

*November, 2001*

**Helicopter Rappel Program  
1972 to present**

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**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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# Interagency Helicopter Rappel Guide

## 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 Hillside    | ➤ 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.
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
  - 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

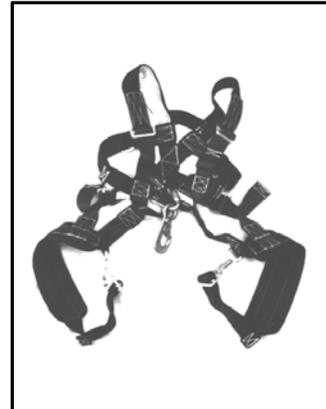
**For wildland fire rappel programs, the HR-2 Harness shall be used.**

#### 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.

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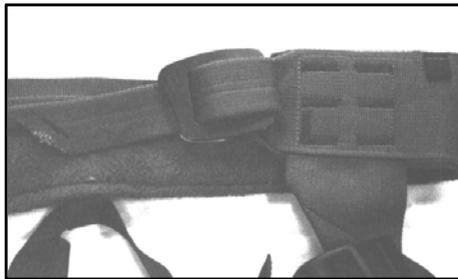


*Figures 3 and 4.*  
Typical Commercial  
Sit Harness.



### 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.

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### 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

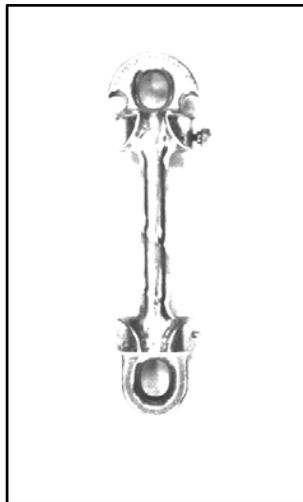
## Interagency Helicopter Rappel Guide

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.



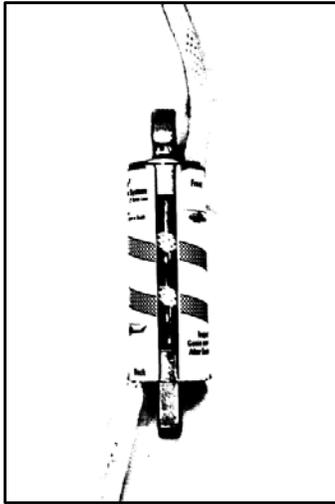
**Figures 6.** Sky Genie® without cover.

**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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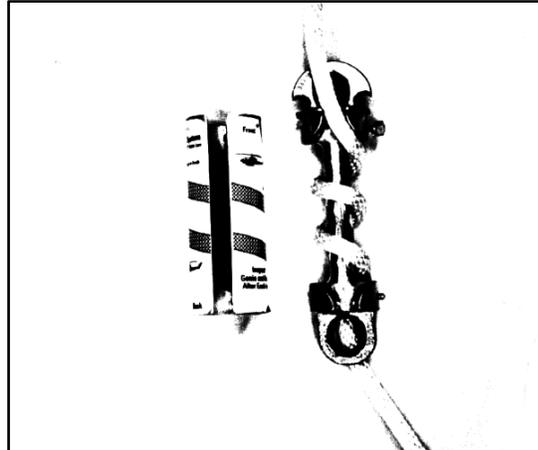


**Figures 7. Descent Control Sky Genie®.**  
(Model no. # 14G-O)

**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
- Date of rappel
- ID number
- Remarks/problems
- Number of prior uses
- Rappeller's name
- Date retired
- 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
- ID number
- Remarks/Problems
- Inspected by/Inspection date
- Rappeller issued to
- Date retired
- Date of issue

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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.

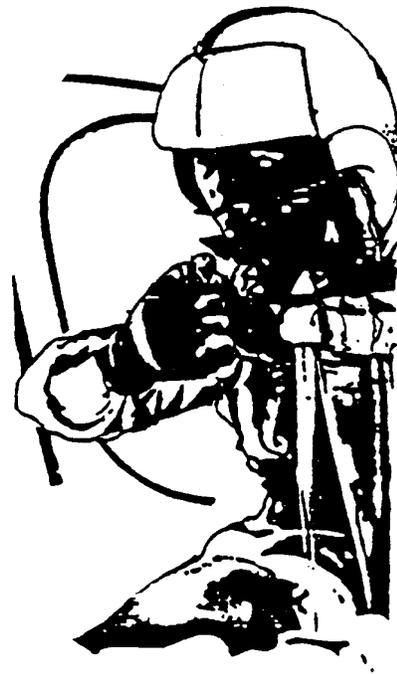
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- F. **Cut Rope:** Horizontal arm wave with outstretched arm. Signal given by spotter to rappeller, after rappeller has given spread eagle signal, indicating that rappeller should tie-off and cut rope below him/her and prepare to be lifted out.
  
- 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



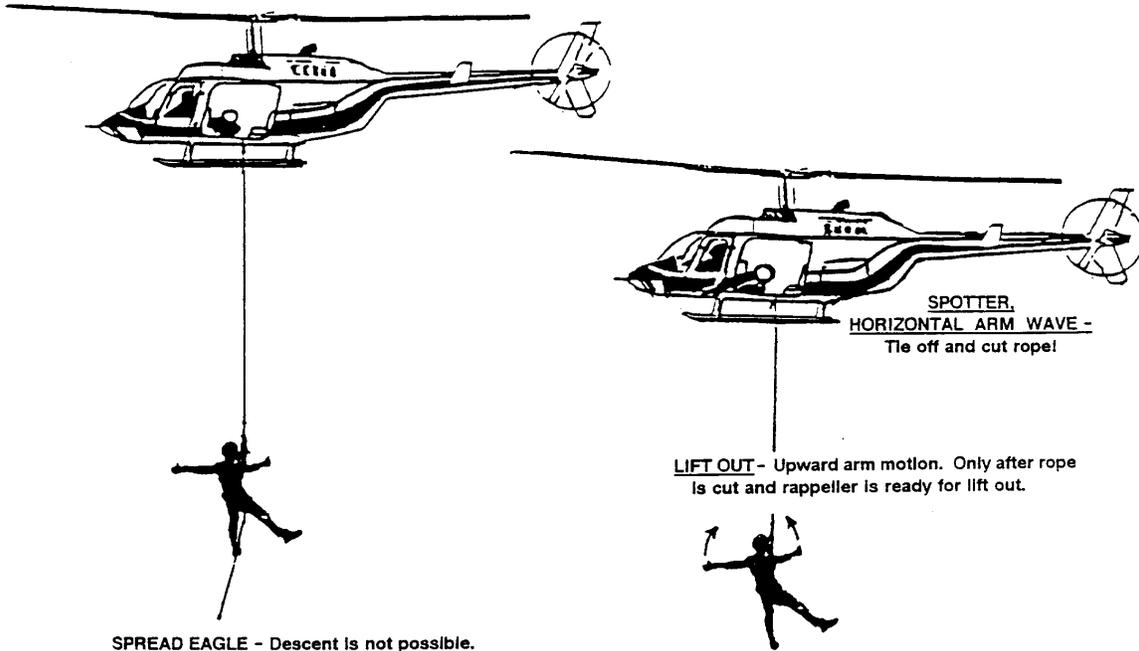
**BEGIN DESCENT** - Arm(s) extended and palm(s) down; the spotter makes a sweeping downward motion.



**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.



**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)

## Interagency Helicopter Rappel Guide

**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

## Interagency Helicopter Rappel Guide

### 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.

## Interagency Helicopter Rappel Guide

### 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.

**November, 2001**

## **APPENDIX A**

### **NEW BASE START-UP PROCEDURES**

All proposed rappel activities must be fully analyzed and supported by agency-approved planning analysis systems. Rappelling is another tool to expand the usefulness of the helicopter resource. It requires thorough planning and training. The program shall be designed from the beginning to maximize safety while meeting minimum equipment and training requirements as outlined in the Interagency Helicopter Rappel Guide (IHRG), also adhering to Agency Aviation Directives, policies, and procedures. Use of rappelling gives the helicopter crew a means of going directly to areas it would otherwise require additional time to walk to and/or to prepare safe helispots where there would otherwise be marginal ones or none. In policy and practice, rappelling shall supplement, rather than replace, other helicopter use.

After analyzing and justifying the feasibility of a program, the local District/Area Office shall request approval from the appropriate State/Regional Office. The state/regional office shall then coordinate with the local unit on scheduling appropriate training in accordance with IHRG. This process must be documented by an approval letter to the local unit listing any conditions and/or restrictions for the new program. The national office should be notified of any new rappel programs being installed.

Tower design and platform heights must comply with the requirements outlined in the IHRG. Appendix A contains previously approved designs currently in use. It is important to involve local engineering personnel when constructing the rappel platform. These platforms must be structurally sound and able to support force loadings encountered during rappel training. Safety considerations due to adverse weather, earthquakes, winds, etc., will need to be addressed to meet local safety issues. Construction costs for erecting a rappel platform can range from \$8,000.00 to \$30,000.00 depending on design and safety considerations.

Equipment requirements have been outlined in the IHRG. Only approved equipment, as stated in the IHRG, shall be purchased and used for rappel operations. The following table will help in the purchase of this equipment.

With the exception of the Helicopter Rappel Anchor, Snub Strap, Spotter Helicopter Tether Harness, and Figure 8, you should plan to purchase one each of the following pieces of equipment per rappeller as a minimum. If possible, plan to purchase more than the minimum to have extra equipment in the event that replacements are needed.

Depending on the alternatives recommended by your Area, State, or Regional Office, for training new spotters and rappellers, you may need to budget additional dollars to have spotters attend training at an operational rappel base or to pay for travel and per diem to bring qualified instructors to the base to present the training. Plan one week for spotter

training and another week for rappel training. It is not advisable to train first-time spotters and rappellers in the same one-week session.

For bases initiating a rappel program, first-time spotters should not be trained simultaneously with first-time rappellers.

At each new base, a check spotter must be utilized to instruct and certify new spotters and rappellers assuring the new spotter has demonstrated ability to rig helicopter, conduct rappels and cargo let down to the satisfaction of the check spotter. The trainee must meet all the training requirements of IHRG for a spotter.

### EQUIPMENT SOURCE LIST

<b>Equipment</b>	<b>Manufacturer</b>	<b>Approximate Cost</b>
Sky Genie Tensile Strength 10,000 lb.	Descent Control Box 6405 Ft. Smith, AR 72906 (501) 646-4832	\$150.00
Sky Genie Rope	Same	\$250.00
Harness, Rappeller, Full Body	High Angle Associates 6002 Calhoun Dr. Fredericksburg, VA 22407 (540) 786-2102	\$225.00
Helmet, Rappellers, SPH-4, SPH-5 or motorcycle type, ANSI Spec. Z-90, DOT approved. (Climbing & modified hardhat types are NOT approved)	Various	\$100.00 - \$500.00
Gloves, Rappel, Double Palm	Sullivan Glove Co. 1315 S.E. Armour Bend, OR 97702 (800) 627-7954 (541) 382-3092	\$25.00 – \$35.00
Rope Bag	BLM, USFS Rappel Bases, Parachute Lofts, and Commercial Sources	\$20.00
Pack Out/Letdown Bags	BLM, USFS Rappel Bases, Parachute Lofts, and Commercial Sources	\$100.00 - \$150.00
Belly Bags/ PG Bags (optional)	BLM, USFS Rappel Bases, Parachute Lofts, and Commercial Sources	\$50.00 - \$100.00
Webbing, Tubular Nylon, ¾" 250' continuous length	Para Gear Lowy Enterprises REI	\$.55/ ft.
Letdown Accordion Pack	BLM, USFS Rappel Bases, Parachute Lofts, and Commercial Sources	\$10.00

New Base Start-Up Procedures

<b>Equipment</b>	<b>Manufacturer</b>	<b>Approximate Cost</b>
Safety Snub Strap	BLM, USFS Rappel Bases, Parachute Lofts, or an FAA Certified Master Rigger	\$30.00
Spotter Harness	BLM, USFS Rappel Bases, Parachute Lofts, or an FAA Certified Master Rigger	\$150.00
Jack-the-Ripper Knives	Para Gear 3839 W. Oakton St. Skokie IL, 60076 (847) 679-5905	\$11.00
Carabiner, Steel, Positive Locking	High Angle Associates 6002 Calhoun Dr. Fredericksburg, VA 22407 (540) 786-2102	\$20.00 - \$40.00
Rescue "8"	High Angle Associates 6002 Calhoun Dr. Fredericksburg, VA 22407 (540) 786-2102 and other sources	\$40.00
** Helicopter Rappel Anchor	** MTDC, OAS or FAA STC approval required	\$300.00 - \$3000.00
Gunner Strap	BLM, USFS Rappel Bases, Parachute Lofts, or an FAA Certified Master Rigger	\$75.00 - \$100.00

\*\* All Rappel Anchors need to be approved by one or both agencies, i.e., U.S. Forest Service (Missoula Technology & Development Center) or Office of Aircraft Services (Technical Services in Boise office).

Approximate equipment costs per rappeller, not including flight time, is \$900.00.

Plan for approximately one (1) hour flight time for every new rappeller to be trained.

Also plan one (1) hour flight time per rappeller in order to maintain currency requirements. These costs will fluctuate due to the amount of currency rappels required throughout the season.

Plan for approximately 20% above actual equipment need to start up a base. This will allow for replacement/backup equipment.

May 2003

APPENDIX B  
**MODEL SPECIFIC PROCEDURES**

**B-1**



**AEROSPATIALE SA 315B (Lama) RAPPEL PROCEDURES WITH  
“ROBERTS/GEO-SEIS” RAPPEL ANCHOR**

On Ground: Pre Rappel

1. Configure helicopter.

**NOTE: The helicopter will be configured to meet the needs of the specific rappel mission. Left front (spotter’s) seat may be removed or reversed at the discretion of the program manager. If seat is reversed, headrest attachment shall be installed.**

**It is also permissible for rappellers to wear belly bags at the discretion of the program manager.**

- A. Remove doors and all loose items from cabin and baskets.
  - B. Reverse or remove spotters seat.
  - C. Visually inspect rappel anchor (*See Chapter 3, Rappel Anchor Inspection*).
2. Loading/Boarding.
- A. Rappellers complete buddy check to include buddy's rope and genie.
  - B. Spotter oversees securing of cargo (*Refer to Cargo Deployment Procedures page B-4*).
  - C. Rappeller(s) approach aircraft and place rope bags on floor of helicopter. Right side rappeller completes equipment check on spotter. Ropes are attached to rear attach points of anchor, and snub strap to ropes, between 1<sup>st</sup> and 2<sup>nd</sup> swedge.
  - D. Rappellers connect genie to harness, make necessary adjustments, then lock off.

- E. The spotter then initiates the spotter check, one rappeller at a time, by starting with the rappeller on the pilot side of the aircraft and then moving to rappeller on the spotter side. When complete the spotter gives the thumbs up signal.
- F. The rappellers, in sequence, take their assigned seats, and fasten their seat belts. The spotter will ensure that each rope bag is secured in the aircraft.
- G. The spotter connects tether to approved attach point, displays harness, PPE, tether, and knife to rappellers and exchanges a thumbs up signal if all is OK.
- H. The spotter enters the aircraft, takes seat, fastens seat belt, and plugs into radio system. Rappeller(s) will note this and if okay thumbs-up signal is again exchanged.
- I. The spotter gives "O.K." to pilot to take off and reminds pilot if there is an external load attached.

### In-Flight Operations

#### 1. The Rappel

- A. Pilot flies a reconnaissance of the area to look for hazards and works with spotter in selecting an appropriate landing or rappel site.
- B. Pilot and spotter select rappel site and then consider alternate emergency site in the event that one or both rappellers need to tie off and be flown to the emergency site.
- C. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel sequence.
- D. Radio volume is adjusted, if necessary.
- E. Pilot announces, "*One minute out*".
- F. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

**NOTE: An OGE Power check is accomplished prior to entering rappel hover at an altitude comparable to the site or greater. A positive rate of climb must be established *without exceeding aircraft limitations*.**

- G. If spotter's seat is removed, spotter receives pilot approval to move forward in aircraft.
- H. Helicopter is positioned over the designated rappel site with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- I. Pilot establishes hover, checks power, gives "O.K." to proceed.

**NOTE: If using external cargo delivery, rappellers remain belted until cargo portion is complete. Refer to External Cargo Deployment Procedures page B-6.**

- J. Spotter signals rappellers to undo seat belts.
- K. Spotter states "dropping rope(s)", pilot responds "O.K " or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action. If O.K. spotter gives signal (*downward sweeping motion of arms with index finger extended*) to drop ropes(s) **inside of the skids**. (Spotter may elect to drop spotter side rope).
- L. Spotter checks that the ropes are free of knots and rope bag(s) is on the ground and informs pilot the "*ropes are on the ground*". Rappellers edge outwards to place outboard foot onto step.
- M. Spotter states "*rappellers to skids*", pilot responds "O.K " or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.
- N. If okay, spotter signals each rappeller (*locked hands*) to move into position on skid. Rappellers reach behind their back with inside hand grasping doorframe. Moving outside foot to step, turning to face inside. Inside foot crosses behind outside foot down to final position on skid. Outside foot is moved to center forward facing seat.
- O. Spotter states, "*sending rappellers,*" pilot responds "O.K " or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.

**NOTE: If at any time the pilot (or spotter) indicates a problem, the spotter and pilot will reassess the situation and take appropriate action. This may include the spotter aborting the mission and signaling rappeller(s) back into the aircraft or merely delaying sending them.**

- P. If okay, spotter signals rappellers to descend. (*palms down, sweeping motion*)
- Q. Rappellers then exit skids, unlock, and descend to the ground at a controlled rate. The spotter notifies the pilot of the position of the rappeller(s) from the aircraft to the ground.
- R. After reaching the ground, rappeller(s) disconnect from the rope and move to a safe area.
- S. Spotter advises the pilot "*rappellers clear*", disconnects safety snub strap and secures it, disconnects and drops the rope(s) and advises pilot "ropes on ground," and secures seat belts is necessary.
- T. Spotter remains in seat and advises pilot to depart or initiate the internal cargo procedure.
- U. Pilot departs rappel site, while spotter re-hooks seat belt.
- V. Radio returned to normal operational mode and flight following authority is informed that the rappel sequence has been completed. The helicopter should remain in the area until radio contact is established with rappellers.

