of three loads of rappellers with cargo from helicopter to the satisfaction of the certifying official (may be another spotter with experience in make and model being used).
4. Typical terrain shall be utilized for at least one of the three loads.

### **Model Specific:**

Trainees must be approved by an appropriate certifying official in each make and model of helicopter that will be utilized as an operating platform. Certifying officials (e.g. spotters, check spotters) must be current in the make and model of helicopter that they intend to certify trainees in.

The model specific procedures contained in the Appendices shall be used for training and operational rappels.

1. Briefing and familiarization on rappel anchor and hard points for the specific model.
2. Seating arrangement for rappellers and spotters.
3. Rappel cargo placement/ location and deployment sequence and method.
4. Exit procedures, sequences, and emergency procedures.
5. Perform a minimum of six ground mock-ups in the helicopter model to be used including:
  - a. rigging helicopter for rappel mission;
  - b. deploying cargo; and

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- c. deploying rappellers.
6. Briefing by pilot on any peculiarities of the specific model.
7. Perform a minimum of three training rappel cycles (one low, one medium, and one high) with a full load of rappellers and cargo deployment.

### **RAPPELLER:**

#### **Position/Prerequisites:**

1. To be considered as an appropriate rappeller candidate, all of the following minimum requirements must be met every year as a condition to perform the duties of the position:
2. Meet the training and experience requirements for a helitack crewperson as stated in their agency policy.

**NOTE:** For exclusive-use helitack/rappel crews it is acceptable for first year helitack/rappeller candidates to be trained and qualified in both helitack and rappel with the approval of a USFS Helicopter Operations Specialist or appropriate equivalent DOI agency official.

3. Meet the current Fit to Work Standards as presented by MTDC, at the firefighter level for wildland fire operations. This guide shall be adhered to as it is written. **Program managers are encouraged to have fitness programs that exceed the minimum standards.**
4. In order to qualify as a rappeller, candidate must be able to perform the following performance based rappel procedures with the full weight of rope (or equivalent) suspended below the rappeller.

Rappeller must successfully perform:

- A. 3 simulator exits.
- B. 3 simulator re-entries from the rappel position on the skid/step.
- C. Untie 3 knots during simulator rappels
- D. Complete 3 emergency procedures (lock-off, tie-off)

### **Training:**

#### *Ground Training:*

1. Demonstrate the proper use of rappel equipment, including personal protective equipment.
2. Demonstrate the required skill level and proficiency in each phase of elevated Platform training before proceeding to the next phase. Each rappeller will perform a

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minimum of 15 low and high platform rappels. This will include five consecutive high platform rappels, including three demonstrating proper execution of emergency procedures without procedural error.

### *Helicopter Mock-Up:*

Rappellers shall demonstrate proficiency in actual rappel simulations with full gear as directed by the spotter, with a partner present, in the helicopter, not running.

### **Helicopter Rappels:**

1. First rappel should be at a low rappel height and in flat open terrain.
2. Second rappel should be at medium height and in flat open terrain.
3. Third rappel should be at medium height and in flat open terrain.
4. Fourth rappel will be at high rappel height and in flat open terrain.
5. Fifth rappel will be at high rappel height and in flat open terrain, or typical terrain at the discretion of the spotter.
6. Sixth rappel will be at high rappel height and in typical terrain.
7. Seventh rappel will be at high rappel on a side hill in typical terrain.
8. Eighth rappel will be at maximum allowable rappel height and in typical terrain.
9. A training emergency tie-off will be completed from the hovering helicopter during a rappellers initial training. It is recommended that this be accomplished at low to medium rappel height, in flat open terrain during or after the third helicopter rappel.

### **Proficiency:**

Each rappeller shall make at least one error-free helicopter or simulator rappel in any 14 consecutive days. If a simulator rappel is used to maintain proficiency during any 14 day period, a helicopter rappel must be completed during the next 14 day cycle. If proficiency is lost, an error-free simulator or mockup and helicopter proficiency rappel must be completed prior to any operational rappels. If two proficiency rappel periods pass (28 days), the spotter will insure the rappeller is capable of performing the rappel through the use of mockups or training rappels.

**NOTE:** *Proficiency for rappellers and spotters shall refer to maintaining currency during the current season.*

### **Requalification:**

A rappeller who has qualified the previous year will:

1. Meet fitness standards as outlined in prerequisites for a rappeller candidate.
2. Attend basic helicopter safety refresher.
3. Participate in rappel ground training.
4. Demonstrate knowledge of rappel principles.

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5. Utilize the training/ proficiency simulator without procedural error.
6. Complete three helicopter rappels in typical terrain without procedural error.
7. Identify emergency situations and perform corrective actions without procedural error.

### **Model Specific:**

Trainees must be approved by an appropriate certifying official in each make and model of helicopter that will be utilized as an operating platform. Certifying officials (e.g. spotters, check spotters) must be current in the make and model of helicopter that they intend to certify trainees in.

The model specific procedures contained in the Appendices shall be used for training and operational rappels.

1. Briefing and familiarization on rappel anchor and hard points for the specific model.
2. Seating arrangement for rappellers and spotters.
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4. Exit procedures, sequences, and emergency procedures.
5. Perform a minimum of six ground mock-ups in the helicopter model to be used including:
  - a. rigging helicopter for rappel mission;
  - b. deploying cargo; and
  - c. deploying rappellers.
6. Briefing by pilot on any peculiarities of the specific model.
7. Perform a minimum of three training rappel cycles (one low, one medium, and one high) with a full load of rappellers and cargo deployment.

CHAPTER 3

**RAPPEL EQUIPMENT**

**I. Equipment, Accessory, and Procedure Development Process for USFS and DOI**

Objectives:

- A. Increase the quality and efficiency of rappel equipment development work and, at the same time, reduce development costs.
- B. Properly balance input and participation in the equipment development process by rappel bases, Technology and Development (T&D) Centers, State, Regional and Washington Office management.
- C. Identify priorities for T&D Centers' development work by systematically identifying priority rappel problems that can be solved by equipment development.
- D. Clearly identify procedures and items of rappel equipment that need to be standardized to facilitate interregional exchange of rappellers, and which will also increase safety and maximize efficiency.
- E. Clearly identify operational procedures and technical requirements for each item of equipment in advance of development work. The probability of a satisfactory item of equipment being developed before defining requirements is very low. Conversely, success is much higher if a piece of equipment is designed to meet pre-defined and agreed upon operational, procedural, and technical requirements.

Outlined below is the formal process for obtaining the necessary approval and technical support for helicopter rappellers to propose new or improved equipment and/or procedures.

When a field user has a need for a new or improved piece of equipment and/or procedure, documentation of that need must be submitted to the Interagency Helirappel Working Group, where it will be evaluated based on the above objectives and the following criteria.

- 1. Critical Safety
- 2. National Focus

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### 3. Priority

### 4. Probability of Success

If the Working Group decides the need is viable and meets the above criteria and objectives, the proposal is forwarded to the National Aerial Attack Systems Specialist for Forest Service Operations, or the Fire Management/Aviation/ Operations/ Retardant/ Explosives/ specialist for BLM operations, who will have final authority to accept or reject the proposal.

If the proposal is accepted, it will follow one of the paths outlined below:

1. If the proposal is a change in procedure or an "off-the-shelf" piece of equipment that does not require extensive testing and development, it will receive the appropriate engineering test and/or review in coordination with the appropriate Technology and Development Center. Upon recommendation, it may be provisionally approved for one season of field use for evaluation and formally approved when it is found to meet the evaluation criteria.
  - Upon formal approval, the Rappel Guide will be amended to include the new equipment and/or procedure(s).
  
2. If the proposal requires a major equipment development effort (i.e., engineering design, drawings, testing, etc.), with project funding from the Washington Office Fire and Aviation Management, it is then forwarded to the Working Group. They will address the proposal to the above-mentioned criteria and, if approved, assign the equipment development task to the appropriate Technology and Development Center. The design, engineering and development work is accomplished there.
  - If necessary, a prototype design is provisionally approved and manufactured for field evaluation for one season of use; after which, the design is finalized and formally approved.
  - Upon formal approval, the Rappel Guide will be amended to include the new or revised drawings, specifications, procedures, etc.

***All equipment used in rappel operations will be approved by the Aerial Attack Systems Specialist for USFS, the BLM National Aviation Operations Specialist; and appropriate authority for DOI agencies. All equipment will be monitored during use for***

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wear and stress related damage. Shortening the service life or removal from service of a special component may be done, as necessary, in order to maintain an adequate margin of safety in the program.

### II. **Rappel Base Equipment** (*Equipment Source List included in Appendix D*)

#### Rappel Platform Training Simulator

A rappel platform simulating the cabin area, seating positions, and skid heights of the helicopter utilized must be readily available to each rappel base, preferably at the rappel base. The purpose of the platform is to train rappellers and maintain proficiency in exit and emergency procedures.

Requirements for the simulator are:

- A minimum height of 20 feet above ground level.
- Construction should approximate the helicopter to be utilized as near as possible, i.e., cabin configuration, seating positions, skid height.

### III. **Individual Rappel Equipment**

#### A. Helmets

##### 1. Spotter Helmet

Must meet minimum standards of SPH-4 or SPH-5 and have avionics for intercom and radio communications.

##### 2. Rappeller Helmet

**NOTE: Aviator's or motorcycle type are the only helmets approved for use by USFS and DOI fire operations rappellers.**

- Approved Aviator's Helmet (i.e., SPH-4 or SPH-5).
- Motorcycle-type Helmet, ANSI Spec. Z-90, DOT approved.
- Climbing-type Helmet (Joe Brown, MSR, Petzl, or equivalent) must be Union International Alpine Association (UIAA) approved. The chinstrap should be designed to prevent the helmet from falling over the eyes or off the head.

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### 3. Helmet Adjustment

Select proper size and adjust to fit individual. When chinstrap is adjusted snugly, any loose strap should be secured to eliminate entanglement in descent device or rope.

### 4. Inspection, Care, and Repair

Inspect helmet lining and chinstrap. If helmet is involved in a fall or hit by a falling object; or if cracks, dents, or chips appear to compromise safety of helmet, remove from service. Also, if the chinstrap is frayed or buckle inoperable, remove helmet from service. NOTE: Check helmet warranty prior to painting. Some paints contain acetone or toluene, which may weaken helmet shell. Follow manufacturer's requirements.

### B. Eye Protection

For any rappel operation, rappellers must wear agency-approved eye protection. The visor down on flight helmets meets this requirement.

### C. Flame-Resistant Clothing

Flame-resistant clothing shall meet the requirements of **NFPA 1977, PROTECTIVE CLOTHING and EQUIPMENT for WILDLAND FIRE FIGHTING, 1998 Edition** for all rappel operations. Pants or flight suit will be of sufficient length to eliminate exposure of legs when in a sitting position. Undergarments will be of natural fiber (i.e., cotton, wool, etc.).

### D. Leather Boots

Shall be of sufficient height to eliminate exposure of legs between Nomex® and boot top, and have non-skid Vibram lug or equivalent soles. If leather boots are not conducive to the working environment (e.g., water or snow) and it is determined that rubber boots, or synthetic "snow boots" are essential to the mission, the government supervisor is required to inform the crew and passengers of the increased personal hazard in the event of an aircraft mishap resulting in fire. Reference IHOG.

**NOTE:** Fabric-sided (cotton or nylon) shoes or boots are not acceptable under any circumstances.

### E. Rappel Gloves

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Gloves should be all leather with double-leather palm and fingers and provide sufficient heat protection for rappel descent.

### F. Personal Gear Bag/Belly Bag (*Optional*)

This bag may be designed so that it attaches to the rappel harness, incorporating quick-release type buckles. Loose straps must be secured to prevent entanglement during the rappel process. Personnel may also utilize daypacks if appropriate to the mission and aircraft configuration.

Model-specific procedures and equipment specifications must be approved through the IHRSC prior to rappelling with daypacks.

### G. Harnesses

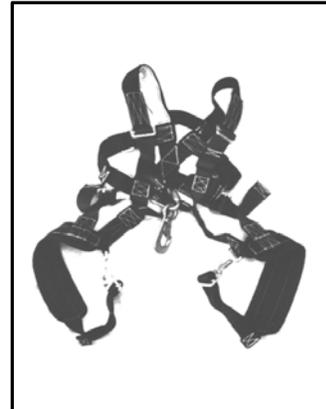
**For wildland fire rappel programs, the HR-2 Harness shall be used.**

#### 1(a). Forest Service and DOI Fire Rappel Programs

The HR-2 Wildland Fire Helicopter Rappel Harness shall be used for wildland fire helicopter rappelling.



*Figures 1 and 2.  
HR-2 Rappel  
Harness.*



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- (b). Fire Spotter Harness  
Spotters shall wear a helicopter spotter harness manufactured in accordance with *BLM Drawing #B49001*, HR-2 harness or the Petzl Harness.
- (c). Rappeller Gunner Strap  
Rappellers that are required to remove their seat belts to move to a door to hook into their genie (example, Bell 212), require a secondary restraint manufactured in accordance with MTDC drawing MTDC 984.
- 2. Non-Fire Rappel Programs  
Those units utilizing a Sit Harness must have approval by local program managers.

The harness will be constructed, at a minimum, of two-inch polyester or nylon webbing (3,500 pound minimum breaking strength). It is recommended that all stitching be of a contrasting color to that of the webbing to increase thread wear visibility. Attachment loops for the descending device will be above the body's center of gravity to minimize the potential of inversion.

A locking-D carabiner, or spring-loaded twist lock of comparable strength, will be used to attach the descent device to the harness for those harnesses that do not use a Forgecraft hook.

Adjustment of the harness is accomplished by positioning the body in the harness; should be adjusted to fit snugly. Buckles must not rotate when loaded; this would create pressure points. Buckles should not create pressure points at groin area or kidneys.

It is critical on any harness with double pass-type buckles to double the belt back through the buckle for maximum slip resistance. This maintains proper fit and keeps the rappeller secure in the harness. As with all rappel equipment, follow the manufacturer's instructions carefully.

**NOTE:** With the sit harness, neither the pivot point nor point of rotation is where the carabiner is, but is level with the pelvic line.

## Interagency Helicopter Rappel Guide

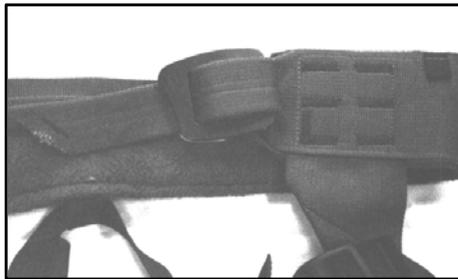


*Figures 3 and 4.*  
Typical Commercial  
Sit Harness.



### 3. Spotter Harness

An approved spotter harness or rappel harness must be used. The approval process is through normal channels and approved by the Working Group.



*Figures 5.* Double  
Pass style buckle.

### 4. Harness inspection

- Inspect stitching and webbing for abrasion, wear or other damage.
- Check buckles and descender attachment points.
- For HR-2 harnesses inspect the Forgecraft hook for proper locking and release of spring loaded gate.

## Interagency Helicopter Rappel Guide

### IV. Ropes And Descent Devices

The following is broken into the two rappelling rope and descent device systems utilized by the member agencies. The *Descent Control* and *Kernmantle* ropes will be the only ropes used for helicopter rappelling.

#### A. Descent Control Braided Nylon Rope

**NOTE: The USFS and BLM have approved only the Descent Control Type 4 rope and Sky Genie descent device (Model 14G-O) for use in their fire helicopter rappel programs. Fire operations will only utilize equipment manufactured by Descent Control.**

This rope manufactured by Descent Control, Inc. is one-half inch braided nylon manufactured in 250 foot lengths. Three metal swedges, one-half inch (1/2") apart, attach a metal eye (thimble) to each end of the rope.

To increase each rope's operational life, rope ends will be rotated after each rappel sequence.

- Ropes that lay over a doorsill or pass through a carabiner shall have a rubber hose jacket to provide protection. It must give sufficient protection to minimize direct right angles to rope and eliminate rope damage on door edges.

#### 1. Rope Damage

##### a. Heat

It is imperative to document any type of heat damage to rappel ropes. Although some ropes may be more tolerant to heat damage than others, it can be assumed that if a rappeller can smell a pungent odor of burning nylon, sufficient damage has been caused to create concern and necessitate close inspection and documentation in the rope log.

During fast descents there is little friction developed while descending. As the rappeller nears the ground, friction is applied to slow the descent. This generates heat quickly. As the rappel device absorbs heat, it may become hot enough to glaze or melt the rope, especially when coming to an abrupt stop on a long descent.

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For nylon rope, a critical temperature of 350°F will cause breakdown in fibers. At 480°F, melting will begin. A rapid rappel to minimize exposure under a hovering helicopter will inevitably cause heat damage, reduce rope life, and may require immediate rope retirement, even with a new rope.

To minimize potential for heat damage, do not allow the descent device to heat to the point where it will melt the rope fibers. To accomplish this, vary the rate of descent or amount of friction applied to the descent device. This will decrease any steady heat buildup by allowing some cooling of the device between braking. After each rappel, visually check the rope for glazed areas or feel for hard, stiff areas that may indicate heat damage. If any damage is found document it on the rope log sheet. If there is any doubt concerning extent of rope damage, retire the rope.

b. Dirt

Any contaminant, which works into the fibers and construction of the rope, will cause deterioration. Mud, dirt, and sand have sufficient grit to cause abrasion to rope fibers. Because of the potential for fiber abrasion, ropes should not be stepped on. Look for excessive mud and dirt. Feel the rope for grit or particles that could possibly work into the rope. Do not drag the rope over the ground.

c. Chemicals

Contact with acids or bleach must be avoided. Chemical damage to ropes can occur and may not be visually detected. Because of this potential hazard, ropes should always be stored in a rope bag away from batteries and chemicals. Alkalis, oxidizing, and reducing agents (e.g., bleach, fire retardant, or foam) are all known to be dangerous to nylon. Nylon is unaffected by hydrocarbons; however, additives in these agents may adversely affect the rope. Any surface that ropes may potentially make contact with should be inspected for the presence of contaminants that can damage the ropes.

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### 2. Rope Inspection

Refer to *San Dimas TDC Memo issued May 1990, "Time in Service and On Condition Guidelines"* (following) and *Aviation Tech Tips, June 1992, 5700-9257, 1306-SDTDC* section on recommendations regarding rappel rope care.

For rope documentation guidelines refer to chapter 4 of the IHRG.

Nothing limits the discretion of either the spotter or the rappeller to retire a rope.

Inspection of any rappel rope should be done carefully and methodically. At the time the rope is initially put in service it will be thoroughly inspected and after every use of the rope. First, untangle the rope into a loose, knot-free or "flaked" pile on a clean surface. Next, inspect a short section at a time. Feel the rope, without gloves, for deformities or burrs, anything out of the ordinary. Look for visual indications of abuse: puffs; boogers; heat glazing or anything that may indicate rope damage. If damage is apparent, remove from service and document on the rope log sheet.

Swedges and thimbles shall be inspected for deformity, cracks, and sharp edges. If damage is noticed to metal components, retire the rope. Thimbles and swedges should be snug. If not, return to manufacturer or retire it. When more than 25% of surface strands have been pulled out in a loop, and cannot be worked back into rope, the rope will be retired.