**NOTE: The spotter and pilot may elect to deploy one rappeller at a time for a variety of reasons. This is an acceptable practice. The National Helicopter Operations Specialist for Forest Service rappel operations must approve any variations in these procedures. DOI agencies shall receive approvals from their agencies' national aviation operations specialist prior to deviating from these procedures.**

## **Cargo Deployment Procedures**

There are two (2) cargo delivery methods for the AS-315 Lama. The two methods are floor internal cargo and floor external cargo.

### Floor Internal Cargo

#### 1. Pre Deployment

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. The pilot and spotter configure aircraft for mission by removing door(s) and securing loose items. Removal of front seat is optional.
- B. Spotter puts on harness, knife readily accessible.

- C. Visually inspect floor-mounted anchor. (*See Chapter 3, Rappel Anchor Inspection*)
- D. Secure cargo in helicopter.
- E. Secure harness tether to an approved attach point. If cargo mission is separate from rappeller deployment, spotter shall display PPE, harness and tether to pilot. Assure carabiners, figure 8 and letdown lines are on board. Enter aircraft and buckle seat belt.

## 2. Approach to Drop Site:

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternate site.
- C. Rig letdown line through figure 8, attach figure 8 to positive locking steel carabiner and to floor anchor with carabiner. Then attach end of letdown line to positive locking steel carabiner on cargo and lock carabiner. Take up any additional slack. Inform pilot cargo is rigged.
- D. Spotter may elect to remain seat belted, unfasten seat belt, or move to rearward facing spotters seat.
- E. Inform ground personnel to stay clear of cargo during deployment.
- F. Inform flight following that the radio will be off frequency (if not already done).
- G. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

## 3. Hover Position

- A. Communicate with pilot to position helicopter over deployment spot. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- B. Spotter Checks power with pilot. Suggested verbiage to use when in hover over spot:

SPOTTER: *"How's Power?"*

PILOT: *"Power is good"*

SPOTTER: *"Ready To Deploy"*

PILOT: *"Go Ahead"*

**CAUTION: Spotter shall not move cargo outside the aircraft until the pilot announces power is good.**

4. Cargo Deployment

- A. Ease cargo out of door, lowering between fuselage and skid.
- B. Lower cargo with positive control of letdown line. Via hot mike, keep pilot informed of actions and progress of cargo descent:
  - *"Cargo out the door";*
  - *"Cargo halfway down";*
  - *"Cargo on ground, etc. "*
- C. When cargo is on ground, hold slack in line to prevent billowing (if deploying split load, attach cargo to letdown line and repeat steps A and B), unhook figure 8, remove figure 8 from letdown line, and secure in aircraft.
- D. Wrap excess letdown line around the accordion pack and drop pack to the ground.
- E. Inform pilot if more cargo is to be lowered with additional letdown line. Pilot will determine whether to hover or orbit area until cargo is ready for subsequent deployment. When cargo deployment is complete and rigging is clear of aircraft, inform pilot *"We're clear to fly away"*.

Floor External Cargo

1. Pre-Deployment Procedures

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. Spotter puts on harness, knife readily accessible.
- B. Attach cargo via cargo strap to swivel.
- C. Perform all appropriate hook checks.
- D. Attach swivel connected to cargo strap to helicopter belly hook.

**NOTE: A swivel will be required with all external loads. The swivel attachment ring inside diameter must meet helicopter hook specifications.**

- E. Attach the single hard loop end of breakaway strap to the top end of the swivel hardware.

- F. Rig letdown line through figure 8 and attach to positive locking steel carabiner on spotter's side forward attach point. Lock carabiner.
- G. Lock-off letdown line on figure 8.
- H. Attach positive locking steel carabiner on rigged letdown line to the velcro loop on the breakaway strap.
- I. Secure accordion pack and harness tether to approved attach point.
- J. Spotter performs final cargo letdown system inspection. Displays harness tether attachments to rappellers for *thumbs up*. If cargo mission is separate from rappeller deployment, spotter shall display PPE, harness and tether to pilot.
- K. Spotter fastens seat belt. Gives OK to pilot to depart and reminds pilot if there is an external load attached.

**NOTE: Maintain positive control of letdown line while enroute to the deployment site.**

## 2. Approach to Drop Site

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternate site.
- C. Inform any ground personnel to stay clear of cargo during deployment
- D. Inform flight following that the radio will be off frequency (if not already done).
- E. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

## 3. Hover Position

- A. Communicate with pilot to position helicopter over deployment spot. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- B. Spotter Checks power with pilot. Suggested verbiage to use when in hover over spot:

SPOTTER: *"How's Power?"*

PILOT: *"Power is good"*

- C. If power is good, spotter initiates cargo hook-up

#### 4. Cargo Hook-Up and Deployment

- A. **If cargo is deployed with rappellers on board**, spotter side rappeller turns body to face outward.
- B. Spotter attaches letdown line to hard loop on breakaway strap with positive locking steel carabiner. Lock carabiner.
- C. Spotter unlocks figure 8 and remove slack in line to allow for a smooth deployment.
- D. Spotter manually places carabiner over doorsill of helicopter, then informs pilot that cargo is rigged and ready for deployment. Spotter confirms power once more with pilot.
- E. Pilot gives a three (3) count and releases cargo from belly hook.

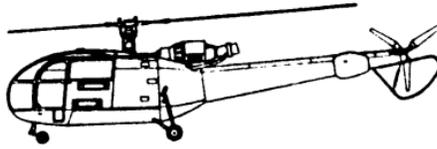
**NOTE: Maintain a tight letdown line at all times. Do not allow unarrested descent.**

- F. Via hot mike, keep pilot informed of actions and progress of cargo descent:
  - *"Cargo halfway down";*
  - *"Cargo on ground, etc. "*
- G. When cargo reaches ground, hold slack in rope and prevent billowing of line while unhooking Figure 8.
- H. Secure Figure 8 inside aircraft.
- I. Accordion pack is unhooked. Excess line is wrapped around pack to eliminate the potential for excess line pulling out when dropped.
- J. After the accordion pack and line are clear of the helicopter, the spotter communicates to the pilot that the cargo is clear. **If cargo is deployed with rappellers on board**, spotter side rappeller returns feet to forward position.
- K. Pilot may remain in hover or depart and return to hover to deploy rappellers.
- L. Spotter will proceed with rappeller deployment.

- M. After completion of mission, re-establish communications with flight following.

**NOTE: When external cargo procedures are complete, spotter may then deploy rappellers. Refer to In Flight Operations page B-2.**

**B-2**



***AEROSPATIALE SA316-B WITH OVERHEAD RAPPEL ANCHOR***

On-Ground: Pre-Rappel

1. Configure Helicopter.

**NOTE: The helicopter will be configured to meet the needs of the specific rappel mission. It is also permissible for rappellers to wear belly bags at the discretion of the program manager.**

- A. Rear doors shall be opened and locked back, front doors shall be removed. Remove all loose items from cabin and baskets, secure bungee cords to rear of, or inside of baskets.
- B. Remove left front seat if installed. Rappel operations shall be conducted using center seat installed. Install fuel shutoff guard if necessary.
- C. Visually inspect overhead and floor mounted anchors (*See Chapter 3, Rappel Anchor Inspection*).

2. Loading/Boarding

- A. Rappellers complete buddy check to include buddy's rope and genie. Rappeller(s) approach aircraft and place rope bags on floor of helicopter. Right side rappeller completes equipment check on spotter.
- B. If using external cargo delivery method, spotter rigs external cargo. (*Refer to Cargo Deployment Procedures page B-14.*)
- C. Spotter attaches ropes to anchor with locking carabiners and connects safety snub straps between ropes and anchor with locking carabiners.
- D. Rappellers connect descent device to harness and lock-off while in pre-descent position on the steps.
- E. Spotter initiates equipment checks one rappeller at a time starting with pilot side. Spotter inspects the rappel anchor, attachments, rope, snub strap, descent device, Forgecraft hook, and tri-link. Spotter inspects

rappellers PPE (helmet, eye protection, clothing, gloves), harness (stitching and hardware), and ensures the safety knife is readily accessible and secure.

- F. If all is correct, *thumbs up* are exchanged by rappeller and spotter, then rappeller enters aircraft and buckles in. If all equipment is not correct, start the inspection over.
- G. Spotter double checks seat belt and ensures rope bag is positioned on seat, between rappellers.
- H. Repeat process with second rappeller.
- I. Spotter boards aircraft, attaches spotter tether to hard point, then displays his/her tether to and receives (*thumbs up*) signal from both rappellers.
- J. Spotter fastens seat belt. Gives OK to pilot to depart and reminds pilot if there is an external load on the hook.

### In-Flight Operations

#### 1. The Rappel

- A. Pilot flies a reconnaissance of the area to look for hazards and works with spotter in selecting an appropriate landing or rappel site.
- B. Pilot and spotter select rappel site and then consider alternate emergency site in the event that one or both rappellers need to tie off and be flown to the emergency site.
- C. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel sequence.
- D. Radio volume is adjusted, if necessary.
- E. Pilot announces, "*One minute out*".
- F. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

**NOTE: An OGE Power check is accomplished prior to entering rappel hover at an altitude comparable to the site or greater. A positive rate of climb must be established *without exceeding aircraft limitations*.**

- G. Helicopter is positioned over the designated rappel site with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back and up and down relative to altitude above the ground*).
- H. Pilot establishes hover, checks power, gives "O.K." to proceed.

**NOTE: If using external cargo delivery, rappellers remain belted until cargo portion is complete. Refer to Cargo Deployment Procedures page B-14.**

- I. Upon confirmation of good power, spotter directs rappellers to unbuckle seat belts.
- J. Spotter completes visual systems check of rappel hardware. Spotter states "*dropping rope(s)*", pilot responds "O.K." or "No". If pilot responds "No", spotter and pilot will reassess situation and take appropriate action.
- K. If okay, spotter signals to drop rope bags (*downward sweeping motion of arms with index fingers extended*). Spotter checks that the ropes are free of knots and rope bag(s) are on the ground. Pilot side rappeller gives spotter "*thumbs up*" indicating their rope is O.K. Spotter informs pilot "*ropes are on the ground*".
- L. Spotter states, "*sending rappellers to the steps*", pilot responds "O.K." or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.
- M. If okay, spotter signals each rappeller (*locked hands*) to move to the step(s).
- N. Rappellers exit aircraft facing each other with their genies in their left hand and using the overhead rappel anchor in their right hand for support. They place one foot on the step and the other foot on the basket edge or foot peg making sure that the rope is on their right side. Once outside the rappellers release the rappel anchor and lean back with straight legs. Rappeller(s) will have genie in the left hand with the rope grasped in the right hand near the lock-off.
- O. Spotter informs pilot of rappeller movements, informing pilot when rappeller(s) are in position on the step(s). Once the rappeller is in position on skid, both spotter and rappeller must "clear rope" by checking entire rope from anchor to ground, looking for any knots, rope hang-ups, obstructions in the descent path and that rope bags are on the ground. IF pilot responds "*Power O.K.*", spotter completes visual systems check. IF pilot responds "No," spotter signals rappeller(s) back into cabin (*raised clenched fists, bent elbows moving together*). Rappeller(s) return to their seat and fasten seat belt(s).

- P. Spotter states, "*sending rappellers,*" pilot responds "*O.K*" or "*No*". IF pilot responds "*No*", spotter and pilot will reassess situation and take appropriate action.

**NOTE: If at any time the pilot (or spotter) indicates a problem, the spotter and pilot will reassess the situation and take appropriate action. This may include the spotter aborting the mission and signaling rappeller(s) back into the aircraft or merely delaying sending them.**

- Q. If okay, spotter signals rappeller(s) to descend (*palms down sweeping motion*).
- R. Rappellers then undo lock-off and smoothly feed rope into the genie until attaining an almost inverted position with legs continuing to be straight.
- S. Rappellers then slip off steps and start feeding in a smooth, but deliberate motion. Rappellers descend to the ground at a controlled rate. The spotter notifies the pilot of the position of the rappeller(s) from the aircraft to the ground.
- T. After reaching the ground, rappeller(s) disconnect from the rope and move to a safe area.
- U. Spotter advises the pilot "rappellers clear," disconnects safety snub strap and secures it, disconnects and drops the left rappel rope, then informs pilot "coming behind you" and climbs on to rear seat to ensure visibility out the door and repeats process with right rope advising pilot "ropes on ground."
- V. Spotter then slides over to the center left seat and advises the pilot to depart or initiate the internal cargo procedure.
- W. Pilot departs rappel site, while spotter rehooks seat belt.
- X. Radio returned to normal operational mode and flight following authority is informed that the rappel sequence has been completed. The helicopter should remain in the area until radio contact is established with rappellers.

**NOTE: The spotter and pilot may elect to deploy one rappeller at a time for a variety of reasons. This is an acceptable practice. The National Helicopter Operations Specialist for Forest Service rappel operations must approve any variations in these procedures. DOI agencies shall receive approvals from their agencies' national aviation operations specialist prior to deviating from these procedures.**

## **Cargo Deployment Procedures** (*Floor Mounted Anchor*)

### 1. Pre Deployment

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. Rear doors shall be opened and locked back, front doors shall be removed. Remove all loose items from cabin and baskets, secure bungee cords to rear of or inside of baskets.
- B. Remove left front seat if installed. Cargo operations shall be conducted with center seat installed. Install fuel shutoff guard if necessary.
- C. Spotter puts on harness, knife readily available.
- D. Visually inspect floor-mounted anchor. (*See Chapter 3, Rappel Anchor Inspection*).
- E. Attach cargo via cargo strap to swivel.
- F. Perform all appropriate hook checks.
- G. Attach swivel connected to cargo strap to helicopter belly hook.

**NOTE: A swivel will be required with all external loads. The swivel attachment ring inside diameter must meet helicopter hook specifications.**

- H. Attach single hard loop end of breakaway strap to the top end of the swivel hardware.
- I. Rig letdown line through figure 8 and attach to the floor anchor with two (2) positive locking steel carabiners in line to prevent side load.
- J. Lock off letdown line on figure 8.
- K. Attach positive locking steel carabiner on rigged letdown line to the velcro loop on the breakaway strap.
- L. Spotter performs final cargo letdown system inspection.
- M. Secure accordion pack and harness tether to approved attachment point.
- N. Spotter fastens seat belt and gives pilot the OK to depart, and reminds him/her of the external load.

## 2. Approach to Drop Site

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternate site.
- C. Inform ground personnel to stay clear of cargo during deployment.
- D. Inform flight following that the radio will be off frequency (if not already done).
- E. Activate hot mike. From this point on all spotter actions are verbalized to pilot.
- F. Spotter moves to floor position.

## 3. Hover Position

- A. Communicate with pilot to position helicopter over deployment spot. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- B. Spotter Checks power with pilot. Suggested verbiage to use when in hover over spot.  
  
SPOTTER: *"How's Power?"*  
PILOT: *"Power is good"*
- C. If power is good, spotter initiates cargo hook-up.

## 4. Cargo Hook Up and Deployment.

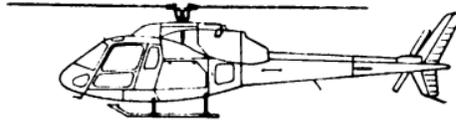
- A. Upon confirmation of power, spotter prepares cargo by connecting soft loop of breakaway strap to carabiner on letdown line.
- B. Unlock let down line from figure 8 and feed carabiner past the step.
- C. Spotter informs pilot that load is ready and requests another power check.
- D. If power is "O.K.", the pilot proceeds to give three (3) count and release the load from the cargo hook.

**NOTE: Maintain a tight letdown at all times. Do not allow unarrested descent.**

- E. Via hot mike, keep pilot informed of actions and progress of cargo descent:
  - *"Cargo halfway down";*
  - *"Cargo on ground, etc. "*
- F. When cargo reaches ground, hold slack in line to prevent billowing while unhooking Figure 8.
- G. Secure Figure 8 inside aircraft.
- H. Unhook accordion pack and wrap excess line around pack to eliminate the potential for excess line pulling out when dropped.
- I. After the accordion pack and line are clear of the helicopter, the spotter communicates to the pilot that the line is clear.
- J. Pilot may remain in hover or depart and return to hover to deploy rappellers.
- K. Spotter will fasten seat belt and proceed with deploying rappellers.
- L. After completion of mission, re-establish communications with flight following.

**NOTE: When external cargo procedures are complete, spotter may then deploy rappellers. Refer to In Flight Operations pages B-11.**

## B-3



### EUROCOPTERS AS-350 SERIES (A-Star) RAPPEL PROCEDURES

#### On Ground: Pre-Rappel

1. Configure helicopter.

**NOTE: The helicopter will be configured to meet the needs of the specific rappel mission. It is also permissible for rappellers to wear belly bags at the discretion of the program manager.**

**The overhead outside anchor and the floor inside anchor are the only acceptable anchors in use.**

- A. The pilot and spotter configure aircraft, remove loose items.
  - B. The spotter visually inspects rappel anchor (*see Chapter 3, Rappel Anchor Inspection*). The overhead anchor is rigged by attaching the rope to the **inner** attach point with one steel carabiner. One end of the snub strap is attached to the rope and the other to the **aft** attachment point. The floor anchor is rigged by attaching rope to the *aft left and right* attachment points with locking steel carabiners. The snub strap is attached between the first and second swedges of the two rope ends. (For single rappel, the free end of the snub strap will be secured to the opposite side of the rappel anchor.) Attachment points will hereafter be referred to as approved attach points.
  - C. Rappellers begin gearing up for the rappel.
2. Loading/Boarding
    - A. Rappellers complete buddy check to include buddy's rope and genie.
    - B. Spotter oversees securing of cargo (*Refer to Cargo Deployment Procedures page B-20*).
    - C. The rappellers then go to their designated side of the aircraft and hook into the sky genie.