If a rope has been retired due to apparent or suspected damage, the best way to determine the extent of damage is to cut the rope near the site of injury and inspect for actual core destruction. If a breaking strength test on a damaged rope is to be performed by a testing facility, a minimum of eight feet is required, four feet on either side of the damaged area.

No rope shall be used if it shows evidence of: any overheating or burning; visible damage which would compromise its strength or safety; contamination with foam concentrate, retardant, or any petroleum product; or, any damage which affects more than 25% of any woven strand of the rope. ***No rope shall be used more than five years after its manufacture date.***

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### 3. Rope Maintenance

If ropes accidentally become wet, the ropes should be air dried, away from direct sunlight. Do not lay ropes on a concrete floor, as acid is often used in concrete work and may last for years. Drying ropes on asphalt parking lots should also be avoided. Never dry a rope in a clothes dryer. The temperatures are hard to control and heat damage may occur.

### 4. Rope Use and Care

Prior to use a new rope should be attached to a swivel and stretched full length by hand. This will "untwist" the rope and minimize the kinks and coils associated with new ropes. Running the Sky Genie over the ropes a minimum of ten times per end is required to break the rope in. This does not need to be documented in the rope log or Genie log.

Important care tips to be observed include:

- Never step on ropes.
- Avoid prolonged exposure to sunlight; dry ropes in the shade.
- Never expose ropes to rough surfaces.
- Avoid dragging ropes on the ground.
- Avoid contact with all chemicals that may contaminate rope.
- Keep ropes away from heat sources.
- Avoid laying ropes on concrete or asphalt.
- Avoid overloading ropes.
- Avoid contact of the rope with velcro.

All ropes shall be stored under clean, dry, cool conditions. Any rope stored in its original packaging in a cache or warehouse shall not be stored directly in contact with the floor. The ambient temperature shall be maintained between 0°F and 100°F. After placed in service, ropes may be stored in rope bags, provided that clean, cool, dry storage conditions prevail.

No rope shall be used more than 100 rappels per end.

### B. Sky Genie®

For helicopter rappelling, the one-half inch Sky Genie® (*Model no. # 14G-O*), manufactured by Descent Control, Inc., shall be used by all fire rappel operations. This is a two-piece descent device, shaft and cover. (Cover will have the Interagency Wildland Fire Helicopter Rappel Genie Decal on it) A

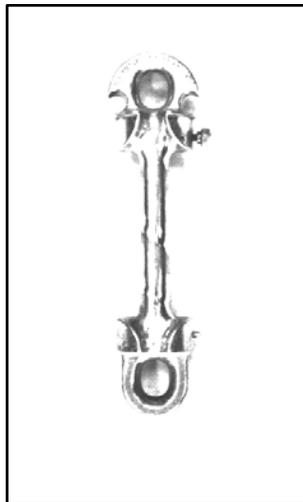
## Interagency Helicopter Rappel Guide

standard of 2-1/2 wraps around the shaft will be used. The rope will enter the front and exit the back of the cover and show two wraps in the cover window. Follow the arrow on the shaft for direction of wraps. It must be used only with the Descent Control, Inc., one-half inch diameter rappel rope (*Type 4*).

The retirement life for the Sky Genie® is based on the wear grooves on the shaft. Sky Genie's® shall be retired after a 1/16-inch deep wear groove is observed.

After each rappel, inspect for:

- Dents in cover.
- Rough or sharp surfaces on cover and shaft
- Scratches or excessive wear on shaft.
- Faulty detent pin or locking screw.
- Cracks or breaks.
- Cover fitting on shaft.
- Dirt, tree sap, etc.
- Wear on cover, inside or out, at thumb screw slot or detent pin hole.



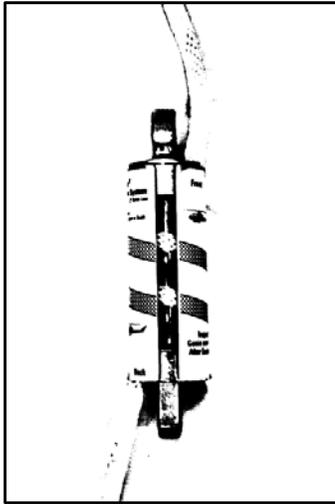
**Figures 6. Sky Genie® without cover.**

**NOTE: Wear grooves around shaft.**

Take care to:

- Avoid rough handling.
- Not drop or drag on ground.
- Keep Sky Genie® shafts with original covers.
- Keep clean.

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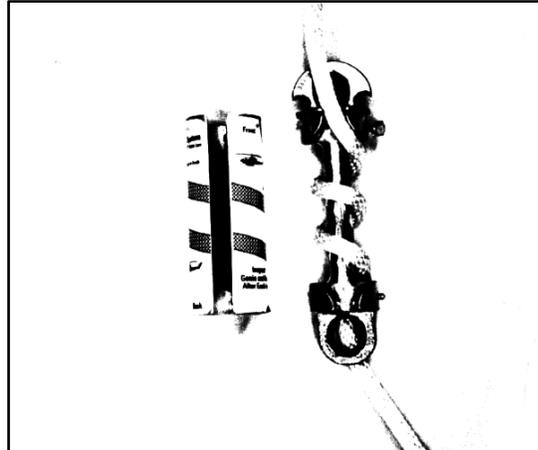


**Figures 7. Descent Control Sky Genie®.**  
(Model no. # 14G-O)

**NOTE: "Two wraps in window".**

**Figures 8. Sky Genie® with cover removed.**

**NOTE: Orientation of rope around shaft.**



### C. Kernmantle (Jacketed) Rope, Dynamic/Static (Non-Fire Operations)

This was originally a European two-component design. Currently, many of these ropes are manufactured in the United States, with U.S. design and engineering. The "kern" is a high-strength inner core, covered by a protective sheath called the "mantle". The core can be made of parallel filaments or filaments spiraled into cords that run the entire length of the rope. Damage sustained only to the outside sheath may affect 20-50% of the rope's initial strength, while 50-75% of the strength remains in the core. There are two types of kernmantle rope, dynamic and static.

#### 1. Dynamic

Has 2-4% stretch under body weight, as much as 40-70% before breaking.

#### 2. Static

Has low stretch, and is specifically designed for rescue, caving, and rappelling; has as much as 20% stretch before breaking.

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### 3. Rope Requirements

- A minimum of 11-mm (7/16-inch) diameter will be required for all rappel operations.
- A minimum of 5,000 lb tensile strength for any rappel rope, tested under federal test standard 191A, method number 6016.
- Ropes that lay over a doorsill will have a rubber hose jacket to give protection. It must give sufficient protection to minimize direct right angles to rope and eliminate rope damage on door edges.
- Knots tied for attachment to anchor or rappel plate will be single or double "Figure of 8" plus a back-up knot.

### 4. Rope Damage

#### a. Heat

It is imperative to document any type of heat injury to rappel ropes. Although some ropes may be more tolerant to heat damage than others, it can be assumed that if a rappeller can smell a pungent odor of burning nylon, sufficient damage has been caused to create concern and necessitate close inspection and documentation in the rope log.

If a rappeller descends very fast, there is little friction developed while descending. As the rappeller nears the ground, friction is applied to slow the descent. This generates heat quickly. As the rappel device absorbs more heat than it can dissipate, it may become hot enough to glaze or melt the rope, especially when coming to an abrupt stop on a long descent.

For nylon rope, a critical temperature of 350°F will cause breakdown in fibers. At 480°F, melting will begin. A rapid rappel to minimize exposure under a hovering helicopter will inevitably cause heat damage, reduce rope life, and may require immediate rope retirement, even with a new rope.

To minimize potential for heat damage, do not allow the descent device to heat to the point where it will melt the rope fibers. To accomplish this, vary the rate of descent or amount of friction applied to the descent device. This will decrease any steady heat

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buildup by allowing some cooling of the device between braking. After each rappel, visually check the rope for glazed areas or feel for hard, stiff areas that may indicate heat damage. If any damage is found document it on the rope log sheet. If there is any doubt concerning extent of rope heat damage, retire the rope.

b. Dirt

Any contaminant, which works into the fibers and construction of the rope will cause deterioration. Mud, dirt, and sand have sufficient grit to cause abrasion to rope fibers. Because of the potential for fiber abrasion, ropes should never be stepped on. Look for excessive mud and dirt. Feel the rope for grit or particles that could possibly work into the rope. Do not drag the rope over the ground.

c. Chemicals

Contact with acids or bleach must be avoided. Chemical damage to ropes can occur and may not be visually detected. Because of this potential hazard, ropes should always be stored in a rope bag away from batteries and chemicals. Alkalis, oxidizing, and reducing agents (e.g., bleach, fire retardant, or foam) are all known to be dangerous to nylon. Nylon is unaffected by hydrocarbons; however, additives in these agents may adversely affect the rope. Any surface that ropes may potentially make contact with should be inspected for the presence of contaminants that can damage the ropes.

5. Rope Inspection

Refer to *San Dimas TDC Memo issued May 1990, "Time in Service and On Condition Guidelines"* (following) and *Aviation Tech Tips, June 1992, 5700-9257, 1306-SDTDC* section on recommendations regarding rappel rope care. For rope documentation guidelines refer to chapter 4 of the IHRG.

Nothing limits the discretion of either the spotter or the rappeller to retire a rope.

Inspection of any rappel rope should be done carefully and methodically. At the time the rope is initially put in service it will be thoroughly inspected after every use of the rope. First, untangle the rope into a loose, knot-free or "flaked" pile on a clean surface. Next,

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inspect a short section at a time. Feel the rope, without gloves, for deformities or burrs, anything out of the ordinary. Look for visual indications of abuse: puffs; boogers; heat glazing, or anything that may indicate rope damage. If damage is apparent, remove from service and document on the rope log sheet.