- D. The rappellers adjust rope slack, tension and genie placement by assuming the rappel stance on the skid.
- E. The rappellers stand by for the spotter check. Right side rappeller completes equipment check on spotter.
- F. The spotter then initiates the spotter check, one rappeller at a time, by starting with the rappeller on the pilot side of the aircraft and then moving to rappeller on the spotter side. When complete the spotter gives the thumbs up signal.
- G. The rappellers, in sequence, take their assigned seats, and fasten their seat belts. The spotter will ensure that each rope bag is secured in the aircraft
- H. The spotter connects to the spotter tether, displays harness, PPE, tether, and knife to rappellers and exchanges a thumbs up signal if all is OK.
- I. The spotter enters the aircraft, takes seat, fastens seat belt, and plugs into radio system. Rappeller(s) will note this and if okay thumbs-up signal is again exchanged.
- J. The spotter gives "O.K." to pilot to take off and reminds pilot if there is an external load attached.

### In-Flight Operations

#### 1. The Rappel

- A. Pilot flies a reconnaissance of the area to look for hazards and works with spotter in selecting an appropriate landing or rappel site.
- B. Pilot and spotter select rappel site and then consider alternate emergency site in the event that one or both rappellers need to tie off and be flown to the emergency site.
- C. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel sequence.
- D. Radio volume is adjusted, if necessary.
- E. Pilot announces, "*One minute out*".
- F. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

**NOTE: An OGE Power check is accomplished prior to entering rappel hover at an altitude comparable to the site or greater. A positive rate of climb must be established *without exceeding aircraft limitations*.**

- G. Spotter then receives pilot approval to move forward in aircraft.
- H. Helicopter is positioned over the designated rappel site with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back, and up or down relative to altitude above the ground*).
- I. Pilot establishes hover, checks power, gives "O.K." to proceed.

**NOTE: If using external cargo delivery, rappellers remain belted until cargo portion is complete. Refer to Cargo Deployment Procedures page B-20.**

- J. Spotter signals rappellers to undo seat belts.
- K. Spotter states "*dropping rope(s)*", pilot responds "O.K." or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action. If pilot responds O.K., spotter gives signal (*downward sweeping motion of arms with index finger extended*) to drop rope(s) out, over the skid. (Spotter may elect to drop spotter side rope).
- L. Spotter checks to ensure the rope(s) are free of knots and the rope bag(s) are on the ground. If okay, spotter informs the pilot that "*ropes are on the ground*"
- M. Spotter states "*rappellers to skids*" pilot responds "O.K." or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.
- N. If O.K., spotter signals each rappeller (*locked hands*) to move into position on skid. Rappeller exits to skid by placing outboard foot on step, backing out, and placing other foot to skid, then following to the skid with the first foot. Rappeller remains in standing position, leaning back with weight supported by anchored rope. Once the rappeller is in position on skid, both spotter and rappeller must "clear rope" by checking entire rope from anchor to ground, looking for any knots, rope hang-ups, obstructions in the descent path and that rope bags are on the ground.
- O. Spotter states, "sending rappeller(s)", pilot responds "O.K." or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.

**NOTE: If at any time the pilot (or spotter) indicates a problem, the spotter and pilot will reassess the situation and take appropriate action. This may**

**include the spotter aborting the mission and signaling rappeller(s) back into the aircraft or merely delaying sending them.**

- P. If O.K., spotter signals rappellers to descend (*palm(s) down in a sweeping motion*).

**NOTE: Approved EXIT is an *inverted exit*.**

- Q. Rappellers then undo lock-off and smoothly feed rope into the genie until attaining an almost inverted position with legs continuing to be straight.
- R. Rappellers then slip off skids and start feeding in a smooth, but deliberate motion. Rappellers descend to the ground at a controlled rate. The spotter notifies the pilot of the position of the rappeller(s) from the aircraft to the ground.
- S. After reaching the ground, rappeller(s) disconnect from the rope and move to a safe area
- T. Spotter advises the pilot "*rappellers clear,*" disconnects safety snub strap and secures it, disconnects and drops the rappel rope(s), advises pilot "*ropes on ground,*" and secures seat belts if necessary.
- U. Spotter then moves to seat and advises the pilot to depart or initiate the internal cargo procedure.
- V. Pilot departs rappel site, while spotter fastens seat belt.
- W. Radio returned to normal operational mode and flight following authority is informed that the rappel sequence has been completed. The helicopter should remain in the area until radio contact is established with rappellers.

**NOTE: The spotter and pilot may elect to deploy one rappeller at a time for a variety of reasons. This is an acceptable practice. The National Helicopter Operations Specialist for Forest Service rappel operations must approve any variations in these procedures. DOI agencies shall receive approvals from their agencies' national aviation operations specialist prior to deviating from these procedures.**

## **Cargo Deployment Procedures**

There are two (2) cargo delivery methods for the AS-350 A-Star Series. The two methods are internal cargo and external cargo. The approved attach point for the figure 8 on the overhead anchor is the outside attach point; on the floor anchor, the approved attach point is the forward right or left attach point. Attachment points will hereafter be referred to as approved attach points.

Internal Cargo

1. Pre Deployment

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. The pilot and spotter configure aircraft for mission removing door(s) and securing loose items. Removal of front seat is optional.
- B. Spotter puts on harness, knife readily accessible.
- C. Visually inspect anchor. *(See Chapter 3, Rappel Anchor Inspection).*
- D. Secure cargo in helicopter.
- E. Secure harness tether to an approved attachment point with positive locking steel carabiner. Spotter shall display PPE, harness and tether, and knife to rappellers and/or pilot to confirm all is properly worn and rigged.
- F. Assure carabiners, figure 8, and letdown lines are on board. Enter aircraft and buckle seat belt.

2. Approach to Drop Site:

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternate site.
- C. Rig letdown line through figure 8. Attach figure 8 to positive locking steel carabiner at the approved attach point. Then attach end of letdown line to positive locking steel carabiner on cargo and lock carabiner. Take up any additional slack. Inform pilot cargo is rigged.
- D. Spotter may elect to remain seat belted, unfasten seat belt, or move to rearward facing spotter position.
- E. Inform ground personnel to stay clear of cargo during deployment.
- F. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel sequence.
- G. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

### 3. Hover Position

- A. Communicate with pilot to position helicopter over deployment spot. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- B. Spotter Checks power with pilot. Suggested verbiage to use when in hover over spot:

SPOTTER: *"How's Power?"*

PILOT: *"Power is good"*

SPOTTER: *"Ready To Deploy"*

PILOT: *"Go Ahead"*

**CAUTION: Spotter shall not move cargo outside the aircraft until the pilot announces power is good.**

### 4. Cargo Deployment

- A. Ease cargo out of door, lowering outside of skid.
- B. Begin lowering cargo with positive control of letdown line. Via hot mike, keep pilot informed of actions and progress of cargo descent:
  - *"Cargo out the door";*
  - *"Cargo halfway down";*
  - *"Cargo on ground, etc. "*
- C. When cargo is on ground, hold slack in line to prevent billowing (if deploying split load, attach cargo to letdown line and repeat steps A and B), unhook figure 8, remove figure 8 from letdown line, and secure figure 8 in aircraft.
- D. Wrap excess letdown line around the accordion pack and drop pack to the ground.
- E. Inform pilot if more cargo is to be lowered with additional letdown line. Pilot will determine whether to hover or orbit area until cargo is ready for subsequent deployment. When cargo deployment is complete and rigging is clear of aircraft, inform pilot *"We're clear to fly away"*.

### External Cargo

#### 1. Pre-Deployment Procedures

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. Spotter puts on harness, knife readily accessible.
- B. Attach cargo via cargo strap to swivel.
- C. Perform all appropriate hook checks.
- D. Attach swivel connected to cargo strap to helicopter belly hook.

**NOTE: A swivel will be required with all external loads. The swivel attachment ring inside diameter must meet helicopter hook specifications.**

- E. Attach the single hard loop end of breakaway strap to the top end of the swivel hardware.
- F. Rig letdown line through figure 8 and attach to positive locking steel carabiner at *approved* attach point on anchor. Lock carabiner.
- G. Lock-off letdown line on figure 8.
- H. Attach positive locking steel carabiner on rigged letdown line to the velcro loop on the breakaway strap.
- I. Secure accordion pack and harness tether to approved attachment point.
- J. Spotter performs final cargo letdown system inspection. Displays harness tether attachments to rappellers for *thumbs up*.
- K. Spotter fastens seat belt. Gives OK to pilot to depart and reminds pilot if there is an external load on the hook.

**NOTE: Maintain positive control of letdown line enroute to the deployment site.**

## 2. Approach to Drop Site

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternate site.
- C. Inform any ground personnel to stay clear of cargo during deployment.
- D. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the letdown sequence.

- E. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

### 3. Hover Position

- A. Communicate with pilot to position helicopter over deployment spot. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- B. Spotter Checks power with pilot. Suggested verbiage to use when in hover over spot:

SPOTTER: *"How's power?"*

PILOT: *"Power is good"*

- C. If power is good, spotter initiates cargo hook-up

### 4. Cargo Hook-Up and Deployment

- A. Attach letdown line to hard loop on breakaway strap with positive locking steel carabiner. Lock carabiner.
- B. Unlock figure 8 and remove slack in line to allow for a smooth deployment.
- C. Spotter informs pilot that cargo is rigged and ready for deployment. Spotter confirms power once more with pilot.
- D. Pilot gives a three (3) count and releases cargo from belly hook.

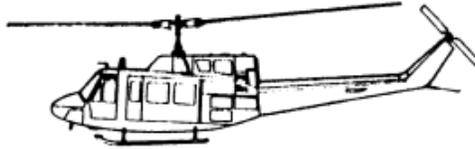
**NOTE: Maintain a tight letdown line at all times. Do not allow unarrested descent.**

- E. Via hot mike, keep pilot informed of actions and progress of cargo descent:
  - *"Cargo halfway down";*
  - *"Cargo on ground, etc. "*
- F. When cargo reaches ground, hold slack in rope and prevent billowing of line while unhooking Figure 8.
- G. Secure Figure 8 inside aircraft.
- H. Unhook accordion pack and wrap excess line around pack to eliminate the potential for excess line pulling out when dropped.

- I. After the accordion pack and line are clear of the helicopter, the spotter communicates to the pilot that the cargo is clear.
- J. Pilot may remain in hover or depart and return to hover to deploy rappellers.
- K. Spotter may proceed with rappeller deployment, or return to seat and fasten seat belt, if applicable.
- L. After completion of mission, re-establish communications with flight following.

**NOTE: When cargo procedures are complete, spotter may then deploy rappellers. Refer to In Flight Operations page B-18.**

**B-4**



***BELL 205/212/214B/412 RAPPEL PROCEDURES WITH  
OVERHEAD RAPPEL ANCHOR***

On Ground: Pre-Rappel

1. Configure helicopter.

**NOTE: The helicopter will be configured to meet the needs of the specific rappel mission. This may include combinations of forward facing, aft facing or well seating as dictated by mission requirements. It is also permissible for rappellers to wear belly bags at the discretion of the program manager.**

- A. Visually inspect overhead rappel anchor, door brackets, safety snub and rappeller gunner straps (*See Chapter 3, Rappel Anchor Inspection*). This will include ensuring that gunner straps are adjusted for proper length to allow access to doorway and genie(s), but insufficient length to allow egress from the aircraft.
  - B. Spotter oversees loading of cargo, with adequate letdown gear. (*Refer to Cargo Deployment Procedures page B-30*).
  - C. Attach rope(s) to anchor and attach safety snub strap to rope(s). For single side operation free end of snub strap will be secured to the off or opposite side of the rappel anchor.
  - D. Inspect descent devices.
2. Loading/Boarding
- A. Rappellers complete buddy check. The rope(s) and genie(s) are pre-rigged for installation in the aircraft.

- B. Rappellers organize into proper rappel order and prepare to board the aircraft. First rappeller completes equipment check on Spotter.
- C. Spotter initiates spotter's checks of rappellers, one rappeller at a time.
- D. When all checks are completed both the spotter and rappeller exchange a "thumbs up".
- E. Repeat process with each rappeller.
- F. Rappeller boards aircraft, takes assigned seat, attaches gunner strap around torso above Forgecraft hook, and fastens seat belt around waist below Forgecraft hook
- G. While boarding aircraft, rappellers shall visually inspect rigged genie(s), rope attachment, and safety snub strap.
- H. Spotter confirms rappellers' seat belts and gunner straps are fastened correctly.
- I. With tether attached to approved attach point, spotter displays his/her tether, tether attachment, PPE, harness, knife, and commo, and then receives "thumbs up" confirmation from rappellers.

### 3. In-Flight Operations

#### 1. The Rappel

- A. Pilot flies a reconnaissance of the area to look for hazards and works with spotter in selecting an appropriate landing or rappel site.
- B. Pilot and spotter select rappel site and then consider alternate emergency site in the event that one or both rappellers need to tie off and be flown to the emergency site.
- C. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel sequence.
- D. Radio volume is adjusted, if necessary.
- E. Pilot announces, "One minute out".
- F. Spotter removes seat belt and moves into position.

- G. On pilot approval spotter will slide door open, if double door operation have designated rappeller open other door upon receiving hand signal (*horizontal sweeping arm motion toward the rear of the aircraft*).
- H. Spotter designates rappellers to be deployed if less than full load is to be deployed.
- I. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

**NOTE: An OGE Power check is accomplished prior to entering rappel hover at an altitude comparable to the site or greater. A positive rate of climb must be established *without exceeding aircraft limitations*.**

- J. Pilot positions helicopter over the designated rappel site, with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back, and up or down relative to altitude above the ground*). Allow sufficient hover height above canopy to facilitate multiple rappellers.
- K. Pilot establishes hover, checks power, gives "O.K." to proceed.

**NOTE: Internal cargo may be delivered at this time, rappellers shall remain in seat belts until cargo portion complete. Refer to Cargo Deployment Procedures page B-30.**

- L. Spotter states "*dropping rope*", pilot responds "O.K." or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.
- M. Spotter drops rope bag and ensures it is free of knots and rope bag is on the ground. In double door operation spotter will give designated rappeller on the opposite side of the aircraft signal to drop rope (*downward sweeping motion of arm with index finger extended*).
- N. Spotter states "*starting rappeller(s)*", pilot responds "O.K." or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.

**NOTE: If at any time the pilot (or spotter) indicates a problem, the spotter and pilot will reassess the situation and take appropriate action. *This may include the spotter aborting the mission and signaling rappeller(s) back into the aircraft or merely delaying sending them.***

- O. Spotter signals individual rappeller(s) with remove seat belt signal. Rappeller(s) remove seat belt and move into pre-rappel position.

Rappeller(s) grasp and attach genie to Forgecraft hook and lock-off (*spotter may assist*). The spotter does a visual inspection of each rappeller's hook-up and lock-off, *ensuring rappellers right hand is on gunner strap release*. Spotter signals approval of hook-up and lock-off by giving rappeller(s) locked hands signal; upon receipt of locked hands signal each rappeller detaches gunner strap and moves into position onto the skid(s).

**NOTE: Spotter will ensure that rappeller properly detaches gunner strap.**

- P. Spotter informs pilot of rappeller movements, informing pilot when rappeller(s) are in pre-rappel position on the skid(s). Once the rappeller is in position on skid, both spotter and rappeller must "clear rope" by checking entire rope from anchor to ground, looking for any knots, rope hang-ups, obstructions in the descent path and that rope bags are on the ground. IF pilot responds "*power O.K.*", spotter completes visual equipment check. IF pilot responds "*No*", spotter signals rappeller(s) back into cabin (*raised clenched fist, bent elbows moving together*). *Rappeller(s) returns to their seat and fastens seat belt*).
- Q. Spotter states, "sending rappeller(s)", pilot responds "*O.K.*" or "*No*". IF pilot responds "*No*", spotter and pilot will reassess situation and take appropriate action.

**NOTE: If at any time the pilot (or spotter) indicates a problem, the spotter and pilot will reassess the situation and take appropriate action. This may include the spotter aborting the mission and signaling rappeller(s) back into the aircraft or merely delaying sending them.**

- R. If okay, spotter signals rappellers to descend (*palm(s) down in a sweeping motion*).
- S. Rappeller(s) will then unlock, exit skid(s), and descend to ground at a controlled descent rate. The spotter notifies the pilot of the position of the rappeller(s) from the aircraft to the ground.
- T. After reaching the ground, rappeller(s) disconnects from rope and moves to a safe area.
- U. Spotter confirms genie is on ground and directs pilot to lower aircraft as necessary.
- V. Spotter advises the pilot "rappeller(s) clear", repeats process as necessary. When complete, spotter drops rope(s) and advises pilot "rope(s) on ground".

- W. The spotter advises the pilot to depart or initiate the internal cargo procedure.
- X. Pilot departs rappel site, while spotter closes door(s) and rehooks seat belt.
- Y. Radio returned to normal operational mode and flight following authority is informed that rappel sequence has been completed. The helicopter should remain in the area until radio contact is established with rappellers.

**NOTE: The spotter and pilot may elect to deploy one rappeller at a time for a variety of reasons. This is an acceptable practice. The National Helicopter Operations Specialist for Forest Service rappel operations must approve any variations in these procedures. DOI agencies shall receive approvals from their agencies' national aviation operations specialist prior to deviating from these procedures.**

**NOTE: If helicopter is to be configured in flight after deploying a partial load of rappellers, remaining rappellers shall visually inspect rigged genie(s), rope attachment, and safety snub strap prior to commencing rappel operation.**

## **Cargo Deployment Procedures**

For the Bell 212/214B/412/205 only internal cargo deployment procedures have been developed and approved at this time.

### 1. Pre Deployment

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. Spotter puts on harness, knife readily accessible.
- B. Rig load(s) with carabiner; secure cargo in ship;
- C. Rig Figure 8 and secure;
  - 1) Carabiner is placed in rear slot of door bracket
  - 2) Use one (1) carabiner with the figure 8.

**NOTE: Figure 8 should be rigged to prevent crossing of letdown line and unintentional line abrasion.**

3) Secure accordion pack and harness tether to an approved attach point.