Through extended use, all rappel ropes will develop fuzz as the outside surface wears and individual filaments are broken by grit and sharp edges. Examine the surface fibers with a 10X magnifying glass. Inspect each fiber bundle. If more than 50% of the fibers are broken in any single bundle remove the rope from service.

As the rope is being inspected, note any lumps or depressions. Harm to the core will create filament or yarn breakage and slight retraction. If enough strands rupture, a localized reduction of the diameter of the rope results in a depression that can be felt and/or seen. Further inspection of suspected damage should be accomplished by applying tension to this section of rope with body weight to emphasize the dimple by separating broken strands and enlarging the depression. If damage is found after this test, retire the rope.

Core damages without sheath damage usually cannot be seen. Generally, lumps and depressions in rope diameter can be attributed to the rope being coiled, flaked, or piled into a box or bag. These are usually harmless, although should be tested further to be certain. Feel for any changes in stiffness. If a soft spot is felt, bend rope at suspected site. If the sharp bend varies in its surface texture or firmness from the rest of the rope, retire it.

As the rope is being felt, check for puffs (core fibers, which tend to be clean and white, that protrude from the sheath) or a booger (severely worn area, possibly showing core strands). If any changes in diameter or texture exist, it will be necessary to distinguish between mere knot compression, storage compression, or actual damage. If in doubt, remove the rope from rappel service.

If a rope has been retired due to apparent or suspected damage, the best way to determine the extent of damage is to cut the rope near the site of injury and inspect for actual core destruction. If a breaking strength test on a damaged rope is to be performed by a testing facility, a minimum of eight feet is required, four feet on either side of the damaged area.

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No rope shall be used if it shows evidence of: any overheating or burning; visible damage which would compromise its strength or safety; contamination with foam concentrate, retardant, or any petroleum product; or, any damage which affects more than 25% of any woven strand of the rope. ***No rope shall be used more than five years after its manufacture date.***

### 6. Rope Maintenance

If ropes accidentally become wet from rain or exposure to weather, the ropes should be air dried, away from direct sunlight. Do not lay ropes on a concrete floor, as acid is often used in concrete work and may last for years. Drying ropes on asphalt parking lots should also be avoided. Although not critical, it is an extension of good rope care and eliminates potential for grease or tar to contact rope. Never dry a rope in clothes dryer. The temperatures are hard to control and heat damage may occur.

### D. Figure 8 with "Ears"

This is a one-piece descent device, originally designed for mountaineering. For rappel use, the Figure 8 should have "ears" to minimize the potential of the rope slipping up and knotting at the top of the descender. The ears also simplify the technique of locking-off.

The rope enters the inside of the large "O", bottom up, then loops over the attachment ring, presenting the running end of the rope to the brake hand. The Figure 8 is then attached to the rappel harness with a locking carabiner and locked.

After each rappel, be sure to inspect for:

- Grooves developing or flaking occurring in aluminum Figure 8's.
- Cracks or breaks.

When a groove develops beyond the anodized surface of the aluminum Figure 8, wear will rapidly occur. If the groove is beyond 1/16-inch deep, retire the Figure 8. Inspect the Figure 8 for aluminum flaking. This develops rough edges that could cause excessive wear on the rope. If flaking is evident, remove the Figure 8 from service. In some instances, 30 rappels may be the maximum use. Although the acquisition cost is double, steel Figure 8's have proven more durable and service life is considerably longer

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than aluminum, however, steel may cause heat damage more easily because it does not dissipate heat as readily as aluminum.

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Take care to:

- Avoid rough handling.
- Not drop or drag on ground.
- Keep clean.

**Figures 9. Figure 8 with ears, "double rigged".**



### V. Other Equipment

#### A. Carabiners

Positive locking steel carabiners are required and shall meet the requirements of **NFPA 1983, Standard of Fire Service Life Safety Rope and System Components 1995 Edition**. Positive locking steel carabiners shall meet the "Personal Use" requirement of the 1983 standard which states the carabiner shall have a major axis minimum breaking strength of at least 6000 lbs. (26.67 kN). ***All wildland fire rappel operations will use only positive locking steel carabiners that meet the above requirements.***

**NOTE:** Paragraph 4-5.6 of NFPA 1983 states, "Snap link and carabiner gates shall be self-closing and of a locking design." Appendix A - Explanatory Material: Definition A-4-5.6, "Locking designs can include screw and spring collars that are designed to prevent gates from opening accidentally during use."

**Steel locking carabiners will be used, inspected and retired (if applicable) in accordance with manufactures specifications. No records need be kept on positive locking steel carabiners.**

One positive locking steel carabiner will be used to attach rappel ropes to the rappel plate or anchor. Positive locking steel carabiners shall be used in all cargo deployments.

**NOTE:** *Carabiners are designed to be loaded longitudinally; if load occurs on the side(s), gate failure may occur.*

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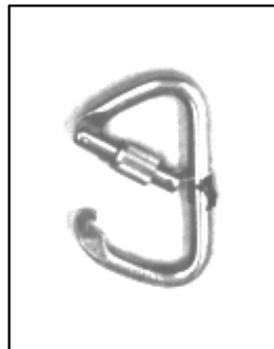
Inspect to be sure that gates and locking mechanism function properly. If gate becomes sticky, remove from service. Look for abrasion, burrs, or rough edges. If there is any visual indication that raises question, retire it. When retired, the carabiner should be destroyed.

When using carabiners make certain that:

- Gates are locked when in use.
- Pull is not on gate.
- Carabiners are not dropped on ground or hard surface.
- Rough handling is avoided.
- Carabiners are kept clean.



**Figures 10. Steel locking carabiner, gate locked in place.**



**Figures 11. Steel locking carabiner, gate open.**

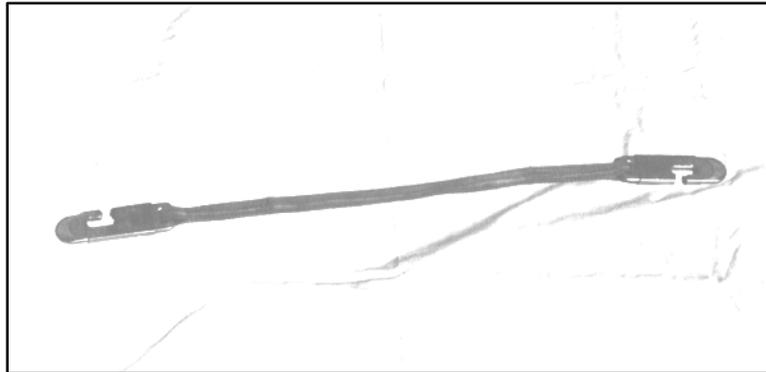
### B. Knife

All rappellers and spotters are required to have a hook knife, with lanyard, readily accessible for emergency use. The "Jack the Ripper" style knife is required for use by rappellers and spotters. A heavier seat-belt type hook knife may be used for spotter use.

### C. Safety Snub Strap

An approved safety snub strap will be utilized to securely connect the two ropes that are attached to the rappel anchor to one another. *The snub strap shall be manufactured in accordance with MTDC drawing #958 for all models with the exception of the Bell 407. Which shall be manufactured in accordance with MTDC drawing #978 for overhead anchor.*

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**Figures 12. Safety snub strap.**

### D. Cargo Deployment Equipment

A Figure 8 with "Ears" shall be used as the friction device for cargo letdown operations. The let-down line shall be a minimum of 250' in length and conform to **Mil-W-5625K Webbing, Textile, Nylon, Tubular, 3/4"**. 3/4" tubular nylon webbing conforming to Mil-W-5625K has a minimum breaking strength of 2300 lbs. Letdown line will be inspected for wear and burns after cargo deployment, and the ends reversed for the next letdown sequence.

A letdown accordion pack will be constructed to accommodate a minimum of 250 feet of letdown line. A five foot section from each end of the letdown line and a ten foot section in the center of the line should be clearly marked. The pack will conform to *MTDC Drawing #974*. The line will be packed in accordance with the *Wildland Fire Helicopter Rappel Cargo Letdown Accordion Pack* video produced by MTDC. Edge protection may be necessary along helicopter door edge to prevent abrasion of the line.

### E. Cargo Let-Down Containers

Bags are to be manufactured with high strength abrasion-resistant materials. The attachment points on the bag must be reinforced to ensure there is not a failure during deployment. Possible sources for cargo letdown gear bags are smokejumper lofts.

Maximum allowable suspended weight per cargo let down container shall be 125 lb. This allowable is excepted in the case of the Tuna Net which may be used to a maximum of 300 lb. Maximum allowable suspended weight per cargo let down line shall be 300 lb. Approved cargo let down containers shall pass a static strength test with no failure or ruptured stitches when loaded to a

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minimum weight of 468.75 lb. (safety factor of 3.75 to 1). Cargo Letdown Containers, shall consist of the following:

1. Cardboard box with harness, the cardboard box shall consist of double wall construction with a minimum burst strength of 275 lb. The box harness and attachment hardware shall have a minimum tensile strength of 1125 lb.
2. Smokejumper style pack out bags, the cargo let down attach point shall consist of hardware and webbing with minimum tensile strength of 1125 lb. and shall be attached with FF thread 6 to 8 stitches per inch with a four point W a minimum of four inches in length.
3. A/5 Haul Bag.
4. Tuna Net (NFES #0795).
5. Klamath Cargo Letdown Bag, which shall conform to *MTDC Drawing #959*.