4) Do verbal check with pilot: (See note at bottom of B-32)

- *“Carabiners locked”;*
- *“Spotter safety tether and seat belt are secure”;*
- *“Knife is accessible”;*

- *“Accordion pack is secure”*;
- *“Cargo is secure”*;

## 2. Approach to Drop Site:

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternate site.
- C. On pilot’s concurrence unbuckle seat belt and open door.
- D. Inform ground personnel to stay clear while deploying cargo.
- E. Inform flight following that radio will be off frequency (if not already done).
- F. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

## 3. Hover Position

- A. Communicate with pilot to position helicopter over deployment spot. Terminology should use pilot’s perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*)
- B. Spotter checks power with pilot. Suggested verbiage to use when in hover over spot.

SPOTTER: *“How's Power?”*

PILOT: *“Power is good”*

SPOTTER: *“Ready To Deploy”*

PILOT: *“Go Ahead”*

**CAUTION: Spotter shall not move cargo outside the aircraft until the pilot announces power is OK.**

## 4. Cargo Deployment

- A. Ease cargo out of door, and hold out away from skid/step. Via hot mike, keep pilot informed of actions:
  - *“Cargo out the door”*;
  - *“Cargo halfway down”*;
  - *“Cargo on ground, etc. ”*

- B. Personnel on the ground shall stay clear and maintain visual contact with the aircraft and cargo being lowered.
- C. When cargo is on ground, hold slack in line to prevent billowing (if deploying split load, attach cargo to letdown line and repeat steps a and b), unhook figure 8, remove figure 8 from letdown line, and secure figure 8 in aircraft.
- D. Wrap excess letdown line around the accordion pack and drop pack to the ground.
- E. Inform pilot if more cargo is to be lowered with additional letdown line. Pilot will determine whether to hover or orbit area until cargo is ready for subsequent deployment. When cargo deployment is complete and rigging is clear of aircraft, inform pilot "*We're clear to fly away*".

**NOTE: Figure 8 may be rigged and hung on bracket in flight.**

**NOTE: IF RAPPELLERS ARE DELIVERED BEFORE CARGO THEN THE SEQUENCE OF EVENTS WILL BE ADJUSTED ACCORDINGLY TO REFLECT THIS (i.e. items accomplished in the deployment of rappellers do not need to be repeated).**

**B-5**



***BELL-206, L-SERIES RAPPEL PROCEDURES WITH  
USDA RAPPEL ANCHOR. STC #SH 4547NM***

On-Ground: Pre-Rappel

1. Configure helicopter.

**NOTE: The helicopter will be configured to meet the needs of the specific rappel mission. It is also permissible for rappellers to wear belly bags at the discretion of the program manager.**

- A. Rear doors removed, front doors and litter door removed at pilots and spotters discretion, loose items removed from rear seat area, secure all seat belts.
- B. Spotter visually inspects rappel anchor (*See Chapter 3 Rappel Anchor Inspection*).
- C. Rappellers begin gearing up for the rappel.

2. Loading/Boarding

- A. Spotter oversees securing of cargo (*Refer to Cargo Deployment Procedures page B-37*).
- B. Rappellers complete buddy check to include buddy's rope and genie.
- C. Ropes are then attached to the rappel anchor with steel locking carabiners; the safety snub is then attached to each rope. Once completed, all rigging must be inspected by the spotter assigned to that mission.
- D. The rappellers then go to their designated side of the aircraft and “inspect rigging”, “hook up”, “adjust”, and “lock off” the Sky Genie.

\*NOTE- to properly adjust Sky Genie- assume the rappel stance/squat on the skid.

- E. The rappellers standby for the spotter check. Right side rappeller completes equipment check on spotter.
- F. The spotter then initiates the spotter check, one rappeller at a time, by starting with the rappeller on the pilot side of the aircraft and then moving to rappeller on the spotter side. When complete the spotter gives the thumbs up signal. Rappellers then move to their assigned rear seat and fasten their seat belt.
- G. The spotter connects his/her spotter tether to an approved attachment point, displays harness, PPE, tether, and knife to rappellers and exchanges a thumbs up signal if all is OK.
- H. The spotter enters the aircraft, takes seat, fastens seat belt, and plugs into radio system. Spotter displays seat belt- checks rappeller's seat belts, checks all cargo, assures rope bags are secured, and a thumbs-up signal is exchanged one last time.
- I. The spotter gives "O.K." to pilot to take off and reminds pilot if there is an external load attached.

### In-Flight Operations

#### 1. The Rappel

- A. Pilot flies a reconnaissance of the area to look for hazards and works with spotter in selecting an appropriate landing or rappel site.
- B. Pilot and spotter select rappel site and then consider alternate emergency site in the event that one or both rappellers need to tie off and be flown to the emergency site.
- C. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel sequence.
- D. Radio volume is adjusted, if necessary.
- E. Pilot must perform power check prior to rappel operations- (see note P.35)
- F. Pilot announces, "*One minute out*".

- G. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

**NOTE: An OGE Power check is accomplished prior to entering rappel hover at an altitude comparable to the site or greater. A positive rate of climb must be established *without exceeding aircraft limitations*. For internal cargo operations, the spotter may bring rappellers out of their seat belts after completion of power check.**

- H. Helicopter is positioned over the designated rappel site with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- I. Pilot establishes hover, checks power, gives "O.K" to proceed.

**NOTE: If using external cargo delivery, rappellers remain in their seat belts until cargo portion is complete. Refer to Cargo Deployment Procedures page B-36.**

- J. Spotter states "*dropping rope(s)*", pilot responds "O.K " or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.
- K. If okay, spotter signals rappellers to drop their rope bags *inside of the skids, (downward sweeping motion of arms with index finger extended)*. Spotter checks that the ropes are free of knots and rope bag(s) is on the ground and informs pilot the "*ropes are on the ground*".
- L. Spotter states "*rappellers to skids*" pilot responds "O.K " or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.
- M. If okay, spotter signals each rappeller (*locked hands*) to move into position on skid.
- N. Rappeller exits to skid by placing outboard foot on step, backing out, and placing inboard foot to skid first.
- O. Spotter informs pilot of rappeller(s) movements, informing pilot when rappeller(s) are in pre-rappel position on the skid(s). Once the rappeller is in position on skid, both spotter and rappeller must "clear rope" by checking entire rope from anchor to ground, looking for any knots, rope hang-ups, obstructions in the descent path and that rope bags are on the ground. IF pilot responds "*Power O.K*", spotter completes visual equipment check. IF pilot responds "No", *spotter* signals rappeller(s)

back into cabin (*raised clenched fists, bent elbows moving together*).  
*Rappeller(s) returns to their seat and fastens seat belt*).

- P. Spotter states, "*sending rappellers*," pilot responds "O.K " or "No". IF pilot responds "No", spotter and pilot will reassess situation and take appropriate action.

**NOTE: If at any time the pilot (or spotter) indicates a problem, the spotter and pilot will reassess the situation and take appropriate action. This may include the spotter aborting the mission and signaling rappeller(s) back into the aircraft or merely delaying sending them.**

- Q. If okay, spotter signals rappeller(s) to descend (*palms down sweeping motion*).
- R. Rappellers then exit skids. After loading body weight on rope, unlock and descend to the ground at controlled rate. The spotter notifies the pilot of the position of the rappeller(s) from the aircraft to the ground.
- S. After reaching the ground, rappeller(s) disconnect from the rope and move to a safe area.
- T. Spotter advises the pilot "*rappellers clear*," disconnects safety snub strap and secures it, disconnects and drops the rope(s); and advises the pilot "*ropes on ground*."
- U. Spotter advises pilot "*clear to fly away*"; pilot may elect to remain in hover to initiate internal cargo procedure and advises spotter accordingly.
- V. Radio returned to normal operational mode and flight following authority is informed that the rappel sequence has been completed. The helicopter should remain in the area until radio contact is established with rappellers.

**NOTE: The spotter and pilot may elect to deploy one rappeller at a time for a variety of reasons. This is an acceptable practice. Rappel operations with single rappeller on board will be from the left side only. The National Helicopter Operations Specialist for Forest Service rappel operations must approve any other variations in these procedures. DOI agencies shall receive approvals from their agencies' national aviation operations specialist prior to deviating from these procedures.**

## Cargo Deployment Procedures

There are two (2) cargo delivery methods for the Bell 206L Series. The two methods are internal and external delivery.

### Overhead/Floor Anchor Internal Cargo

#### 1. Pre Deployment

**NOTE: Due to lateral C.G. limitations, cargo will be deployed from the left (observers) side of the helicopter.**

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. Remove doors at pilots and spotters discretion.
  - B. Spotter puts on harness, knife readily accessible.
  - C. Visually inspect anchor (*See Chapter 3, Rappel Anchor Inspection*).
  - D. Secure cargo in helicopter.
  - E. Secure harness tether to an approved attachment point. Assure carabiners, figure 8 and letdown lines are on board. Enter aircraft and buckle seat belt.
2. Approach to Drop Site:
- A. Recon area for hazards and confirm deployment site with pilot.
  - B. Identify and check alternate site.
  - C. Rig letdown line through figure 8, attach figure 8 to positive locking steel carabiner on overhead or floor anchor, and lock carabiner for deployment. Then attach end of letdown line to positive locking steel carabiner on cargo, and lock carabiner. Take up any additional slack. Inform pilot that cargo is rigged and to proceed into the cargo site. Note- spotter and pilot may elect to stay over the rappel site during cargo rigging operations.
  - D. Inform ground personnel to stay clear of cargo during deployment.
  - E. Inform flight following that radio will be turned down (if not already done).

- F. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

### 3. Hover Position

- A. Helicopter is positioned over the designated rappel site with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back and up and down relative to altitude above the ground*)
- B. Spotter Checks power with pilot. Suggested verbiage to use when in hover over spot.

SPOTTER: *"How's Power?"*

PILOT: *"Power is good"*

SPOTTER: *"Ready To Deploy"*

PILOT: *"Go Ahead"*

**CAUTION: Spotter shall not move cargo outside the aircraft until the pilot announces power is good.**

### 4. Cargo Deployment

- A. Ease cargo out of door, lowering between fuselage and skid.
- B. Lower cargo with positive control of letdown line. Via hot mike, keep pilot informed of actions and progress of cargo descent:
  - *"Cargo out the door";*
  - *"Cargo halfway down";*
  - *"Cargo on ground, etc."*
- C. When cargo is on ground, hold slack in line to prevent billowing (if deploying split load, attach cargo to letdown line and repeat steps a and b), unhook figure 8, remove figure 8 from letdown line, and secure figure 8 in aircraft.
- D. Wrap excess letdown line around the accordion pack and drop pack to the ground.
- E. Inform pilot if more cargo is to be lowered with additional letdown line. Pilot will determine whether to hover or orbit area until cargo is ready for subsequent deployment. When cargo deployment is complete and rigging is clear of aircraft, inform pilot *"We're clear to fly away"*.

Overhead Anchor External Cargo

**NOTE: Due to lateral C.G. limitations, cargo will be deployed from the left (observers) side of the helicopter only.**

1. Pre-Deployment Procedures:

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. Spotter puts on harness.
- B. Attach cargo to swivel.
- C. Perform all appropriate hook checks.
- D. Attach swivel connected to cargo strap to helicopter belly hook.

**NOTE: A swivel will be required with all external loads. The swivel attachment ring inside diameter must meet helicopter hook specifications.**

- E. Attach single hard loop end of breakaway strap to the top end of the swivel hardware.
- F. Rig letdown line through figure 8 and attach to positive locking steel carabiner on overhead or floor anchor and lock carabiner. On overhead anchor, pull carabiner and line down; level with the horizontal rear seat cushion.
- G. Lock off letdown line on figure 8.
- H. Attach positive locking steel carabiner on rigged letdown line to the velcro loop on the breakaway strap.
- I. Secure accordion pack and harness tether to approved attachment point.
- J. Spotter performs final cargo letdown system inspection and fastens seat belt.
- K. Spotter tells pilot “*OK to depart*” and informs pilot that there is an external load attached to the cargo hook.

**NOTE: Maintain positive control of letdown line enroute to the deployment site.**

2. Approach to Drop Site.

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternative site.
- C. Inform ground personnel to stay clear of cargo during deployment.
- D. Inform flight following that the radio will be off frequency (if not already done).
- E. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

3. Hover Position

- A. Helicopter is positioned over the designated rappel site with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back and up and down relative to altitude above the ground*)
- B. Spotter Checks power with pilot. Suggested verbiage to use when in hover over spot.

SPOTTER: *"How's Power?"*

PILOT: *"Power is good"*

- C. If power is good, spotter initiates cargo hook-up.

4. Cargo Hook Up and Deployment.

- A. Attach letdown line to hard loop on breakaway strap with positive locking steel carabiner. Lock carabiner.
- B. Unlock figure 8 and remove slack in line to allow for a smooth deployment.
- C. Spotter manually places carabiner over doorsill of helicopter, then informs pilot that cargo is rigged and ready for deployment on pilots count.
- D. Pilot gives a three (3) count and releases cargo from belly hook.

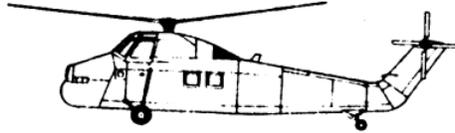
**NOTE: Maintain a tight letdown line at all times. Do not allow unarrested descent.**

- E. Spotter communicates with pilot as load descends to the ground.

- F. When the cargo reaches the ground, the left side rappeller will hold the letdown line taught. This will make the removal of the figure 8 easier for the spotter (overhead anchor only).
- G. Secure the figure 8 inside the aircraft.
- H. Wrap excess letdown line around the accordion pack and drop pack to the ground.
- I. After the accordion pack and line are clear of the helicopter, the spotter communicates to the pilot that the cargo is clear.
- J. Pilot may remain in hover or depart and return to deploy rappellers.
- K. Spotter will proceed with deploying rappellers.
- L. After completion of mission reestablish communications with flight following.

**NOTE: When cargo procedures are complete, spotter may then deploy rappellers. Refer to In Flight Operations page B-34.**

**B-6**



***SIKORSKY 58T RAPPEL PROCEDURES WITH OAS RAPPEL ANCHOR***

On Ground: Pre-Rappel

1. Configure helicopter.

**NOTE: The helicopter will be configured to meet the needs of the specific rappel mission. It is also permissible for the rappellers to wear belly bags at the discretion of the program manager.**

- A. Lock door in open position, secure all loose items in cabin. (*Refer to Cargo Deployment Procedures page B-47*).
- B. Spotter visually inspects rappel anchor, safety snub strap and rappeller gunner straps (See Chapter 3, Rappel Anchor Inspection). This will include ensuring that rappeller gunner straps are adjusted for proper length to allow access to the doorway and genie(s), but insufficient length to allow egress from the aircraft.
- C. Spotter oversees securing of cargo, with adequate letdown gear. (Refer to Cargo Deployment Procedures page B-47).
- D. Attach carabiner to two (2) adjacent rings on the rappel anchor. Attach rope to carabiner (make sure protective hose is at the bottom end of the rope). Connect the safety snub strap between the first and second swedges of the rope, attaching the free end of the safety snub strap to additional ring on the rappel anchor. Spotter confirms the appropriate number of genies are rigged for mission requirements.

**NOTE: The rope may be configured with any number of genies (not to exceed 5 genies) depending on mission requirements.**

- E. Rappellers complete buddy check.

2. Loading/Boarding

- A. Rappellers organize into proper rappel order and prepare to board the aircraft.

**NOTE: First rappeller to be deployed, needs to be seated aft. Proper deployment sequence for the S-58T is from aft to forward.**

- B. The first rappeller to be checked, check's the spotter's PPE and harness.
- C. When rappeller's check of spotter's PPE and harness are complete, rappeller and spotter exchange "*thumbs up*".
- D. Spotter initiates spotter's checks of rappellers, one rappeller at a time.
- E. When all checks are completed, both the spotter and rappeller exchange a "*thumbs up*". Rappeller boards the aircraft, takes assigned seat, attaches gunner strap around torso above Forgecraft hook, and fastens seat belt around waist below Forgecraft hook.
- F. Repeat the process with each rappeller.
- G. Prior to boarding aircraft, the last rappeller to be checked, visually inspects rigged genie(s), rope attachment, and safety snub strap. Spotter observes rappellers check of rappel hardware. When all checks are completed, rappeller and spotter exchange "*thumbs up*".

**NOTE: Rappel hardware to be inspected includes steel locking carabiner attached and locked to (2) two adjacent rings on rappel anchor, rope end attached to steel locking carabiner, safety snub strap attached to anchor and rappel rope, and genie(s) attached to rope.**

- H. Spotter repeats checks of all rappel hardware. The last rappeller observes spotter check of rappel hardware. When all checks are completed, spotter and rappeller exchange "*thumbs up*".
- I. The last rappeller boards aircraft, takes assigned seat, attaches gunner strap, and fastens seat belt.
- J. Spotter checks that rappeller's seat belts and gunner straps are fastened correctly. When checks are complete, spotter and rappellers exchange "*thumbs up*".
- K. Spotter attaches spotter tether to approved attachment point, spotter displays tether attachment, tether, knife, commo, seat belt, and then exchanges "*thumbs up*" confirmation with rappellers.

In-Flight Operations

1. The Rappel

- A. Pilot flies a reconnaissance of the area to look for hazards and works with spotter in selecting an appropriate landing or rappel site.
- B. Pilot and spotter select rappel site and then consider alternate emergency site in the event that the rappeller needs to tie off and be flown to the emergency site.
- C. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel sequence.

**NOTE: Advise flight following authority that during rappel sequence, radio volume will be adjusted down to provide for a sterile cockpit, however, the ability to transmit emergency messages will still be maintained.**

- D. Radio volume is adjusted.
- E. Pilot announces, "*One minute out*".

**NOTE: An OGE power check is accomplished prior to entering rappel hover at an altitude comparable to the site or greater. A positive rate of climb must be established *without exceeding aircraft limitations*.**

- F. Activates hot mike. From this point on all spotter actions are verbalized to the pilot.
- G. Spotter removes seat belt and moves into position.
- H. Spotter designates specific rappellers if less than a full load is to be deployed.
- I. Pilot positions helicopter over the designated rappel site, with spotter assistance. Terminology should use pilot's perspective (*right side, left side, forward, back, up or down relative to altitude above the ground*). Allow sufficient hover height above canopy to facilitate multiple rappellers.
- J. Pilot establishes hover, checks power, gives the "O.K." or *No*". If pilot responds "*No*", spotter and pilot will reassess situation and take appropriate action.