**NOTE:** Bags and other containers should be frequently inspected and not used if damaged.

### F. External Cargo Deployment (Break-away strap and Cargo Strap)

For external cargo deployment the break away strap which is the connecting line between the external load or cargo strap and cargo let down line shall conform to Mil-W-5625K and be 1” tubular nylon. The minimum breaking strength of 1” tubular is 4000 lbs. External cargo operations shall use the model specific Break Away and Cargo Straps manufactured in accordance with MTDC Drawing #980 Helicopter Rappel External Cargo Break Away strap and MTDC Drawing #982 Helicopter Rappel External Cargo Strap.

### G. Rappel Anchors

An anchor point is defined as the point of attachment for rappel ropes for the purpose of rappelling. Rappel anchors are evaluated and approved for use by the Office of Aircraft Services (OAS) for DOI operations or the Missoula Technology and Development Center for USFS use. Each helicopter model will be evaluated for anchor hard points and design to determine the proper rappel bracket or brackets that may be used.

The USFS and OAS helicopter program managers maintain a list of approved rappel anchors and rappel aircraft.

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Rappel anchors will be visually inspected before and after each rappel operation. In addition an annual inspection will also be conducted. The designer (or manufacturer) of the anchor is responsible for developing a maintenance inspection, which ensures the continued airworthiness of the anchor. The owner of the anchor is responsible for ensuring that the inspection(s) is conducted. Contact MTDC for report no. # *ICA 206/407* if you have a Bell 206B/L-1/L-3/L-4/407 helicopter rappel *kit* (STC # *SH4547NM*), or report no. # *ICA 212* if you have a Bell 212 rappel kit assembly (STC # *SH261WE*). In the event that no formal inspection has been developed, “generic” inspections are described in Sections VI and VII. If any discrepancies are found during an inspection, do not rappel. Critical inspection of metal components can be achieved using magnaflux, X-ray, sonics, or dye penetrant. ***No welding or major repairs will be accomplished without prior notification and approval of OAS or USFS Regional Aviation Officer as appropriate. Major repairs shall be done only by certified personnel.***

Take care to:

- Not step on straps or related anchor equipment.
- Keep all components clean.
- Handle gently, do not drop or bang around.

See Appendices for specifications.

### VI. Rappel Anchor Daily Inspection (*Generic*)

Prior to installation of the rappel anchor in the aircraft and prior to each day of use, the rappel anchor shall be visually inspected for general condition as follows:

#### A. Metal Rappel Anchor

1. Assure plate identification tag with serial number is installed.
2. Inspect anchor for cracks, corrosion, and deep scratches, particularly around the carabiner and clevis holes.
3. Inspect for loose rivets.
4. Inspect clevises and attaching hardware for security and damage.

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### B. Webbing (*Anchor Points and Snub Straps*)

1. Inspect for fraying, loose or damaged stitching, abrasions, mildew, and cleanliness.
2. Inspect adjusters for damaged or missing parts, cracks, and corrosion.
3. Check adjusters for proper operation and signs of webbing slippage in adjusters.
4. Inspect webbing-to-airframe attaching hooks and hardware for signs of damage, corrosion, security, and proper closing of gates.

### C. Cables

1. Inspect cable for damage, corrosion, fraying, and kinks.
2. Inspect Nicopress® sleeves for signs of cable slippage.

### D. Guards

1. Inspect guards for proper installation and security.
  - a. Scuff plates on Bell 206 L-series.
  - b. Rope guards installed on skids.
  - c. Letdown line abrasion guard for 407 #MTDC-977.

## VII. **Rappel Anchor Annual Inspection (*Generic*)**

### Rappel Anchor Inspection

- A. Remove anchor from aircraft.
- B. Inspect installation location in aircraft for cracks, corrosion or signs of deformation.
- C. Ensure anchor identification tag with serial number is installed.
- D. Visually inspect anchor for cracks, corrosion, and deep scratches, particularly around the carabiner and clevis holes.
- E. Visually inspect clevises and attaching hardware for security and damage.

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- F. Inspect anchor for loose rivets (if rivets are present).
  
- G. Remove all clevises; hardware, and carabiners from anchor and dye penetrate entire anchor assembly on both sides. Inspect for cracks, particularly around clevis and carabiner holes. The dye penetrant inspection shall be performed by an A & P mechanic or an FAA repair station.
  
- H. Dye penetrate and inspect clevises for cracks or replace with new clevises.
  
- I. Dye penetrate or replace clevis bolts with new bolts.
  
- J. Reinstall removed parts and enter inspection compliance in the rappel anchor's maintenance record (use new mounting fasteners when installing back into the helicopter).

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## CHAPTER 4

### DOCUMENTATION

All rappel logs are official documents and are not to be destroyed. Historical logs may be archived as necessary.

The following documentation will be accomplished using the forms in Appendix C.

#### I. **Personal Training, Certification and Proficiency**

##### A. Rappeller

The rappel crewmember training record shall fully document each individual step in the training. Full competency at each level of the training, must be demonstrated by the trainee before the spotter shall permit advancement to the next step.

**NOTE:** In addition to the standard crewmember training form, it is advisable that spotters maintain a separate comment sheet to document any training deficiencies that may potentially arise.

##### B. Spotter

The spotter trainee record shall fully document each individual step in the training. Full competency at each level of the training, must be demonstrated by the trainee before the check spotter shall permit advancement to the next step.

**NOTE:** See above NOTE for rappellers.

#### II. **Rappel Unit Log**

All rappels must be entered into the rappel unit log. A rappel unit log shall be kept at all units. Information documented shall be:

- Incident/Location
- “N” number of A/C
- Purpose of rappel
- Remarks/Problems
- Spotter’s name
- Rappeller’s name
- Date of rappel(s)

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The spotter or rappel base manager will ensure that information is entered into the logs in a timely manner and that the logs are kept current.

### III. Equipment logs

All equipment will be assigned a unique identification number and will be retired with the piece of equipment. All of the following equipment shall have a log assigned to it:

#### A. Rope

Documentation history must be maintained for all rappel ropes. A log sheet and a history shall be maintained from the date of purchase until its removal from rappel service. The rope history will be kept in the rappel unit log. Each rope must have an identification number and be marked at both ends, one end marked "A" and the other end marked "B."

The following minimum items shall be recorded in the rope log:

- End used
- Date of rappel
- Rope ID number
- Purpose of rappel
- Remarks/Problems
- Number of prior uses
- Height of rappel
- Rappeller's name
- Manufacture Date
- Date retired
- Name of Inspector/Date inspected

All rope uses will be documented. After inspection, any irregularities will be noted and brought to the attention of the spotter. Documented information will dictate when to retire a rope from service.

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### B. Personnel Descent Devices

Use and inspection of any descent device will be documented on a Descent device log sheet. Cover and shaft will have the same identification number and will always be used together. Numbers will be engraved. After each rappel, the descent device will be inspected for wear or deformity and remarks noted. When a rappel device is retired, it will be destroyed to eliminate further use.

The following minimum items shall be recorded in the descent device log:

- Date put in service
- Number of prior uses
- Date of rappel
- Rappeller's name
- ID number
- Date retired
- Remarks/problems
- Inspected by/inspection date

### C. Harness

Use and inspection of any harness will be documented on harness log.

The following minimum items shall be recorded in the harness log:

- Date put in service
- Rappeller issued to
- ID number
- Date retired
- Remarks/Problems
- Date of issue
- Inspected by/Inspection date

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### D. Cargo Letdown Line

Use and inspection of any cargo let down line will be documented in a cargo letdown line log.

The following minimum items shall be recorded in the cargo letdown line log:

- Date put in service
- Name of Inspector/date inspected
- Date of use
- Identification number
- Spotter's name

All cargo letdown line use will be documented. After inspection, any irregularities will be noted.

### E. Positive Locking Steel Carabiners

**Positive locking steel carabiners will be used, inspected and retired (if applicable) in accordance with manufacture's specifications. No records need be kept on carabiners.**

### F. Rappel Anchor

Use and inspection of rappel anchors (both helicopter and tower) will be documented.

**NOTE:** This is in addition to the annual inspections.

- Date put in service
- Type of use  
(Helicopter or tower)
- ID number
- Remarks/problems
- Inspector's name/date inspected

CHAPTER 5

**RAPPEL OPERATIONS**

**I. Administrative Responsibilities**

The spotter, as required by individual agency/bureau policy, will be responsible for coordinating all rappel activities (pre- and post-rappel) including the following:

- Maintaining daily rappel roster as required by agency.
- Communicating with agency/dispatch the daily helicopter and rappel status.
- Relaying all pertinent information to pilot (e.g., destination, cargo, number of rappellers, flight hazards).
- Monitor currency of all personnel and schedule training as needed.
- Assuring that all rappel unit log books on rappellers and equipment are up-to date.

**II. Pre-Rappel Briefing**

Prior to any rappel mission, the spotter must brief all personnel involved as to the nature of the mission and its location, and provide pertinent information to accomplish the rappel mission. The information should include environmental concerns (weather, wind, terrain landing areas, density-altitude, etc.), individual responsibilities and incident specific information.

**III. Pre-Flight Inspection**

**A. Rappel Equipment Check**

The spotter will go through the following checklist:

- Cargo - remove on-board items not essential to the mission.
- Cabin Configuration - as directed by pilot, set up for rappel mission.
- Anchor Point - correctly installed and secure.
- Rope(s) - attached to the rappel anchor with locking carabiners with gates locked and both ropes securely attached with safety snub strap.
- Rope abrasion protection, or pads - in place covering helicopter floor edge, if applicable.
- Let-Down Lines and Friction Devices - sufficient number on board to deploy cargo and secured but accessible.
- Spotter's Harness/Safety Strap - securely attached to a hard point, adjusted to provide sufficient movement in cabin but prevent falling out.
- Maps and Mission Information - Accessible and secured.

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- Communication Check - all radios operational and appropriate frequencies programmed.

**NOTE:** Different helicopter models may require slight variations in inspection checklist.

### B. Rappeller Personal Equipment Check

Rappellers must have equipment checked prior to boarding the helicopter. The most efficient way to accomplish this is for one rappeller to check another, or a "Buddy Check." Rappeller equipment inspection will be a head-to-toe check, adapted for the specific rappel equipment utilized.

### C. Buddy Check

- Helmet - Chinstrap attached; no loose ends; long hair tucked in.
- Eye Protection - eye protection on
- Collar - tucked in, buttoned to top; flight suit (Nomex®) completely zipped.
- Sleeves (Nomex®) - down.
- Gloves - on (sleeves over gloves and fastened or gauntlets over sleeves and secure).
- Harness - correctly fitted; loose straps secured with no twists.
- Buckles - Attached correctly.
- Forgecraft hook (for descent device) - Attached and locked.
- Knife (with lanyard)- Easily accessible, lanyard secured, out of way.
- Boots - Leather, lace; tops covered by Nomex®.

There may be other items specific to your base, such as PG/belly bags.

**NOTE:** The rappellers must inspect the rappel anchor and spotters equipment to include harness, knife, helmet, and tether point. Although redundant, it maintains the continuity of check/double-check, and minimizes the potential for human error.

### D. Spotter/Rappeller Check

The spotter must check each rappeller as follows:

- Rope correctly attached to anchor.
- Safety snub strap correctly in place.
- Rope protector (model specific).
- Descent device properly rigged.
- Descent device properly attached to harness and attachment hardware

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functional.

- Harness, properly fit, and hardware secure.
- Knife readily accessible, lanyard secure.
- Gloves, wrist straps secure and ends tucked in.
- Helmet, chinstrap snapped and loose ends secure.
- Eye protection in place and utilized.
- Seat belt properly fastened.

**NOTE:** Different helicopter models may require a slight variation in the inspection checklist. See **Model Specific Procedures**.

#### IV. **In-Flight and Incident Approach Duties**

The spotter will initiate flight-following procedures upon departure, per agency policy. The spotter will assist the pilot in navigation and flight-following position reports; and advise pilot of any hazards along the flight route (use hazard map).

The following criteria should be used as a guide by the pilot and spotter when evaluating whether to rappel or land:

- A. Is a good landing site available within reasonable distance of where you need to go? If so, land and walk.
- B. Does the urgency of the situation dictate getting someone to a site as quickly as possible? If not, land at the closest suitable landing site and walk.
- C. Is the risk of traversing the terrain greater than the risk associated with rappelling? If not, land and walk.

If landing is not practical, the spotter and pilot will select a suitable rappel site. Before rappel operations begin:

- The pilot will perform a hovering power check.
- Flight following and nearby ground personnel and/or aircraft notified of the beginning of the rappel operation.
- Radio may be turned down, but must be left on.
- Hot-mike activated.

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### V. **Rappel Procedures** (*See Appendix B, Model Specific Procedures.*)

#### A. The spotter will:

- Prior to beginning rappel, confirm with pilot that rappel site is good and power is within limits.
- Maintain position over rappel site by communicating with pilot.
- Notify pilot of intent to drop rope(s).
- Either spotter or rappeller(s) drops rope(s).
- Check rope(s) are not hung up, free of knots, and rope(s) are on ground.
- Inform pilot when rope(s) are on ground.
- Signal rappeller(s) to (model specific); hook-up; release seat belts; exit cabin and establish pre-rappel position.
- Notify pilot that rappeller(s) are in pre-rappel position,
- Signal rappeller(s) to descend.
- Inform pilot of rappeller's progress.
- Notify pilot when rappeller(s) are off rope and clear.
- Notify pilot of intent to drop ropes.
- Disconnect ropes and drop to ground.
- Advise pilot ropes are clear.
- Depart rappel site.

**NOTE:** During rappel sequence, the spotter shall maintain communications with the pilot on each phase of the rappel as it occurs.

#### B. Rappeller

1. Lock-Off A technique intended to temporarily attain a stationary position on the rope.
  - Place brake hand on running end of rappel rope approximately one foot below the descent device.
  - Pull running end of rope up and over descent device, locking between fixed rope and descent device, loop running end around again--lock-off is accomplished.
2. Pre-Rappel (**See Model Specific Procedures**)
  - Helicopter approaches rappel site, rappeller(s) may assist in site selection.
  - Helicopter approaches hover, rappeller(s) will do one last equipment check, on self, buddy, spotter, and rigging and then maintain eye contact with spotter.
  - A Lock-off will be in place prior to exiting the helicopter.

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- Rappeller releases seat belt, and establishes final pre-descent position.
- Rappeller positions rope on brake-hand side of body, looks down rope to check for knots or entanglements and makes certain rope is on the ground.
- Rappeller establishes pre-rappel position and makes eye contact with spotter.
- Spotter gives rappeller signal to descend.
- Rappeller leaves pre-rappel position, unlocks rope and descends.

### 3. During Descent

Rappeller will:

- Watch landing area.
- Maintain controlled rate of descent.
- Maintain break hand on rope during descent until securely on the ground.
- Prior to ground contact, look for undiscovered hazards (e.g., hidden logs, loose rocks, etc.)
- Upon ground contact, when possible, go into a crouched position; this will give sufficient slack to disconnect from the rope without tension.
- Disconnect descender from rappel harness.

## VI. **Spotter Duties**

### A. Cargo Delivery (See Model Specific Procedures)

The Spotter will:

- Inform pilot that cargo is to be deployed.
- Secure accordion pack.
- Attach Figure “8” to an anchor.
- Attach letdown line to Figure “8”.
- Attach letdown line to cargo with a positive locking steel carabiner.
- Inform pilot when cargo is ready for deployment.
- Coordinate cargo deployment with pilot.
- Notify pilot of deployment progress.
- Notify pilot that cargo is securely on the ground.
- Inform pilot if additional cargo is to be deployed.
- Disconnect accordion pack, and make several wraps around the pack to eliminate any potential for excess line to spill out upon being dropped. Drop accordion pack.
- Inform pilot letdown bag is clear of aircraft and mission is complete.

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### B. Post-Rappel (See Model Specific Procedures)

The Spotter will:

- Secure loose items in the helicopter.
- Check to see seat belts are fastened.
- Advise pilot forward flight may be initiated.
- Determine status of rappeller(s) deployed.
- Establish radio contact with ground personnel and flight following.

### C. Administrative

- Complete necessary documentation, pertinent to the mission.

### D. Post-rappel debriefing

- Spotter/pilot will critique the mission, and or discuss problems that may have occurred.
- Upon rappellers return, spotter and rappeller(s) will critique the mission.

## VII. **Hand Signals - General**

The following standard hand signals shall be used:

- A. ***Thumbs Up***: Used by rappellers and spotters to indicate, "*I agree*" or "*I am O.K.*"
- B. ***Drop Ropes***: With outstretched arm(s) and index finger pointing down, move arms in a downward motion. Signal given by spotter to rappeller(s) to drop ropes.
- C. ***Move Into Position***: Hands clasped at chest level with elbows out. Given by spotter to rappellers to signal move to pre-rappel position.
- D. ***Begin Descent***: Arm(s) extended with open palms down, sweeping downward motion. Signal given by spotter to rappeller(s), indicating rappeller(s) to unlock and begin rappel.
- E. ***Spread Eagle***: Arms and legs outstretched while looking up to establish eye contact with spotter. Signal given by rappeller to spotter to indicate that rappeller has locked-off and further descent is not possible.

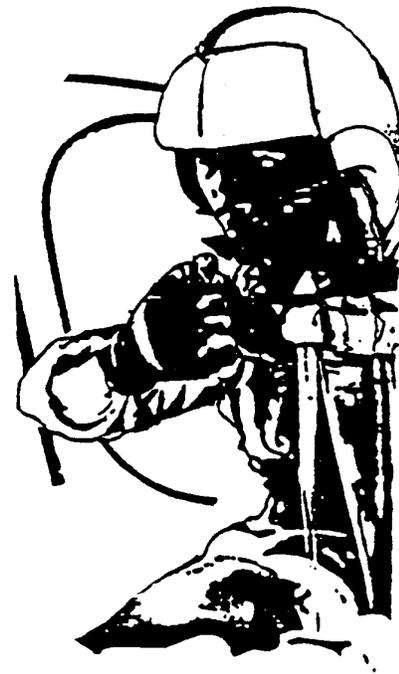
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- F. ***Cut Rope:*** Horizontal arm wave with outstretched arm. Signal given by spotter to rappeller, after rappeller has given spread eagle signal, indicating that rappeller should tie-off and cut rope below him/her and prepare to be lifted out.
  
- G. ***Lift Out:*** Upward motion with outstretched arms. Given by rappeller to spotter to indicate that rope below rappeller has been cut and rappeller is ready to be flown out.
  
- H. ***Clear of Obstacles:*** Both arms extended to front of body with palms together. Signal given by rappeller during lift out and fly away indicating that rappeller is clear of obstacles and pilot can begin forward flight.
  
- I. ***Bad Rope:*** With one arm outstretched, slashing motion across outstretched arm with other arm. Signal given by rappeller to spotter to indicate there is something wrong with the rope and spotter should drop it.
  
- J. ***Discontinue Rappel:*** Slashing motion across throat with one arm. Signal given by rappeller to spotter indicating bad rappel site, discontinue rappel.
  
- K. ***Stop, Hold Position:*** Arm(s) extended toward signal recipient with fist clenched (palm toward recipient). Signal given normally by spotter to stop and hold rappeller in position prior to the “begin descent” signal.
  
- L. ***Return to Seat:*** Give "Stop and Hold" signal [arm(s) extended, fist(s) clenched] then bring fists and elbows together [arms bent 90° and fist(s) in front of body]. Signal given by spotter to indicate rappeller(s) should return to seat and buckle seat belt.