**NOTE: Internal cargo may be delivered at this time; rappellers shall remain in seat belts until cargo portion complete. Refer to Cargo Deployment Procedures page B-47.**

**NOTE: Rappeller(s) may assist spotter with specific tasks when requested. Refer to Cargo Deployment Procedures page B-47**

- K. Spotter states “*dropping rope*”, pilot responds “*O.K.*” or “*No*”. IF pilot responds “*No*”, spotter and pilot will reassess situation and take appropriate action.
- L. Spotter drops rope bag and ensures it is free of knots and rope bag is on the ground.
- M. Spotter states “*starting rappeller*”, pilot responds “*O.K.*” or “*No*”. IF pilot responds “*No*”, spotter and pilot will reassess situation and take appropriate action.
- N. Spotter signals individual rappeller with the remove seat belt signal. Rappeller removes seat belt and moves into pre-rappel position. Rappeller grasps and attaches genie to Forgecraft hook and locks off (spotter may assist). The spotter does a visual inspection of each rappeller hook-up and lock-off, ensuring rappeller’s right hand is on gunner strap release. Spotter signals approval of hook-up and lock-off by giving rappeller the locked hands signal; upon receipt of the locked hands signal each rappeller detaches the gunner strap and moves into position on the step.

**NOTE: Rappeller extends genie with left hand, displaying that the genie and Forgecraft hook are properly attached.**

- O The spotter does a visual inspection of the rappeller hook-up and lock-off, ensuring rappeller’s right hand is on the gunner’s strap release and confirms with the locked hand signal. Upon receipt of locked hand signal, the rappeller detaches the gunner strap and moves to the bottom step. Once the rappeller is in position on the step, both spotter and rappeller must “clear rope” by checking entire rope from anchor to ground, looking for any knots, rope hang-ups, obstructions in the descent path and that the rope bag is on the ground.

**NOTE: Spotter will ensure that rappeller properly detaches gunner strap.**

- P. Spotter informs pilot of rappeller movement, informing pilot when rappeller is in pre-rappel position on the step. If pilot responds, “*power O.K.*”, spotter completes visual equipment check. If pilot responds, “*No*”, spotter signals rappeller back into cabin (*raised clenched fist, elbows*

*moving together*). Rappeller returns to closest available seat and fastens seat belt.

- Q. Spotter states “*sending rappeller*”, pilot responds “*O.K.*; or *No*”. If pilot responds “*No*,” spotter and pilot will reassess situation and take appropriate action.

**NOTE: If at any time the pilot (or spotter) indicates a problem, the spotter and pilot will reassess the situation and take appropriate action. This may include the spotter aborting the mission and signaling rappeller back into the aircraft or merely delaying sending them.**

- R. If O.K., spotter signals rappellers to descend. (*palm(s) down in a sweeping motion*)
- S. Rappeller will then unlock, exit lower step, and descend at a controlled descent rate. The spotter notifies the pilot of the position of the rappeller from the aircraft to the ground.
- T. After reaching the ground, rappeller disconnects from rope and moves to a safe area.
- U. Spotter confirms gearies on ground and directs the pilot to lower aircraft as necessary.
- V. Spotter advises pilot “*rappeller(s) clear*”, and repeats process as necessary. When all rappellers are clear, drops rope and advises pilot “*rope on the ground*”.

**NOTE: If more than the maximum number of rappellers per rope are to be deployed, the closest rappeller to the door shall maintain control of the rope bag and rope as the spotter connects the rope to the anchor.**

**NOTE: Rappeller observes spotter inspection of proper attachment of rappel hardware. Rappeller and spotter exchange “thumbs up” confirmation of hardware inspection.**

- W. Spotter advises pilot “*clear to depart*”. Pilot departs rappel site, spotter returns to seat and fastens seat belt.
- X. Radio is returned to normal operational mode and flight following authority is informed that the rappel sequence has been completed. The helicopter should remain in the area until radio contact has been established with the rappellers.

**NOTE: The National Helicopter Operations Specialist for Forest Service rappel operations must approve any variations in these procedures. DOI agencies shall receive approvals from their agencies' national aviation operations specialist prior to deviating from these procedures.**

## **Cargo Deployment Procedures**

For the Sikorsky S-58T internal cargo is all that is developed at this time.

### 1. Pre Deployment

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. Spotter puts on harness, knife readily accessible.
- B. Rig load(s) with carabiner; secure inside aircraft;
- C. Attach carabiner to rappel anchor, with gate facing inboard. Carabiner oriented pear side downward, gate facing inboard.
- D. Attach figure 8 to carabiner on rappel anchor.

**NOTE: Figure 8 should be rigged to prevent crossing of letdown line and unintentional line abrasion.**

- E. Secure accordion pack and harness tether to an approved attach point.
- F. Do verbal check with pilot: (See note at top of B-48)
  - *“Carabiners locked”;*
  - *“Spotter safety tether and seat belt are secure”;*
  - *“Knife is accessible”;*
  - *“Accordion pack is secure”;*
  - *“Cargo is secure”;*

### 2. Approach to Drop Site:

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternate site.
- C. On pilot's concurrence unbuckle seat belt and move to door.
- D. Inform ground personnel to stay clear while deploying cargo.
- E. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the cargo letdown sequence.

NOTE: Advise flight following authority that during rappel sequence, radio volume will be adjusted down to provide for a sterile cockpit, however, the ability to transmit emergency messages will still be maintained.

- F. Radio volume is adjusted, if necessary
- G. Activate hot mike. From this point on all spotter actions are verbalized to pilot.
- H. Attach figure 8 to carabiner at anchor.

### 3. Hover Position

- A. Communicate with pilot to position helicopter over deployment spot. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*)
- B. Spotter checks power with pilot. Suggested verbiage to use when in hover over spot.

SPOTTER: *"How's Power?"*

PILOT: *"Power is good"*

SPOTTER: *"Ready To Deploy"*

PILOT: *"Go Ahead"*

**CAUTION: Spotter shall not move cargo outside the aircraft until the pilot announces power is OK.**

### 4. Cargo Deployment

- A. Ease cargo out of door, and hold out away from step. Via hot mike, keep pilot informed of actions:
  - *"Cargo out the door";*
  - *"Cargo halfway down";*
  - *"Cargo on ground, etc. "*
- B. Personnel on the ground shall stay clear and maintain visual contact with the aircraft and cargo being lowered.
- C. When cargo is on ground, hold slack in line to prevent billowing (if deploying split load, attach cargo to letdown line and repeat steps A and B), unhook figure 8, remove figure 8 from letdown line, and secure figure 8 in aircraft.

- D. Wrap excess letdown line around the accordion pack and drop pack to the ground.
- E. Inform pilot if more cargo is to be lowered with additional letdown line. Pilot will determine whether to hover or orbit area until cargo is ready for subsequent deployment. When cargo deployment is complete and rigging is clear of aircraft, inform pilot “*We’re clear to fly away*”.

**NOTE: Figure 8 may be rigged and hung on bracket in flight.**

**NOTE: IF RAPPELLERS ARE DELIVERED BEFORE CARGO THEN THE SEQUENCE OF EVENTS WILL BE ADJUSTED ACCORDINGLY TO REFLECT THIS (*i.e. items accomplished in the deployment of rappellers do not need to be repeated*).**

**B-7**



***BELL-407 RAPPEL PROCEDURES WITH  
AERONAUTICAL ACCESSORIES OVERHEAD RAPPEL ANCHOR***

On-Ground: Pre-Rappel

1. Configure helicopter.

**NOTE: The helicopter will be configured to meet the needs of the specific rappel mission. It is also permissible for rappellers to wear belly bags at the discretion of the program manager.**

- A. Rear doors removed, front doors and litter door removed at pilots and spotters discretion, loose items removed from rear seat area, center rear seat belt secured.
- B. Visually inspect rappel anchor. *(See Chapter 3, Rappel Anchor Inspection)*
- C. Attach cargo letdown line protective cradle to base plate and ensure keeper pin is in place.

2. Loading/Boarding

- A. Spotter oversees securing of cargo *(this would include attachment of cargo to belly hook for external method. Refer to Cargo Deployment Procedures page B-56)*.
- B. Rappellers complete buddy check to include buddy's rope and genie.
- C. Safety snub strap is attached to the forward carabiner at each anchor, and secured to the ceiling by velcro.
- D. Rappeller(s) approach aircraft and place rope bags on floor of helicopter. Right side rappeller completes equipment check on spotter. Rappeller(s) will connect end of rope to lower locking steel carabiner in the "Y" configuration *(make sure the protective hose is at the bottom end of the rope)*.

- E. Rappeller(s) will connect descent device to harness, adjust length of rope to descent device to ensure proper position on the skid, then lock-off.
- F. Spotter initiates equipment check, one rappeller at a time outside the aircraft, beginning with right side rappeller.
  - 1) Both carabiners locked on anchor, with barrels down in the locked position, facing outboard.
  - 2) Ensure steel locking carabiner attaching rope to anchor is forward facing and goes through both carabiners, locked with barrel down.
  - 3) Safety snub strap is in place on forward carabiner.
  - 4) Descent device rigged properly and locked-off.
  - 5) Check connection of descent device to harness. Check Forgecraft hook and make sure tri-link is through both harness loops and barrel is tight.
  - 6) Check fit of harness, positive connection of belly bag to harness (if applicable), and proper placement of knife.
  - 7) PPE check (helmet, eye protection, clothing, gloves, etc.).
  - 8) If all items are correct and ready, thumbs up will be exchanged between spotter and rappeller. IF NOT, reinitiate equipment check.
  - 9) Rappeller then enters helicopter and fastens seat belt ensuring that both shoulder and lap belt are under hook and tri-link.
  - 10) Repeat process with left side rappeller.
- G. After both rappeller checks have been completed and rappeller(s) have boarded aircraft, the spotter configures cargo deployment equipment and boards helicopter. (*see Cargo Deployment Procedures page B-56*)
- H. Spotter attaches spotter harness tether to approved attachment point, fastens seat belt, plugs into avionics and then inspects rappeller(s) seat belt, displays tether, knife, and seat belt to rappeller(s) and exchanges (*thumbs up*) signal. Gives "O.K." to pilot to take off and reminds pilot if there is an external cargo load attached.

In-Flight Operations:

1. The Rappel

**NOTE: In the Bell 407, Lateral CG requirements need to be considered at all times. Spotter movements in conjunction with rappeller seating must comply with operational CG limitations of aircraft.**

- A. Pilot flies a reconnaissance of the area to look for hazards and works with spotter in selecting an appropriate landing or rappel site.
- B. Pilot and spotter select rappel site and then consider alternate emergency site in the event that one or both rappellers need to tie off and be flown to the emergency site.
- C. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel sequence.
- D. Radio volume adjusted, if necessary.
- E. Pilot announces "*One minute out*".
- F. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

**NOTE: An OGE Powercheck is accomplished prior to entering rappel hover at an altitude comparable to the site. A positive rate of climb must be established without exceeding aircraft limitations.**

- G. Helicopter is positioned over the designated rappel site with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- H. Pilot establishes hover, checks power, gives "*O.K.*" to proceed.

**NOTE: If using external cargo delivery, rappellers remain belted until cargo portion is complete. Refer to Cargo Deployment Procedures page B-56.**

- I. Spotter removes and secures seat belt. This is the signal for rappeller(s) to remove and secure seat belts. Spotter informs pilot.
- J. Spotter states "*dropping rope(s)*", pilot responds "*O.K.*" or "*No*". IF pilot responds "*No*", spotter and pilot will reassess situation and take appropriate action.

- K. If okay, spotter signals rappeller(s) to drop rope bag(s) outside of the skids, (*downward sweeping motion of arms with index finger extended*). Spotter checks that the rope(s) are free of knots and rope bag(s) are on the ground and informs pilot the "*ropes are on the ground*".
- L. Spotter states "*rappellers to skids*" pilot responds "*O.K*" or "*No*". IF pilot responds "*No*", spotter and pilot will reassess situation and take appropriate action.
- M. If okay, spotter signals each rappeller (*locked hands*) to move into position on skid.
- N. Rappeller(s) exit to skid by placing outboard foot on step, backing out, and placing inboard foot directly to skid. Rappeller(s) may utilize overhead carabiner with inboard hand to facilitate exit. *Rappeller must assure rope is on right side of body* when in position on skid. This can be accomplished during transition from step to skid.
- O. Spotter informs pilot of rappeller movements, informing pilot when rappeller(s) are in pre-rappel position on skid(s). Spotter and rappeller(s) perform final visual inspection of rope(s). Once the rappeller is in position on skid, both spotter and rappeller must "clear rope" by checking entire rope from anchor to ground, looking for any knots, rope hang-ups, obstructions in the descent path and that rope bags are on the ground. IF pilot responds "*Power O.K.*", spotter completes visual equipment check. IF pilot responds "*No*", spotter signals rappeller(s) back into cabin (*raised clenched fists, bent elbows moving together*). *Rappeller(s) returns to their seat and fastens seat belt*).
- P. Spotter states, "*sending rappellers*," pilot responds "*O.K*" or "*No*". IF pilot responds "*No*", spotter and pilot will reassess situation and take appropriate action.

**NOTE: If at any time the pilot (or spotter) indicates a problem, the spotter and pilot will reassess the situation and take appropriate action. This may include the spotter aborting the mission and signaling rappeller(s) back into the aircraft or merely delaying sending them.**

- Q. If okay, spotter signals rappeller(s) to descend (*palms down sweeping motion*).
- R. Rappeller(s) then unlock genie(s), and begin exit from skid. The spotter notifies the pilot of the position of the rappeller(s) from the aircraft to the ground.

- S. After reaching the ground, rappeller(s) disconnect from the rope and move to a safe area.
- T. Spotter advises the pilot "*rappellers clear,*" then disconnects and drops each rope. Spotter returns to seat, refastens seat belt and advises the pilot, "*Ready to depart*".
- U. Radio returned to normal operational mode and flight following authority is informed that the rappel sequence has been completed. The helicopter should remain in the area until radio contact is established with rappeller(s).

**NOTE: The spotter and pilot may elect to deploy one rappeller at a time for a variety of reasons. This is an acceptable practice. Rappel operations with single rappeller on board will be from the left side only. Any other variations in these procedures must be approved by the National Helicopter Operations Specialist for Forest Service rappel operations. DOI agencies shall receive approvals from their agencies' national aviation operations specialist prior to deviating from these procedures.**

**Operational limitations when rappelling outside the skids in the Bell 407 equipped with the Aeronautical Accessories overhead rappel anchor (External Cargo).**

- The maximum equipped rappeller weight (including rope) for simultaneous two (2) person rappel operations when left front crew seat is vacant is 265 lbs.
- The maximum equipped rappeller weight (including rope) for simultaneous two (2) person rappel operations when left front crew seat is occupied is 235 lbs.
- For external cargo operations with simultaneous two person rappelling, the lighter rappeller shall occupy the right side.
- The combined weight of crew (front) seat occupants shall not exceed 460 lbs. for external cargo operations during simultaneous two (2) person rappel operations.
- Cargo shall be lowered prior to rappelling activities (*external cargo method*).
- Spotter shall remain on left side during right side rappeller stuck-on-rope recovery operations (*the recovery starts as soon as the left side rappeller is off the rope*).
- **Single person rappelling from the right side is prohibited.**
- Single person rappelling from the left side is permitted only after a mission specific weight and balance calculation has been performed utilizing the worst case scenario(s) (*e.g., 30 minutes fuel; bad rappel procedures {2.3 gls}; rappeller stuck-on-rope*).

## Cargo Deployment Procedures

**At this time the only developed system for cargo letdown is external.**

### 1. Pre Deployment

**NOTE: Due to lateral C.G. limitations, cargo will be deployed from the overhead anchor mounted on the left (observers) side of the helicopter only.**

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

- A. Spotter puts on harness, knife readily accessible.
- B. Rear doors removed, front doors and litter doors removed at the pilots and spotters discretion
- C. Cargo container is set up and loaded at front of helicopter on pilot's side.
- D. Spotter performs all appropriate hook checks, attaches single hard loop end of breakaway strap to the top end of the swivel hardware, and then connects swivel system and cargo to helicopter cargo hook.

**NOTE: A swivel will be required with all external loads. The swivel attachment ring inside diameter must meet helicopter hook specifications.**

- E. Rig letdown line through figure eight. The figure eight is then attached with a locking "D" carabiner to both anchor carabiners with barrel facing aft and up, outboard of rappel rope carabiner (*if rigged for rappel*).
- F. The letdown line, with locking "D" carabiner attached, is pulled down through figure eight so that carabiner is level with the rear seat cushion.
- G. Attach locking "D" carabiner on rigged letdown line to the velcro loop on the breakaway strap.
- H. Lock off let down line on figure eight.
- I. Secure accordion pack and harness tether to approved attachment point.
- J. Spotter performs final cargo letdown system inspection and fastens seat belt.

- K. Spotter tells pilot “*OK to depart*” and informs pilot that there is an external load attached to the cargo hook.

**NOTE: Maintain positive control of letdown line enroute to the deployment site.**

2. Approach to Drop Site.

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternative site.
- C. Inform ground personnel to stay clear during cargo deployment.
- D. Adjust radio volume, if necessary.
- E. Activate hot mike. From this point on all spotter actions are verbalized to pilot.

**NOTE: An OGE Powercheck is accomplished prior to entering rappel hover at an altitude comparable to the site. A positive rate of climb must be established *without exceeding aircraft limitations.***

3. Hover Position.

- A. Spotter may elect to remove and secure seat belt or remain belted during cargo deployment.
- B. Helicopter is positioned over the designated rappel site with spotter assistance. Terminology should use pilot's perspective (*your side, my side, forward, back and up or down relative to altitude above the ground*).
- C. Spotter Checks power with pilot. Suggested verbiage to use when in hover over spot:

SPOTTER: “*How's Power?*”

PILOT: “*Power is good*”

- D. If power is good, spotter initiates cargo hook-up.

4. Cargo Hook Up and Deployment.

- A. Attach carabiner to hard loop on breakaway strap and lock carabiner.
- B. Unlock figure eight and remove slack in line to allow for a smooth deployment.