RAPPELLER HAND SIGNALS - GENERAL



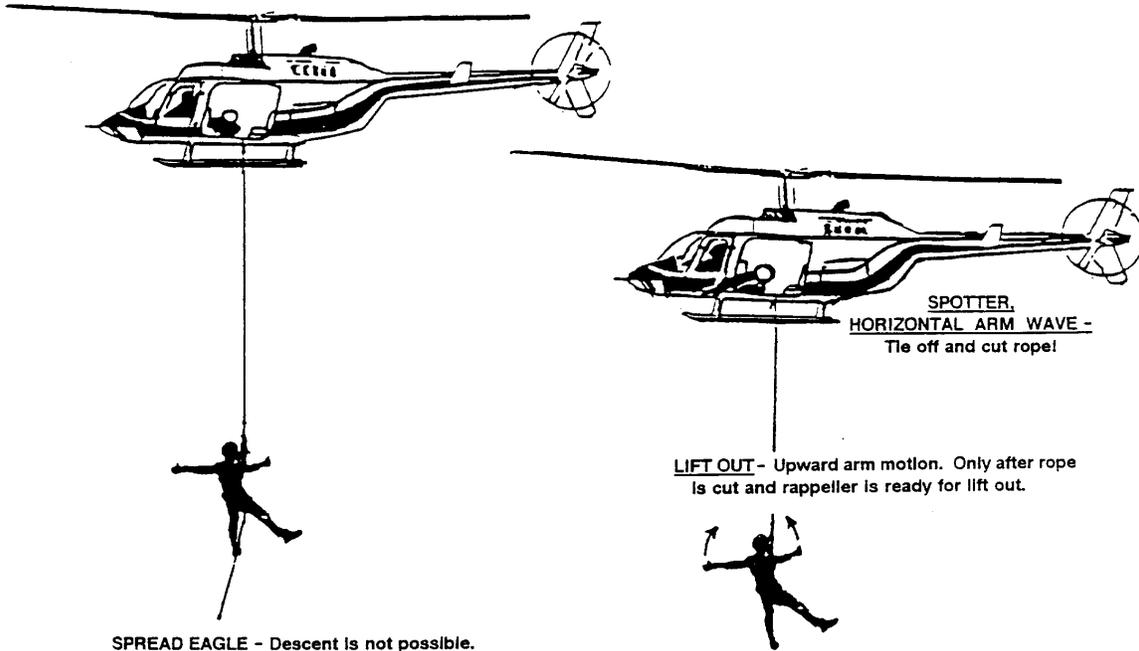
**BEGIN DESCENT** - Arm(s) extended and palm(s) down; the spotter makes a sweeping downward motion.



**MOVE INTO POSITION** - The rappeller moves into rappel position.

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## RAPPELLER HAND SIGNALS - EMERGENCY



**SPREAD EAGLE** - Descent is not possible.  
Rappeller waits for visual contact  
with spotter.

**SPOTTER,  
HORIZONTAL ARM WAVE** -  
Tie off and cut rope!

**LIFT OUT** - Upward arm motion. Only after rope  
is cut and rappeller is ready for lift out.



**SLASH ACROSS THROAT** -  
Discontinue Rappel!  
Bad rappel site.



**TAP ON THE HEAD** -  
Rappeller is O.K.



**SLASH ARM** -  
Bad rope!

CHAPTER 6

**EMERGENCY PROCEDURES**

Emergency Procedures are defined as established methods prescribed to respond to a situation, serious in nature, developing suddenly or unexpectedly, and demanding immediate action.

**I. Rappeller Procedures and Signals**

A. If a Lock-off has been initiated, and a problem or situation cannot be resolved, the rappeller will give the Spread-Eagle Signal and establish eye contact with the spotter. If the spotter gives the Cut-Rope Signal, the rappeller will initiate an emergency Tie-off and cut the rope below. If no cut rope signal is given, the rappeller will be lowered to the ground.

B. Emergency Tie-Off

Emergency Tie-off is a procedure completed after locking-off, to **permanently** secure the rappeller's position on the rope. Some situations when a tie-off may be required are:

- The rope becomes entangled, preventing the rappeller from descending or creates a hazard to the helicopter.
- When the helicopter has insufficient clearance from obstacles to lower rappeller to ground.
- The rappeller cannot descend because of pitch (sap) on the rope.
- The rappeller has a descent device malfunction.
- There is a problem with rappel site/landing area.

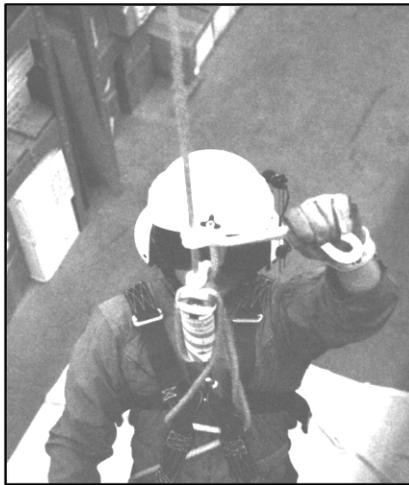
The Tie-Off procedure is as follows:

- Bring running end of rappel rope through the harness webbing where the descent device is attached. Pull up three to four feet of slack, forming a running loop.
- Bring loop up and over descent device and form a half-hitch around the fixed-end (to helicopter) of rope. Pull half-hitch tight.
- Form another half-hitch on top of the first one. Pull tight, at least a two foot looped tail should remain.
- Cut the running end of rope approximately four to six feet below the descent device.

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After the rope has been cut, the rappeller gives the spotter the *Lift-Out Signal*. This indicates to the spotter that the rope has been cut and that the helicopter should climb until the rappeller is clear of obstacles. After all obstacles have been cleared, the rappeller will indicate this with the *clear of obstacles* signal. Then, the helicopter transports rappeller to a safe landing site. Upon arriving at a safe landing site, the rappeller is lowered to the ground.

Circumstance will dictate how the rappeller will release from the rope. If possible, the helicopter should land allowing the rappeller to untie from the rope. However, cutting the rope may be the only safe option.



**Figures 13. Rappeller tying two half-hitch knots while performing emergency tie-off.**

## II. Helicopter Emergency

### A. Control and Power Maintained

This situation may be indicated by caution detector or chip light coming on, gradual oil pressure loss, hydraulic boost pump failure, etc. If the pilot determines the emergency is immediate and must deviate from the rappel sequence, the following procedures will be initiated:

Pilot shall declare emergency and identify problem to spotter. Spotter shall ready knife and cut ropes below metal swedges as soon as rappeller(s) are on the ground.

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As the rappellers may not be aware that there is a problem with the helicopter, their first knowledge of this will most likely be realized when the ropes come down prior to them disconnecting. If this occurs, rappellers shall immediately clear the area and seek protection until the aircraft has departed.

If a rappeller has an indication that something is wrong with the helicopter [may be indicated by hearing an unusual noise, pop or metallic grinding sound, or unexpected movement of the helicopter], they should maximize their rate of descent to the ground and clear the area as quickly as possible.

If emergency occurs during cargo let down operations, pilot shall declare emergency and, based on severity of the problem, direct the spotter to:

1. Immediately cut the line; or,
2. Continue deployment until load is on the ground, then cut line.

### **B. Emergency Requiring Immediate Transition to Forward Flight**

1. Pilot declares emergency and states intentions to spotter.
2. It may be necessary for the spotter to immediately cut ropes regardless of rappellers position or progress.
3. The pilot must continually keep spotter informed of the changing status of the emergency in order for the spotter to have sufficient information to make a potentially life or death decision.

### **C. Engine Failure or Major Component Failure**

A significant risk associated with rappel operations, regardless of the model of helicopter used, is if the helicopter is unable to maintain a hover while rappellers are on the rope (engine failure, tail rotor failure, etc.).

The possibility of inflight emergencies shall be discussed in detail with all involved with the program during the rappel training and periodically thereafter.

If the helicopter is unable to maintain a hover with rappellers on the ropes due to a mechanical problem, it is unlikely that there will be sufficient time

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for the pilot to take any action other than perform a hovering auto-rotation to the rappel site. In this situation, the procedures are as follows:

1. Pilot shall key radio and make a "May-Day" call. (Spotter will be able to hear this through flight helmet.)
2. Spotter shall take seat, fasten seat belt and assume a crash position.
3. Rappellers, if possible, shall immediately move to side after landing, assume as low a profile as possible, and then immediately disconnect from rope.

### III. Rappeller in Distress

#### A. Emergency Descent Arrest

If the rappeller cannot control the rate of descent, rappeller should reach across body and use both hands for braking. A last resort effort can be made by kicking the leg on the same side as the brake hand in a circular motion and wrapping the rope several times around the leg. This maneuver is called a Leg Wrap.

If one rappeller is having a problem and the other is on the ground, the rappeller on the ground should assist by belaying the other rappeller.

#### B. Problems After Rappel

After the first rappeller(s) is/are on the ground and a rope defect or problem is evident, the rappeller(s) will give the Slash-Arm Signal to indicate to the spotter the rope is unsafe and it should be dropped and the mission completed with a new rope.

If a rappeller on the ground recognizes the rappel site is a safety problem, the rappeller will give the Slash-Across-Throat Signal to indicate to the spotter that site is unacceptable so the rope may be dropped and another location can be selected.

CHAPTER 7

**CARGO LETDOWN OPERATIONS**

**I. INTRODUCTION**

"*Helicopter cargo letdown*" is defined as the deployment of cargo from a hovering helicopter by the means of an approved webbing, descent device, and auxiliary equipment.