- C. Place letdown line in cradle and ensure carabiner is clear of fuselage. If rappeller(s) are on board, left side rappeller should hold letdown line secure in cradle during deployment.
- D. Spotter informs pilot that cargo is rigged and ready for deployment on pilots count.
- E. Pilot gives a three (3) count and releases cargo from belly hook.

**NOTE: Maintain a tight letdown line at all times. Do not allow unarrested descent.**

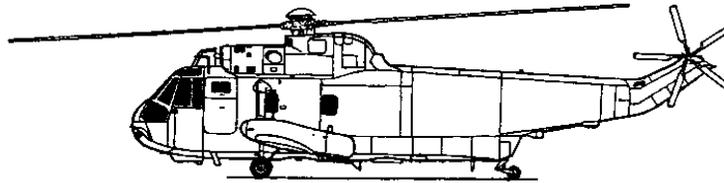
- F. Via hot mike, keep pilot informed of actions and progress of cargo descent:
  - *"Cargo halfway down";*
  - *"Cargo on ground, etc. "*
- G. When cargo reaches the ground, spotter disconnects and secures figure eight, wraps excess line around pack and drops it between flight step and fuselage.

**NOTE: Rappellers may assist spotter in cargo letdown procedures as follows: When cargo reaches the ground, the left side rappeller will hold the letdown line taut. This will prevent excess feeding of the letdown line and facilitate an easy removal of the figure eight for the spotter. The right side rappeller disconnects accordion pack while spotter disconnects figure eight. Spotter hands right side rappeller figure eight while taking accordion pack. Right side rappeller secures figure eight.**

- H. After the accordion pack and line are clear of the helicopter, the spotter communicates to the pilot that the cargo is clear.
- I. Pilot may depart or remain in hover to deploy rappellers.
- J. After completion of mission reestablish communications with flight following.

**NOTE: When cargo procedures are complete, spotter may then deploy rappellers. Refer to In Flight Operations page B-51.**

**B-8**



**SIKORSKY S-61 RAPPEL PROCEDURES**

On Ground: Pre-Rappel

1. Configure Helicopter.

**NOTE: The helicopter will be configured to meet the needs of the specific rappel mission. It is also permissible for rappellers to wear belly bags at the discretion of the program manager.**

- A. Cargo letdown bags/boxes will be inspected for secure packaging and loaded into aircraft and secured at left cabin wall hard point with a carabiner.
- B. Spotter visually inspects rappel anchor (*see chapter 3, Rappel Anchor inspection*) and begins rigging process, attaching one carabiner to OUTSIDE bracket ring with the gate facing inward, this secures rope during rappel sequence. If the mission is cargo delivery, the anchor is rigged by attaching one carabiner to the INSIDE bracket ring with the gate facing inward, this secures the figure 8. (*The rope or figure 8 is not attached at this time, it is attached to the appropriate carabiner and the safety snub strap is attached to the inside bracket ring as per procedure outlined at **IN FLIGHT OPERATIONS**, see section I*). Spotter attaches rappeller gunner strap to ceiling mount above seat #3, ensuring proper length to allow access to doorway and genies, but insufficient length to allow egress from the aircraft.
- C. Spotter attaches required number of Sky Genies (*maximum of 5*) and safety snub strap to rope between the first and second swedges. Spotter sets rope bag on seat #2 and buckles seat belt into bag loops. If second rope is required, the bag will be secured to left wall hard point with carabiner through bag loops in front of seat #3. (*Bags and snub strap may be pre-rigged*).

- D. Spotter will inspect and attach cargo letdown tape bag to left cabin wall hard point with a carabiner. Figure 8 will be taped on top of bag/box to secure it during flight. (*Refer to cargo deployment procedures for S-61 at end of this chapter*).

## 2. Loading/Boarding

- A. Rappellers organize into pairs and complete buddy check process.

**NOTE: Gear will be buddy checked for loose items, and proper attachment to harness for belly bags. All equipment worn will not interfere with the proper function of the rappel harness, or the ability to assume the emergency crash position in the aircraft.**

- B. Rappellers organize into deployment sequence determined by Spotter. Spotter then performs final equipment/Spotter check on each rappeller. Rappeller #1 inspects Spotter's harness and PPE.
- C. Rappellers are cleared to board aircraft to pre-assigned seats.
- D. Each rappeller moves to assigned seat and secures seat belt.
- E. Rappeller in seat #3 attaches to gunner strap
- F. Specific seating assignments are as follows:
  - #1 – Reserved for Spotter.
  - #3 - On deck rappeller (*crew supervisor/IC*), inspects rigging of second rope if required, gives thumbs up to Spotter if OK.
  - #5 - Inspects rigging of rope, gives thumbs up to spotter is OK.
- G. All other rappellers load forward to aft.
- H. Spotter boards aircraft, secures seat belt, attaches avionics, and prepares for flight.

## In Flight Operations

### 1. The Rappel

- A. Pilots (PIC and co-pilot) fly a reconnaissance of the area to look for hazards and work with the spotter in selecting an appropriate landing or rappel site.
- B. Pilot and Spotter select rappel site and alternate flyaway emergency site in the event a rappeller is unable to complete the descent and must be relocated.

- C. Contact will be made to appropriate flight following authority (ATGS, HLCO, Dispatch, etc.) prior to commencing the rappel sequence.

**NOTE: An OGE Powercheck is accomplished prior to entering rappel hover at an altitude comparable to the site. A positive rate of climb must be established without exceeding aircraft limitations.**

- D. PIC indicates, *“one minute from the site, air speed below 40 knots, rappel sequence may begin”*.
- E. Spotter removes seat belt, disconnects avionics, moves from seat, and attaches Spotter tether carabiner to Spotter bracket. Spotter displays hook-up and emergency knife to rappeller in seat #3, receives thumbs up signal that hook up is correct. At the same time rappeller in seat #3 displays gunner strap is correctly attached and receives thumbs up from Spotter. Spotter hooks into avionics and activates hot mike. From this point on all spotter actions will be verbalized to pilots.
- F. Spotter moves to door and announces to pilot “door coming open”, and then finalizes with pilot proper position over rappel site. Terminology will be “left, right, forward, back, up, down, and number of feet for each direction.”
- G. PIC establishes hover over site at appropriate height.  
Spotter to both pilots “ We are over the spot, how is the power?” SIC responds “power is set and good”. PIC responds “I have the spot, you may proceed”.
- H. If either pilot gives a negative response to the Spotter at any time during this segment of the rappel sequence, both will reassess the situation and take appropriate action. It may simply be a slight delay due to repositioning the aircraft or actually aborting the mission depending on the seriousness of the situation..
- I. Spotter retrieves rope end with secured safety snub strap from bag at seat #2, and attaches safety snub strap to INSIDE bracket ring and locks it. Rope end is then attached to OUTSIDE carabiner, Spotter then locks the barrel. Rappeller in seat #5 controls rope bag while Spotter connects rope to anchor. When rope is connected, seat #5 facilitates removal of bag loops from seat belt so Spotter can throw rope bag from aircraft.

**NOTE: If internal cargo is to be delivered at this time, all rappellers shall remain in seat belts until cargo delivery is completed. For cargo, the Spotter un-tapes the rigged figure 8 from bag/box and pulls it toward door and attaches it to INSIDE carabiner then locks the barrel..**

- J. Spotter will state intentions to drop rope; PIC will respond “OK” or “NO”. If Pilot responds “NO”, Spotter and Pilot will reassess situation and take appropriate action.
- K. Spotter signals first rappeller in seat #3 to unhook seat belt and move into pre-rappel position (*hands clasped at seat belt level and motion of pulling apart seat belt*).
- L. Once rappeller is at door, Spotter points to bracket showing that rope end is attached to carabiner and safety snub strap is hooked and locked between rope swedge and inner ring. Rappeller gives thumbs up to Spotter if hook-up is OK.
- M. Spotter slides Sky Genie down rope to correct position and hands it to rappeller who attaches is to Forgecraft hook and performs lock-off procedure.
- N. Spotter does a visual inspection of the rappeller’s hook-up and lock-off procedures, and confirms with hand signal (*hands clasped at chest level and motion of disconnecting gunner strap*). Upon receipt of hand signal the rappeller will detach the gunner strap and move into position on the step. Rappeller quickly looks down the length of the rope to the ground being aware of any knots in rope and where the landing site is, then turns to face the Spotter with full attention.
- O. Spotter verbalizes sequence: “*Rappeller hooked-up and locked-off, rappeller on the step, sending rappeller, rappeller away*”
- P. If either pilot gives a negative response to the spotter during this portion of the rappel sequence, both will reassess the situation and take appropriate action which may include either a delay in the procedure, or the Spotter may be required to signal the rappeller back into the cabin (*raised arms, clenched fist, bent elbows moving together*). It is important that the pilot and Spotter understand EXACTLY what action is required and no mis-communication occurs.

**EMERGENCY PROCEDURE:** In the event of an emergency requiring rappeller to re-enter the helicopter, the following procedure will be followed: rappeller re-enters cabin and moves to seat #1 and fastens seat belt. Spotter disconnects or cuts the rope as necessary, closes door, disconnects Spotter tether and avionics, moves to seat #2, secures seat belt, and connects avionics.

- Q. When Rappeller is in position on the step, spotter will give signal to descend (*arm extended, palm down, the spotter making a sweeping downward motion*).
- R. The spotter will observe and verbalize to pilot the entire rappel sequence “*rappeller away, half down, three quarters down, rappeller is on the ground, rappeller is clear*”.

- S. Unless the first rappeller gives a negative signal to the spotter, the next rappeller will complete steps M – S above until the first rope is completed.

**NOTE: As each rappeller moves from seat #3 into the pre-rappel position, the next up rappeller (*order is left side to right and repeat*) removes seat belt and IMMEDIATELY re-positions to seat #3 and attaches seat belt. When the rappeller in the door removes their gunner strap, seat #3 rappeller will retrieve and attach it.**

- T. If second load of rappellers is required, Spotter will disconnect rope #1 from safety snub strap and carabiner on anchor and drop clear of aircraft, (leave safety snub strap attached to anchor ring). Spotter attaches rope #2 (positioned at left wall hard point and controlled by rappeller in seat #3), to anchor (carabiner first, safety snub strap second) and repeats procedures K – S. Rappeller in seat #3 facilitates removal of rope bag from carabiner so Spotter can throw rope bag from aircraft.
- U. When all rappellers are on the ground, Spotter will verbalize the disconnect procedure to pilot: “unhooking rope and safety snub strap from bracket, dropping rope, rope is clear, closing door, unhooking Spotter tether, returning to seat, seat belt secure, clear to depart”.

**NOTE: The National Helicopter Operations Specialist for Forest Service rappel operations must approve any variations in these procedures. DOI agencies shall receive approvals from their agencies’ national aviation operations specialist prior to deviating from these procedures.**

## Cargo Deployment Procedures Sikorsky S-61

**NOTE: Spotter Safety Checks as per Chapter 7, Section IV shall be followed.**

### 1. CONFIGURE HELICOPTER

- A. Spotter will configure Helicopter to meet the needs of the specific mission (Number of bags/boxes, IA, support, medivac, etc).
- B. Spotter puts on harness, ensures safety knife is readily accessible in Helicopter or attached to harness.
- C. Spotter visually inspects anchor and begins rigging process. (*See Chapter 3, Rappel Anchor Inspection*).
- D. Spotter attaches one carabiner to the INSIDE bracket ring with the gate facing inward, (figure 8 is NOT attached at this time).

- E. Cargo is loaded and secured in helicopter at left cabin wall hard point(s) with one carabiner per bag/box. Cargo letdown tape bag is attached to left forward most hard point in Helicopter with carabiner. Enough let down tape is pulled from bag and rigged to figure 8 to ensure the proper length during actual hook up to bracket. Rigged figure 8 is then taped to bag/box (eye facing toward cargo door) to secure it during flight. Spotter attaches end of let down line with carabiner to bag/box loops and locks barrel. Caution should be used to prevent crossing of letdown lines; this will ensure proper deployment of cargo.
- F. Spotter closes door, secures seat belt, attaches avionics, and prepares for flight.

### 3. APPROACH TO DEPLOYMENT SITE

- A. Recon area for hazards and confirm deployment site with pilot.
- B. Identify and check alternate site.
- C. Inform ground personnel to stay clear of cargo during deployment.
- D. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the deployment sequence.
- E. PIC indicates, “one minute out from site, air speed below 40 kts, cargo sequence may begin.”
- F. Spotter removes seat belt, disconnects avionics, moves from seat, and attaches spotter tether carabiner to spotter bracket. Spotter displays hook up and emergency knife to either on board assistant or co-pilot, and receives thumbs up signal that hook up is correct. Spotter hooks into avionics and activates hot mike. From this point on all Spotter actions will be verbalized to Pilot.

### 3. HOVER POSITION

- A. Spotter moves to door and announces to Pilot “*door coming open*”, and then finalizes proper position over deployment site. Terminology will be: “*Left, Right, Forward, Back, Up, Down, and number of feet for each direction*”.
- B. PIC establishes hover over site at appropriate height. Spotter to both Pilots; “*We are over the spot, how is the power?*” SIC responds, “*Power is set and good*” PIC responds, “*I have the spot, you may proceed*”.

CAUTION: Spotter shall not move cargo outside the A/C until the Pilot announces “*Power is good*”.

#### 4. CARGO DEPLOYMENT

- A. Spotter un-tapes figure 8 and pulls it toward door, attaches it to carabiner, and locks the barrel. **Make sure not to cross cargo lines.** Take up excessive slack between the cargo and bracket as you move cargo towards the door.
  
- B. Ease cargo out of door, lowering outside of step.
- C. Begin lowering cargo with positive control of letdown line; do not allow un-arrested descent of cargo. Keep Pilot informed of actions and progress of cargo descent:
  - “ *Cargo out the door*”
  - “ *Cargo halfway down*”
  - “ *Cargo on the ground, etc.*”
  
- D. When cargo is on the ground, unhook figure 8 from carabiner/bracket and remove letdown tape. Set the figure 8 in seat #1. Hold slack in line to prevent billowing and unhook let down line bag from hard point. Wrap excess letdown line around bag and throw clear of aircraft.
  
- E. Inform Pilot if more cargo is to be lowered. Pilot will determine whether to hold hover or orbit area until cargo is ready for subsequent deployment. If additional cargo is required, repeat steps A-D above. When cargo deployment is complete Spotter will verbalize to Pilot “*Lines are clear, closing door, unhooking Spotter tether, returning to seat, clear to depart*”.

November, 2001

**APPENDIX C**

**SAMPLE FORMS**

The following are sample forms to be used for rappel program documentation purposes. The forms will allow individual rappel programs to organize and document the histories of equipment and training. They were designed to contain all of the pertinent information that has been described in detail in the Interagency Helicopter Rappel Guide.

***C-1***

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### Letdown Line Log

ID#: \_\_\_\_\_

Date Put Into Service: \_\_\_\_\_

Date Retired: \_\_\_\_\_

Number of Prior Uses:

Date	Spotter	Height	End	Inspection Date	Inspector Signature	Remarks/Problems
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Carabiner Log

ID#: \_\_\_\_\_

Date Put Into Service: \_\_\_\_\_

Date Retired: \_\_\_\_\_

Type of Use (Rappel Anchor or Cargo):

Inspection Date	Inspector Signature	Remarks/Problems
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C-3

Sample Forms

### Harness Log

ID#: \_\_\_\_\_

Date Put Into Service: \_\_\_\_\_

Date Retired: \_\_\_\_\_

Rappeller Issued To: \_\_\_\_\_

Date of Issue: \_\_\_\_\_

Inspection Date	Inspector Signature	Remarks/Problems
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C-4

Sample Forms



Descent Device Log

ID#: \_\_\_\_\_

Date Put Into Service: \_\_\_\_\_

Date Retired: \_\_\_\_\_

Number of Prior Uses:

Date	Rappeller (s)	Inspection Date	Inspector Signature	Remarks/Problems
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C-6

Sample Forms



Individual Rappel Record

Year: \_\_\_\_\_

Name:	Seasons Experience	Seasons Fire Experience	Age	Height	Weight	Requirement Certification
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Number of Previous Rappels - Operational:	Other:	Total:
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**-----Record of Rappels-----**

#	Date	Location	Purpose	Height	Remarks
1.	/ /			‘	
2.	/ /			‘	
3.	/ /			‘	
4.	/ /			‘	
5.	/ /			‘	
6.	/ /			‘	
7.	/ /			‘	
8.	/ /			‘	
9.	/ /			‘	
10.	/ /			‘	
11.	/ /			‘	
12.	/ /			‘	
13.	/ /			‘	
14.	/ /			‘	
15.	/ /			‘	
16.	/ /			‘	
17.	/ /			‘	

C-8

Sample Forms

Rappel Crewmember Training Record

Name: \_\_\_\_\_

**Refer to training elements in Interagency Helicopter Guide, Ch. 2. Instructor must sign off as Trainee completes each step.**

**1. Rappel Equipment Use and Inspection**

Rappeller can identify, put on, use, properly inspect and maintain rappel equipment (rope, harness, sky genie, nomex®, helmet, gloves and belly bag if used) without error.

Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____

**2. Ground Training**

Rappeller has completed ground training, without procedural error, for the rappel sequence, wearing full gear and correctly identifying hand signals, doing buddy checks, and spotter check.

Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____

**3. Emergency Procedures**

Rappeller understands and can perform, without procedural error, the following emergency situation procedures; lock off, emergency signals (spread eagle, lift out, all clear), emergency tie off and rope cut.

Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____

**4. Low Tower Training**

Rappeller has successfully completed, without procedural error, rappels and emergency procedures from an elevated platform.

Date: <u>   </u> / <u>   </u> / <u>   </u>	#Rappels: <u>   </u>	A/C Type: <u>   </u>	Instructor: <u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	Signature: <u>   </u>
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**5. High Tower Training**

Rappeller has successfully completed, without procedural error, rappels and emergency procedures from an elevated platform, 20 ft. Minimum height.

Date: <u>   </u> / <u>   </u> / <u>   </u>	#Rappels: <u>   </u>	A/C Type: <u>   </u>	Instructor: <u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	Signature: <u>   </u>
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Rappel Crewmember Training Record

Name: \_\_\_\_\_

6. Mock-up

Rappeller had completed, without procedural error, actual rappel and emergency simulations in the helicopter with full gear, a partner and spotter, while the helicopter remains on the ground, not running.

Date: ____ / ____ / ____	#Rappels: _____	A/C Type: _____	Instructor: _____
/ /	_____	_____	Signature: _____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____

7. Helicopter Rappels

Rappeller has successfully completed, without procedural error, the full rappel sequence from a hovering helicopter at various heights up to 250'.

Date: ____ / ____ / ____	#Rappels: _____	A/C Type: _____	Instructor: _____
/ /	_____	_____	Signature: _____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____
/ /	_____	_____	_____

Date certified as a Rappeller: \_\_\_\_ / \_\_\_\_ / \_\_\_\_      Aircraft Type: \_\_\_\_\_

Spotter/Check Spotter Signature: \_\_\_\_\_

-----X-----

Date certified as a Rappeller: \_\_\_\_ / \_\_\_\_ / \_\_\_\_      Aircraft Type: \_\_\_\_\_

Spotter/Check Spotter Signature: \_\_\_\_\_

-----X-----

Date certified as a Rappeller: \_\_\_\_ / \_\_\_\_ / \_\_\_\_      Aircraft Type: \_\_\_\_\_

Spotter/Check Spotter Signature: \_\_\_\_\_

-----X-----

Date certified as a Rappeller: \_\_\_\_ / \_\_\_\_ / \_\_\_\_      Aircraft Type: \_\_\_\_\_

Spotter/Check Spotter Signature: \_\_\_\_\_

Spotter Trainee Record

Name: \_\_\_\_\_

**Refer to training elements listed in Interagency Helicopter Guide, Ch. 2. Instructor must sign off as trainee completes each step.**

**1. Rappel Equipment Use and Inspection**

Spotter can use, properly inspect and maintain rappel equipment (rope, harness, sky genie, nomex, helmet, gloves and belly bag) and helicopter rappel equipment (rappel anchor, safety strap attach point, letdown equipment and associated hardware) without error.

Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____

**2. Ground Training**

Spotter has completed, without procedural error, ground training rappellers by observing buddy checks, checking rappellers, using hand signals and correcting deficiencies.

Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____

**3. Emergency Procedures**

Spotter has performed signals, procedures and communicated with the pilot during the following emergency situation simulations, without procedural error: rappeller stuck on rope, poor environmental conditions (ropes out), aircraft emergency – expedite (ropes out – rappeller on skid, rappeller on rope), aircraft emergency – immediate (ropes out rappeller on skid, rappeller on rope).

Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____
Date: : <u>   </u> / <u>   </u> / <u>   </u>	Instructor Signature: _____

**4. Low Tower Training**

Spotter has successfully directed, without procedural error, rappels and emergency procedures from an elevated platform.

Date: <u>   </u> / <u>   </u> / <u>   </u>	#Rappels: <u>   </u>	A/C Type: <u>   </u>	Instructor: <u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	Signature: <u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>
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<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>

**5. High Tower Training**

Spotter has successfully directed, without procedural error, rappels and emergency procedures from an elevated platform, 20 ft. Minimum height.

Date: <u>   </u> / <u>   </u> / <u>   </u>	#Rappels: <u>   </u>	A/C Type: <u>   </u>	Instructor: <u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	Signature: <u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>
<u>   </u> / <u>   </u> / <u>   </u>	<u>   </u>	<u>   </u>	<u>   </u>

Spotter Trainee Record

Name: \_\_\_\_\_

8. Mock-up

Spotter has directed, without procedural error, actual rappel and emergency simulations in the helicopter with a full load of rappellers in complete gear, while the helicopter remains on the ground, not running.

Date: <u>   /   /   </u>	#Rappels: <u>      </u>	A/C Type: <u>      </u>	Instructor: <u>      </u>
<u>   /   /   </u>	<u>      </u>	<u>      </u>	Signature: <u>      </u>
<u>   /   /   </u>	<u>      </u>	<u>      </u>	<u>      </u>
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<u>   /   /   </u>	<u>      </u>	<u>      </u>	<u>      </u>
<u>   /   /   </u>	<u>      </u>	<u>      </u>	<u>      </u>
<u>   /   /   </u>	<u>      </u>	<u>      </u>	<u>      </u>

9. Helicopter Rappels

Spotter has successfully spotted, without procedural error, the full rappel sequence from a hovering helicopter at various heights up to 250'.

Date: <u>   /   /   </u>	#Rappels: <u>      </u>	A/C Type: <u>      </u>	Instructor: <u>      </u>
<u>   /   /   </u>	<u>      </u>	<u>      </u>	Signature: <u>      </u>
<u>   /   /   </u>	<u>      </u>	<u>      </u>	<u>      </u>
<u>   /   /   </u>	<u>      </u>	<u>      </u>	<u>      </u>
<u>   /   /   </u>	<u>      </u>	<u>      </u>	<u>      </u>
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<u>   /   /   </u>	<u>      </u>	<u>      </u>	<u>      </u>

Date certified as a Spotter:    /   /                         Aircraft Type:                   

Check Spotter Signature: \_\_\_\_\_

-----X-----

Date certified as a Spotter:    /   /                         Aircraft Type:                   

Check Spotter Signature: \_\_\_\_\_

-----X-----

Date certified as a Spotter:    /   /                         Aircraft Type:                   

Check Spotter Signature: \_\_\_\_\_

-----X-----

Date certified as a Spotter:    /   /                         Aircraft Type:                   

Check Spotter Signature: \_\_\_\_\_

November, 2001

**APPENDIX D****RAPPEL EQUIPMENT SOURCE LIST**

This source list for rappel equipment has been developed to provide field personnel with the names and addresses of suppliers of products used in helicopter rappelling operations. It does **NOT** replace GSA publications, fire catalogs, or any other procurement document – *it is a list of approved products*. Inclusion in this list does not imply that the product is approved for use by the Federal government or is "legal" for purchase.

This list is only intended as a source of information on products that spotters/rappellers have found useful in the past. Some manufacturers do not sell directly to the federal agencies. Call the manufacturer to obtain information on:

- 1) Their policy regarding sales to the federal government and;
- 2) Names/locations of local distributors or retail outlets.

***RAPPEL ANCHORS***

USDA Forest Service  
Technology and Development Center  
Ft. Missoula, Bldg. #1  
Missoula, MT 59804  
(406) 329-3956

US DOI Office of Aircraft Services (OAS)  
3833 S. Development Avenue  
Boise ID 83705  
(208) 387-5775

***BOXES, FIRE PACK AND CHAIN SAW***

Longview Fibre Co.  
PO Box 19325  
Portland OR 97219

***DEVICES, RAPPEL***

California Mountain Co. (CMC)  
PO Box 6602 Santa Barbara CA 93160  
(800) 235-5741

Pigeon Mountain Industries, Inc. (PMI)  
PO Box 803  
Lafayette GA 30728  
(800) 282-ROPE

Descent Control, Inc.  
PO Box 6405  
Ft Smith AR 72901  
(501) 646-4382

Rescue Systems, Inc.  
Rt. 2, Box RSI  
Little Hocking OH 45742  
(800) 552-1133

Mountain Safety Research (MSR)  
1100 East Pike Street  
Seattle WA 98108

High Angle Associates  
6002 Calhoun Drive  
Fredericksburg, VA 22407  
(540) 786 2102

***FIRE RESISTANT CLOTHING, NOMEX***

GSA Wildfire Protection Equipment & Supplies  
GSA – Federal Supply Service  
General Products Center (7FX)  
819 Taylor Street  
Ft. Worth, TX 76102-6195

***GLOVES, HEATER-TYPE***

Sullivan Glove Co.  
100 SE Miller Avenue  
Bend OR 97701  
(541) 382-3092

Pigeon Mountain Industries, Inc. (PMI)  
PO Box 803  
Lafayette GA 30728  
(800) 282-ROPE

***HARNESSES***

California Mountain Co. (CMC)  
PO Box 6602 Santa Barbara CA 93160  
(800) 235-5741

Pigeon Mountain Industries, Inc. (PMI)  
PO Box 803  
Lafayette GA 30728  
(800) 282-ROPE

Forest Mountaineering Ltd.  
1517 Platte Street  
Denver CO 80202

Recreational Equipment, Inc. (REI)  
1525 11<sup>th</sup> Avenue  
Seattle WA 98122  
(800) 426-4840

Larakis Safety Harness, Inc.  
30 Greenough Place  
Newport RI 02840

Rescue Systems, Inc.  
Rt. 2, Box RSI  
Little Hocking OH 45742  
(800) 552-1133

High Angle Associates  
6002 Calhoun Drive  
Fredericksburg, VA 22407  
(540) 786-2102

***LET-DOWN LINE***

Recreational Equipment, Inc. (REI)  
1525 11<sup>th</sup> Avenue  
Seattle WA 98122  
(800) 426-4840

Pigeon Mountain Industries, Inc. (PMI)  
PO Box 803  
Lafayette GA 30728  
(800) 282-ROPE

High Angle Associates  
6002 Calhoun Drive  
Fredericksburg, VA 22407  
(540) 786-2102

***HELMETS, RAPPELLER***

California Mountain Co. (CMC)  
PO Box 6602 Santa Barbara CA 93160  
(800) 235-5141

Recreational Equipment, Inc. (REI)  
1525 11<sup>th</sup> Avenue  
Seattle WA 98122  
(800) 426-4840

Mountain Safety Research (MSR)  
1100 East Pike Street  
Seattle WA 98108

Rescue Systems, Inc  
Rt. 2, Box RSI  
Little Hocking OH 45742  
(800) 552-1133

Pigeon Mountain Industries, Inc. (PMI)  
PO Box 803  
Lafayette GA 30728  
(800) 282-ROPE

J.E. Weinel, Inc.  
PO Box 213  
Valencia PA 16059  
(800) 346-ROPE

***HELMETS, SPOTTER (AVIATOR)***

Gentex Corp.  
2824 Metropolitan Place  
Pomona CA 91767  
(714) 596-6512

Fire Cache  
National Interagency Fire Center  
3833 S. Development Avenue  
Boise ID 83705  
(208) 387-5104

***KNIFE, "JACK THE RIPPER"***

Para-Gear Equipment Co.  
3839 W. Oakton Street  
Skokie IL 60076  
(800) 323-0437

***STRAP, AVIS***

FMC Corp., Industrial Packaging Div.  
1617 J.F. Kennedy Blvd.  
PO Box 1949 Philadelphia PA 19105

Bob & Bob  
PO Box 441  
Lewisburg WV 24901  
(304) 772-5049

***ROPES***

High Angle Associates  
6002 Calhoun Drive  
Fredericksburg, VA 22407  
(540) 786-2102

Blue Water Ltd.  
PO Box 1465  
131 Lovvorn Road  
Carrollton GA 30117  
(404) 832-9694

Pigeon Mountain Industries, Inc. (PMI)  
PO Box 803  
Lafayette GA 30728  
(800) 282-ROPE

California Mountain Co. (CMC)  
PO Box 6602 Santa Barbara CA 93160  
Seattle WA 98122  
(800) 235-5141

Rescue Systems, Inc.  
Rt. 2, Box RSI  
Little Hocking OH 45742  
(800) 552-1133

Descent Control, Inc.  
PO Box 6405  
Ft Smith AR 72901  
(501) 646-4382

Wellington Puritan, Rhino Ropes  
PO Box 521  
Madison GA 30650  
(800) 221-5054

***DESCENT DEVICE***

Pigeon Mountain Industries, Inc. (PMI)  
PO Box 803  
Lafayette GA 30728  
(800) 282-ROPE

Mountain Safety Research (MSR)  
1100 East Pike Street  
Seattle WA 98108

California Mountain Co. (CMC)  
PO Box 6602 Santa Barbara CA 93160  
Seattle WA 98122  
(800) 235-5141

Descent Control, Inc  
PO Box 6405  
Ft Smith AR 72901  
(501) 646-4382

High Angle Associates  
6002 Calhoun Drive  
Fredericksburg, VA 22407  
(540) 786-2102

***HAND TACKING EQUIPMENT***

Para-Gear Equipment Co.  
3839 W. Oakton Street  
Skokie IL 60076-3438  
(708) 679-5905

Cutters Exchange  
627 19th Avenue  
PO Box 373  
Nashville, TN 37202  
(800) 251-2142  
(615) 329-4931

***VARIOUS EQUIPMENT: CARABINERS, GOGGLES, LET-DOWN LINE, BAGS –  
AND PERSONAL GEAR***

Most of this equipment can be procured from previously listed mountaineering or caving suppliers including CMC, Para-Gear, PMI and REI. Other firms that can be contacted include:

International Mountain Equipment, Inc.  
PO Box 494/Mainstreet  
North Conway NH 03860  
(603) 356-6316

Roco Rescue  
1945 Candlewood Avenue  
Baton Rouge LA 70816  
(800) 647-ROCO

KHS Sales  
7247 Oak Ridge Highway  
PO Box 7101  
Knoxville TN 37391  
(615) 690-6706

Seattle Manufacturing Corp. (SMC)  
12880 Northrup Way  
Bellevue WA 98005  
(206) 883-0334

Mountain Gear  
12 West Sprague  
Spokane WA 99204  
(509) 838-8040

High Angle Associates  
6002 Calhoun Drive  
Fredericksburg, VA 22407  
(540) 786-2102

***ORGANIZATIONS AND INFORMATION SOURCES***

American Society for Testing Materials (ASTM)  
1916 Race Street  
Philadelphia PA 19103  
(215) 299-5400

National Association for Search and Rescue (NASAR)  
PO Box 50178  
Washington DC 20004  
703) 352-1349

National Fire Protection Association  
Batterymarch Park  
Quincy MA 02269  
(617) 770-3000

National Speleological Society (NSS)  
Cave Avenue  
Huntsville AL 35810  
(205) 852-1300

USDA Forest Service  
Technology and Development Center  
Ft. Missoula, Bldg. #1  
Missoula, MT 59804  
(406) 329-3956 (Anchors)  
(406) 329-3967 (Equipment)  
(406) 329-3719 (Fax)

### ***REFERENCES***

1. California Mountain Co., Ltd. (CMC), Santa Barbara, CA. Product Catalog No. 6, p. 10.
2. Descent Control, Inc., Ft. Smith, AR.
3. German Alpine Club. Tests, off belay. February 1980. p. 19.
4. March, Bill. Modern rope techniques in mountaineering.
5. O'Campo, Leo. Characteristics of rope materials, Fire Engineering. March 1982. p. 27.
6. Padgett, Allen, and Bruce Smith. On rope, National Speleological Society, Huntsville, AL. 1987. pp. 23-28, 128, 317-332.
7. Para-Gear Equipment Co., Skokie, IL. Product Catalog No. 51, pp. 123, 159.
8. Pigeon Mountain Industries, Inc. (PMI), Lafayette, GA. Product Catalog No. 111, pp. 10, 19, 22.
9. Recreational Equipment, Inc. (REI), Seattle, WA. Product Catalog, p. 57.
10. Setnicka, Tim J. Wilderness search and rescue, Appalachian Mountain Club, Boston, MA. 1980. pp. 172, 181.

### ***RECOMMENDED READING***

In addition to Nos. 6 and 10 above:

11. Martin, Tom. Rappelling, Search, Mt. Sterling, KY.
12. The Parachute Manual, Para Publishing, P.O. Box 4232, Santa Barbara, CA

***MTDC DRAWING NUMBERS***

MTDC-946 Rappel Spotter Tether Attachment  
MTDC-958 Snub Strap  
MTDC-959 Klamath Cargo Container  
MTDC-974 Cargo Let Down Accordion Pack  
MTDC-977 Bell 407 Letdown Line Abrasion Guard  
MTDC-978 Bell 407 Snub Strap  
MTDC-980 Helicopter Rappel External Cargo Break Away Strap  
MTDC-982 Helicopter Rappel External Cargo Strap  
MTDC-983 Helicopter Rappel Cargo Let-Down Line  
MTDC-984 Bell Medium Gunner Strap  
Helicopter Tether Harness Model #9301 Dwg# B49001

November, 2001

**Appendix E**

COURSE: Aviation - Helicopter Training	INSTRUCTOR:
TITLE OF LESSON: Interagency Helirappel Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: I - Introduction	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS:	
OBJECTIVE(S):	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p><b>I. INTRODUCTION</b></p> <p><b>A. Definition</b>                      Helirappelling is the deployment of certified personnel from a hovering helicopter by means of an approved rope, a descent device, and ancillary equipment. Rappelling is comprised of a smooth, controlled, expeditious descent to the ground or other suitable fixed object.</p> <p><b>B. History</b></p> <ol style="list-style-type: none"> <li>1. Late 1950s - U.S. Military</li> <li>2. 1964, Bell 47 over Shasta Lake</li> <li>3. 1966, USDA with Bell 204 on Klamath NF, test program</li> <li>4. 1970, BLM in Alaska - Accident involving the Sky Slide</li> <li>5. 1972, B.C. Forests, Canada Utilization for initial attack on fire</li> <li>6. 1972, USDA at Redmond Air Center began test with Bell 205</li> <li>7. 1974, Bell 212 was introduced to the program</li> <li>8. 1982, Single turbine light helicopter introduced to the program by Yosemite NP.</li> </ol> <p><b>II. AUTHORITY</b></p> <ol style="list-style-type: none"> <li>A. Letter of Authorization</li> <li>B. Operating Authority</li> <li>C. Operating Plan</li> <li>D. Agency-Specific Policy, Fire Missions Only for FS</li> </ol> <p><b>III. PURPOSE AND USE OF INTERAGENCY HELICOPTER RAPPEL GUIDE (IHRG)</b></p> <ol style="list-style-type: none"> <li>A. Develop program standardization</li> </ol>	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>B. Procedures guide C. Reference and source list.</p> <p>IV. INTERAGENCY HELIRAPPEL STEERING COMMITTEE</p> <p>A. Review helirappel operations and practices</p> <ol style="list-style-type: none"> <li>1. Direction</li> <li>2. Interagency cooperation</li> <li>3. Establish operating procedures</li> <li>4. Training needs</li> <li>5. Equipment development</li> </ol> <p>B. Recommend actions</p> <ol style="list-style-type: none"> <li>1. Resolve problems</li> <li>2. Exchange ideas</li> <li>3. Disseminate information</li> <li>4. Technical input</li> <li>5. Training development</li> </ol> <p>V. UTILIZATION (AGENCY POLICY)</p> <p>A. Search and Rescue</p> <ol style="list-style-type: none"> <li>1. Hasty team placement</li> <li>2. Equipment deployment</li> <li>3. Victim evacuation</li> </ol> <p>B. Law Enforcement</p> <p>C. Fire</p> <ol style="list-style-type: none"> <li>1. Initial attack</li> <li>2. Helispot construction</li> <li>3. Hot-spot suppression</li> <li>4. Equipment deployment</li> <li>5. Rescue</li> </ol> <p>VI. QUALIFICATIONS Reference IHRG, Chapter 2</p> <p>VII. DOCUMENTATION Unit log of all helirappels.</p> <p>VIII. PROFICIENCY Refer to IHRG, Chapter 2.</p>	<p>Go to IHRG, pull out copies of rappeller, rope, and genie logs and demonstrate proper completion of forms.</p>