The Helicopter Cargo Letdown Procedures consists of material compiled from the private sector, bureaus, and agencies within the Department of Interior and USDA Forest Service. This guide will allow the user to utilize helicopter cargo letdown to accomplish a wide variety of tasks or projects safely and economically. Cargo letdown was designed to augment helicopter capabilities; *it is not a replacement for long-line operations*. Exposure and risk assessment must be addressed in the process of deciding which type of helicopter cargo delivery system to use.

A. Objectives

The intent of this guide is to develop standardization in training of individual spotters and pilots in a variety of helicopters for the safe and efficient deployment of cargo.

B. Applications

Cargo letdown operations expand the capability of the helicopter by delivering cargo on incidents and projects.

1. Fire

- a. Initial attack equipment can be deployed directly on the fire line.
- b. Helispot construction equipment can be placed on site.
- c. Equipment can be placed on the fire line without excessive nets, swivels, and lead lines to be packed out.
- d. First aid and rescue equipment can be delivered on site rapidly and safely.
- e. Long distance cargo delivery could be more cost-effective and expedient due to faster air speed allowed with internal cargo.

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f. Cargo could be delivered under a variety of conditions:

- (1) tall timber
- (2) steep hillsides
- (3) snag patches
- (4) rock slides
- (5) wind conditions beyond paracargo limits
- (6) no helicopter landing site available

2. Projects

- a. Nesting sites for raptors could be re-supplied more effectively.
- b. Building supplies could be delivered to mountain sheep water development sites.
- c. Wilderness rangers or trail crews might be re-supplied.
- d. Additional tools or equipment could be delivered to any project site, without remote hook long-line capabilities.

## II. QUALIFICATIONS

A. Pilot

1. Pilots Requirements

Pilots must meet the following requirements:

- a. DOI Department Manual parts 350-354 or USDA Forest Service 5700 Manual.
- b. Meet experience requirements for long-line activities of current contract and may be required to perform and agency check ride.
- c. Pilots must attend a familiarization session covering cargo letdown procedures and techniques, crew coordination and emergency procedures.

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- d. Demonstrate ability to operate helicopter during cargo letdown sequence.
- e. Demonstrate ability to work with spotter.

### 2. Pilot Familiarization and Qualification

Pilots must attend an annual familiarization session covering cargo deployment sequences.

## B. Spotter

### 1. Spotter Requirements

To be considered for spotter training, the trainee must have a minimum of one season (three months) as a helitack crewmember and one season experience as a qualified helicopter manager.

**NOTE: During the initial trial period, only the helitack manager and assistant manager will be allowed to spot.**

### 2. Spotter Training and Qualification

- a. Successfully complete Interagency Helicopter Training Guide (IHTG).
- b. Demonstrate ability to rig helicopter and gear for cargo letdown operations.
- c. Complete three (3) simulated deployments. Perform all of the duties of the spotter from the initial call through return to base.
- d. Simulate deployment without procedural error.
- e. Under the supervision of a qualified check spotter, must spot ten (10) loads from the helicopter, five (5) of which are in typical terrain.
- f. Show principles of inspection, care, maintenance, and repair of cargo letdown equipment.
- g. Identify the spotter's duties and responsibilities.

**NOTE: It should be noted that these are minimum requirements and the instructor/check spotter may request additional training due to the complexity of the expected operations,**

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**or an individual's needs for training in specific areas. If an individual cannot meet all of the above minimum requirements, the instructor/check spotter will not approve the spotter for cargo letdown operations.**

### 3. Spotter Proficiency

Individuals will make at least one cargo letdown every 14 days. If a helicopter letdown is not completed within 14 days, the spotter may use a simulation. If a simulation is used to maintain proficiency during the 14 day period, an airborne deployment must be done in the following 14 day period.

### 4. Annual Spotter Re-qualification

- a. Must attend and successfully complete annual cargo letdown training.
- b. Simulate a deployment without error.
- c. Complete deployment of three loads of cargo without procedural error.
- d. Demonstrate knowledge of standard procedures of cargo letdown.

### 5. Check Spotter Requirements and Qualification

- a. Must have been a qualified spotter for two (2) years.
- b. Must have assisted in training of at least two (2) spotters.

**NOTE: New programs will be approved OAS and state or regional aviation manager for DOI, or regional aviation officer for Forest Service. Instructors and local managers will designate a minimum of one check spotter per base.**

### 6. Annual Check Spotter Proficiency

- a. Demonstrate a knowledge of standard procedures of cargo letdown.
- b. Simulate a deployment without procedural error.

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- c. Deploy three (3) loads of cargo in a typical terrain without procedural error.

**NOTE: If currency is lost during the annual qualification period, the check spotter must complete the proficiency requirements to remain current. Regional Helicopter Specialist must qualify check spotters annually.**

### III. ADMINISTRATIVE DUTIES

- A. The spotter will have sufficient training in helicopter service contract administration to ensure the following requirements are met:
  - 1. Load calculations are being completed correctly.
  - 2. Flight time and flight purpose is being documented for billing purposes.
  - 3. Flight and duty hour restrictions are not being violated by pilot.
  - 4. Accident/Incident/Safecom reports are completed when required.
  - 5. Contractual problems are relayed to the contracting officer's representative or project inspector.
  
- B. The spotter will coordinate all individuals involved. This includes:
  - 1. Monitoring qualifications and training
  - 2. Completed all necessary documentation and maintaining unit logs.
  - 3. Spotter/pilot critiques are completed.
  - 4. Problems and solutions are noted in the unit log.

#### **IV. SPOTTER SAFETY CHECKS**

- A. Standard Procedures. All training and actual deployment missions will use the following steps and procedures. The intent is to standardize and maintain continuity between units.
1. Pre Deployment Briefing. Prior to any cargo letdown operation, the spotter will brief all personnel involved.
    - a. Brief pilot with pertinent information affecting deployment mission and environmental concerns (weather, wind, terrain, landing areas, density altitude, etc.)
    - b. Pilot/spotter will brief on emergency procedures and verbal communications during deployment sequence.
    - c. Clear and concise communication between the pilot and the spotter will take place during the entire cargo letdown process. Communication must be completely understood by both the pilot and spotter.
  2. Pre-flight Inspection. Each spotter will conduct an equipment check prior to boarding the helicopter.
    - a. Personal Equipment
      - (1) Aviator's protective helmet is properly fitted and secured. Avionics are operational and cord is long enough to provide sufficient length to accommodate spotter's movement in the cabin without interfering with cargo letdown line.
      - (2) Collar turned up, fire shirt buttoned to top or nomex flight suit zipped up completely.
      - (3) Sleeves down and over gloves.
      - (4) Nomex/leather gloves on.
      - (5) Harness correctly fitted and loose straps secured with no twists.
      - (6) Buckles secure and attached correctly.
      - (7) Knife easily accessible.
      - (8) Leather boots. (Nomex will extend below boot tops)

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**NOTE: Take special care in checking correct buckle attachments and looking for loose ends of straps that could become entangled in the line and/or descent device.**

### HELPFUL HINTS

- Maintain a taught letdown line at all times. **DO NOT** allow unarrested descent.
- Attempt to minimize contact with fuselage, step, skid, or basket when deploying cargo.
- A 5 foot section on each end of the letdown line and a 10 foot section in the center of the line should be clearly marked. Use center-of-line indicators to help determine whether splitting the load is an option.
- The shadow from the load may be useful in determining height above ground.
- Keep helicopter control input to a minimum after descent begins to minimize load oscillations.
- Secure load behind rocks, logs, or bushes whenever possible on steep terrain to avoid rolling.
- If tight spin develops during letdown, accelerate letdown process as much as possible.
- All cargo containers must be manufactured with high strength, abrasion-Resistant materials.
- Aircraft utilizing external cargo operations should minimize flight time with external cargo and maintain an air speed that allows for the external load to remain stable.
- Steel figure 8's will retain more heat than aluminum figure 8's. Excessive heat build up on the figure 8 could cause melting of letdown line during cargo deployment.

**NOTE: For external cargo operations, the cargo shall be deployed prior to the rappeller deployment.**

## V EMERGENCY PROCEDURES

“*Emergency procedures*” are defined as the standard established procedures used to respond to a situation, serious in nature, developing suddenly or unexpectedly, and demanding immediate action.

### A. Helicopter Emergency

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### 1. In-Hover/Control and Power Maintained or Engine Failure, Power Loss

A problem may be indicated by a caution or chip detector light coming on, gradual oil pressure loss, hydraulic boost pump failure, etc. If the pilot determines the emergency is immediate and the deployment sequence must be deviated from, the following procedures will be initiated:

- a. Pilot will declare the emergency to the spotter.
- b. Spotter will cut line.
- c. Spotter will fasten seat belt.
- d. Spotter will report actions both to pilot.

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### B. Deployment Problems

If the spotter is confronted with a problem during the descent (e.g., pitch on the line, a knot, line entangled in trees, etc.).

1. The spotter will declare the emergency and state the problem.
2. The spotter and pilot will determine necessary action (i.e., cut line, lock off and fly away, lower load to ground by decreasing altitude, etc.).

### C. Lock Off and Fly Away Procedures

When the spotter and pilot jointly determine and agree that there is a need to lock off and fly away (like a sling load), the following procedures will be followed:

1. Pilot will maintain hover.
2. Spotter will place brake hand on the running end of line, approximately one foot away from descent device.
3. Spotter will loop running end of line up and over descent device ears twice, locking between loaded line and descent device, locking off is accomplished. (Lock-Off Procedure.)
4. Spotter will notify pilot that load has been locked off and direct pilot to fly away.

**NOTE: Spotter will maintain grip on line with brake hand and have knife ready during fly away.**

5. Pilot will fly load, as a sling load, to nearest suitable landing area, lower to ground and depart.

## VI MODEL SPECIFIC PROCEDURES

The model specific procedures are listed in Appendix B with the model specific rappel procedures.