Rappeller Training

COURSE: Aviation - Helicopter Training	INSTRUCTOR:
TITLE OF LESSON: Interagency Helirappel Training	DATE:
TIME PERIOD (TOTAL): 3 Hours	PLACE:
TYPE OF LESSON: II - Equipment Orientation, Issue, & Fit	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: (1) Interagency Helicopter Rappel Guide for each trainee; (2) All articles of rappel equipment.	
OBJECTIVE(S): * Demonstrate proper use and care of equipment. * Development of equipment confidence.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. RAPPEL EQUIPMENT</p> <p>A. All equipment will be monitored, and life expectancy will be followed in order to maintain an adequate margin of safety. Agency-specific direction will be followed.</p> <p>B. Equipment approval is by letter of request through Bureau or Agency Manager to the Director.</p> <p>C. Local procedures shall be followed.</p> <p>D. Repairs are to be made only by check spotter.</p> <p>II. PERSONNEL PROTECTIVE EQUIPMENT</p> <p>A. Helmet</p> <ol style="list-style-type: none"> <li>1. Purpose</li> <li>2. Fit</li> <li>3. Inspection</li> </ol> <p>B. Fire Resistant Clothing</p> <ol style="list-style-type: none"> <li>1. Purpose</li> <li>2. Fit</li> <li>3. Inspection</li> </ol> <p>C. Leather Boots</p> <ol style="list-style-type: none"> <li>1. Purpose</li> <li>2. Fit</li> <li>3. Inspection</li> </ol> <p>D. Rappel Gloves</p>	<p>Demonstrate proper fit and care and use of all rappel equipment.</p>

Rappeller Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>1. Purpose - use only for rappelling.                  2. Fit                  3. Inspection</p> <p>E. Personal Gear Bag                  1. Purpose                  2. Fit                  3. Inspection</p> <p>F. Rappel and Spotter Harness                  1. Purpose                  2. Fit                  3. Inspection                  4. Care</p> <p>G. Descent Device                  1. Purpose                  2. Fit                  3. Inspection                  4. Care</p> <p>H. Rope                  1. Purpose                  2. Fit - Must integrate with descent device                  3. Inspection                  4. Care                  5. Avoid:                      a. Stepping on ropes                      b. Exposing to prolonged sunlight                      c. Dragging over rough surfaces                      d. Dragging on ground                      e. Allowing contact with chemicals                      f. Overload                      g. Placing near heat source</p> <p>I. Carabiners                  1. Purpose                  2. Fit                  3. Inspection                  4. Care</p> <p>J. Knife                  1. Purpose                  2. Fit                  3. Inspection                  4. Care</p> <p>K. Eye Protection                  1. Purpose</p>	<p>If applicable, demonstrate proper use of PGB</p> <p>Refer to IHRG and manufacturer's instruction manual and technical bulletin</p> <p>See IHRG for particular details on rope care. Refer to SDEDC Technical Bulletin on Ropes 5/25/90.</p> <p>Refer to IHRG on Carabiners. Also demonstrate use of snub-strap</p> <p>Refer to IHRG Section on knives</p> <p>Approved safety glasses or goggles</p>

Rappeller Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<ul style="list-style-type: none"> <li>2. Fit</li> <li>3. Inspection</li> <li>4. Care</li> </ul> <p>III. AIRCRAFT EQUIPMENT NOTE: Pilot should assist with this section.</p> <p>A. Rappel Anchor - Aircraft Specific</p> <ul style="list-style-type: none"> <li>1. FAA Supplemental-Type Certificate</li> <li>2. FAA 337 Certificates</li> <li>3. Aeronautical Accessories - Overhead anchors mounted above and outside the rear doors on the Bell 206 series of helicopters</li> <li>4. Contractor - Built/Installed/Certified</li> </ul>	<p>are required</p> <p>Only agency-approved rappels will be used. Rappel anchors are model-specific.</p>

Rappeller Training

COURSE: Aviation - Helicopter Training	INSTRUCTOR:
TITLE OF LESSON: Interagency Helirappel Training	DATE:
TIME PERIOD (TOTAL): 1 Hour	PLACE:
TYPE OF LESSON: III - Ground Training	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: Training ropes, suitable open area, personal rappel gear, descent control device.	
<p>OBJECTIVE(S):</p> <ul style="list-style-type: none"> <li>* Build rappeller confidence in equipment.</li> <li>* Demonstrate basic relationship between rappel equipment.</li> <li>* Develop individual proficiency in handling the descent device, rope, and lock-off procedures.</li> </ul>	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. EQUIPMENT OPERATIONS DEMONSTRATION</p> <ul style="list-style-type: none"> <li>A. Rope will attach to immovable object at waist-level.</li> <li>B. Descent device is attached to rope.</li> <li>C. Instructor will demonstrate hookup.</li> <li>D. Instructor will demonstrate "lock-off" configuration and will explain function and use of "lock-off."</li> <li>E. Demonstrate spotter checks.</li> <li>F. Lean backwards, testing the "lock-off."</li> <li>G. "Unlock" and demonstrate braking and controlled descent by walking backwards.</li> <li>H. Instructor will then start over and repeat process outlined in A-G, then demonstrate a lock-off to a tie-off using hand signals.</li> </ul> <p>II. FIELD PRACTICAL</p> <ul style="list-style-type: none"> <li>A. Instructor (and assistants) will now start individual trainee instruction on procedures and techniques just demonstrated.</li> <li>B. Follow the same sequence just demonstrated.</li> </ul>	<p>Assistants should set up ground area with proper equipment, i.e., ropes. Trainee group suited in complete rappel gear, (Nomex, harness, PGB, knife, helmet, gloves, descent control device) and assembled in suitable open area.</p> <p>The lock-off is a basic and important concept in the descent. The "lock-off" is used to prevent the rope from physically passing through the descent device, therefore making any downward travel impossible. The "lock-off" is used in the "pre-exit" phase of rappelling as well as in the emergency tie-off procedures that will be discussed later. Utilizing the "lock-off", the rappellers can safely stop and secure them self to the rope at any time during the descent.</p> <p>Stress that all PPE will be worn during training.</p> <p>Remember that we attain 100% proficiency before moving on to the next lesson.</p>

COURSE: Aviation - Helicopter Training	INSTRUCTOR:
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Rappeller Training

TITLE OF LESSON: Interagency Helirappel Training	DATE:
TIME PERIOD (TOTAL): 2 Hours	PLACE:
TYPE OF LESSON: IV - Ground Training - Elevated Platform	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: Training ropes, Low Tower Platform, Harnesses, Safety Strap, two instructors/spotters.	
<p>OBJECTIVE(S):</p> <ul style="list-style-type: none"> <li>* Demonstrate controlled descent.</li> <li>* Demonstrate lock-off and tie-off.</li> <li>* Make three consecutive descents without procedural error.</li> <li>* Build confidence in equipment and procedures.</li> </ul>	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. Instructor will demonstrate hand signals and procedures simulating the exit techniques required.</p> <p>A. Instructor will demonstrate low tower rappel.</p> <ol style="list-style-type: none"> <li>1. Hookup</li> <li>2. Equipment check "Thumbs Up."</li> <li>3. Move into position.</li> <li>4. Unlock.</li> <li>5. Exit platform and begin descent.</li> <li>6. Demonstrate a mid-rappel lock-off.</li> <li>7. Demonstrate emergency procedures and signals.</li> <li>8. Demonstrate proper landing and unhooking technique.               <ol style="list-style-type: none"> <li>a. <b><u>Slow before landing, assessing landing area before final ground contact.</u></b></li> <li>b. Take firm ground stance, squat, and pull slack in rope. No knee touching ground.</li> <li>c. Unhook from descent control device.</li> <li>d. Move away from simulator.</li> </ol> </li> </ol> <p>B. Trainee group will execute low tower rappel. See IHRG for minimum numbers of cycles.</p> <p>II. Instructor and assistants will now start individual trainee instructions on procedures and techniques just demonstrated.</p> <p>At local option, procedures can be duplicated using higher platform.</p>	<p>Assistants should set up low tower platform with proper equipment; i.e., ropes, carabiners, and safety strap(s).</p> <p>Refer to IHRG.</p> <p>Stress that at least one hand must be kept in a braking position throughout the rappel.</p> <p><b>Platform spotter and ground safety spotter will be assigned for each rope in use.</b></p> <p>Remember continual and repetitive training in these procedures is recommended to reach levels of confidence and proficiency. Spotters will emphasize exit procedures, movement when exiting skid, emergency procedures, "buddy checks," and hand signals.</p> <p>Remember that we will attain 100% proficiency before moving on to next section.</p>

Rappeller Training

COURSE: Aviation - Helicopter Training	INSTRUCTOR:
TITLE OF LESSON: Interagency Helirappel Training	DATE:
TIME PERIOD (TOTAL): 2 Hours	PLACE:
TYPE OF LESSON: V - Emergency Procedures	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS:	
OBJECTIVE(S): * Demonstrate and practice emergency procedures.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. AIRCRAFT</p> <p>A. Pilot's Procedures</p> <ol style="list-style-type: none"> <li>1. Mechanical problems                             <ol style="list-style-type: none"> <li>a. Hydraulic boost failure.</li> <li>b. Gradual oil pressure loss.</li> <li>c. Caution light.</li> <li>d. Power loss.</li> <li>e. Catastrophic failure.</li> </ol> </li> <li>2. Don't change the pilot's methods. Discuss emergency procedures. Pilots have formed habits which they will fall back on when things start happening, so we should adjust our procedures to fit their reactions.</li> </ol> <p>II. RAPPEL CYCLE</p> <p>A. Identify the problem:</p> <ul style="list-style-type: none"> <li>Rope entangled in helicopter</li> <li>Rappeller entangled in helicopter</li> <li>Rappeller hung-up on rope or in vegetation</li> <li>Rappeller oscillation</li> <li>Rope hung-up in vegetation</li> <li>Foreign material on rope</li> <li>Rope knotted or twisted</li> <li>Landing spot unsuitable</li> </ul> <p>B. Corrective procedures</p> <ol style="list-style-type: none"> <li>1. Lock-off                             <ol style="list-style-type: none"> <li>a. Stop the descent</li> <li>b. Hold rope tight in brake hand</li> <li>c. It helps to hold the descent control device steady with other hand.</li> </ol> </li> </ol>	<p>Remember risks exist and consequences are potentially <b>FATAL!</b> Everyone must understand this concept.</p> <p>HINT: The trick to locking-off is to use a dynamic move rather than stopping and trying to hold your weight while moving rope.</p>

Rappeller Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>d. Let brake hand move towards descent device</p> <p>e. When 8” away, smoothly draw the rope over the top of the descent control device</p> <p>f. Wedge it down between descent control device and standing line.</p> <p>g. A second wrap will secure it</p> <p>2. Tie-off</p> <p>a. Complete lock-off</p> <p>b. Pull or run loose end of rope beneath attach point on rappel harness until 4-6 feet of slack is obtained.</p> <p>c. Use this slack to tie a half hitch around the standing line above the descent control device.</p> <p>C. Signals to spotter. “Spread Eagle” - descent no longer possible, awaiting spotter instructions.</p> <p>D. Rappeller in distress. In the event a rappeller, while performing a rappel, is injured or unable to proceed, the following procedures shall be implemented.</p> <p>1. If the rope becomes lodged in the descent device and descent is impeded:</p> <p>a. Immediately institute a double lock-off</p> <p>b. Signal the spotter “SPREAD-EAGLE”</p> <p>c. If “CUT” signal is received, proceed with emergency tie off procedures.</p> <p>d. Pilot and spotter will institute a fly-away to a suitable landing area.</p> <p>2. If rappeller or rope drifts into a tree or other hazard:</p> <p>a. Immediate lock-off</p> <p>b. Attempt to disentangle them self or the rope</p> <p>c. If unable to free entanglement, spotter may elect to lower rappeller to the ground if practical. If this is not possible the cut signal will be given.</p> <p>3. Rappeller entangled on the helicopter:</p> <p>a. Correct within 30 seconds or</p> <ul style="list-style-type: none"> <li>- Rappeller re-enters helicopter.</li> <li>- Cut rope</li> <li>- Advise pilot “All Clear”</li> </ul>	<p>Practice cutting unloaded retired ropes.</p> <p>Spotter and Pilot may elect to lower rappeller to the ground while they remain locked off.</p> <p>ALL emergency procedures will be practice in training where a controlled environment can be maintained. Each trainee will be proficient in each procedure before advancing to helicopter rappels.</p>
COURSE: Aviation - Helicopter Training		INSTRUCTOR:
TITLE OF LESSON: Interagency Helirappel Training		DATE:
TIME PERIOD (TOTAL): 3 Hours		PLACE:

Rappeller Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
TYPE OF LESSON: V - Ground Training - High Tower/Helicopter Simulator		
CLASSROOM:	ASSISTANTS:	
TRAINING AIDS: Trailing Rope, High Tower Platform (min. 20' AGL) w/Simulator, Fully Equipped Rappeller/Trainees, Safety Strap, two instructors/spotters, and two ground safety spotters.		
<p>OBJECTIVE(S):</p> <ul style="list-style-type: none"> <li>* Proficiency in exit from simulator.</li> <li>* Demonstrate controlled descent.</li> <li>* Demonstrate lock-off and tie-off.</li> <li>* Make five consecutive rappels without procedural error including 3 demonstrating emergency procedures prior to helicopter mock-ups.</li> <li>* Demonstrate emergency procedures and hand signals.</li> </ul>		

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. HIGH TOWER/HELICOPTER SIMULATOR DEMONSTRATION</p> <p>A. Instructor will give an orientation/review on operational function of the high tower. Instructor should respond to any questions the trainees have.</p> <p>B. Instructor will have at least two training assistants conduct a mock-up simulation and demonstration rappel from the high tower. Demonstrate:</p> <ol style="list-style-type: none"> <li>1. "Buddy check"</li> <li>2. Rappel seating positions</li> <li>3. Seat belts</li> <li>4. Spotter equipment check</li> <li>5. Simulate in-flight and pre-exit procedures Remove seat belts using appropriate signals.</li> <li>6. Rope deployment</li> <li>7. Moving to door</li> <li>8. Position on skids</li> <li>9. "OK" to descend</li> <li>10. Unlock</li> <li>11. Exit from skid</li> <li>12. Descend             <ol style="list-style-type: none"> <li>a. Discuss speed of rappel                 <ol style="list-style-type: none"> <li>(1) Too fast - adverse effect on equipment, glazing of rope, etc.</li> <li>(2) Too slow - increased hover time.</li> </ol> </li> <li>b. Climatic conditions influencing rope speed</li> <li>c. Minimal braking and bouncing</li> <li>d. Maintain proper braking hand position</li> </ol> </li> <li>13. Landing             <ol style="list-style-type: none"> <li>a. <b>Reduce rate of descent for safety and</b></li> </ol> </li> </ol>	<p>Assistants should set up high tower platform with proper equipment, i.e., ropes, carabiners, and safety strap(s). Trainees suited in full rappel gear (Nomex, harness, PGB, knife, helmet, gloves, and descent device).</p> <p>Instructor will demonstrate the "thumbs up" signal delivered by each rappeller that indicates to the spotter that the rappeller has checked harness, carabiner, descent device, rope connection, and seat belt and that everything is operational.</p> <p>Be sure and give continued verbal description and instruction of what</p>

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p><b><u>clearing of landing area before making ground contact.</u></b></p> <ul style="list-style-type: none"> <li>b. Both feet firmly planted before assuming squat position while feeding to gain slack in rope.</li> <li>c. Unhooking procedure as fast smooth motion while standing up from squat.</li> <li>d. Clear rappel site.</li> </ul> <p>14. Review emergency procedures            15. Dropping rope            16. Clearing helicopter for forward flight.</p> <p>II. TRAINEE HIGH TOWER/SIMULATOR RAPPELS</p> <ul style="list-style-type: none"> <li>A. Instructor responds to questions concerning rappelling procedures, techniques, operations, and demonstrations that have been covered up to this point.</li> <li>B. Spotter will have trainees demonstrate emergency tie-off procedures at various intervals during the high tower training phase.</li> <li>C. Keep in mind that repetitious drilling is an effective tower training technique that improves and sharpens individual confidence and proficiency.</li> </ul> <p>III. FIELD PRACTICE</p> <ul style="list-style-type: none"> <li>A. Instructor (and assistants) will now start individual training instruction on procedures and techniques just demonstrated.</li> <li>B. Follow the same sequence as just demonstrated.</li> </ul>	<p>is occurring in the demonstration sequence.</p> <p>Model-specific directions for existing simulator must be followed.</p> <p>Be sure a ground spotter is in place to act as a rope tender.</p> <p>Remember that we will attain 100% proficiency before moving on to the next lesson.</p>

Rappeller Training

COURSE:	INSTRUCTOR:
TITLE OF LESSON: Interagency Helirappel Training	DATE:
TIME PERIOD (TOTAL): 3 Hours	PLACE:
TYPE OF LESSON: VI - Helicopter Mock-Up	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: Rappel-equipped Helicopter, Rappel-qualified Pilot	
OBJECTIVE(S):	
* Familiarize the trainee with the rappel equipment and procedures in the helicopter to be used.	
* Demonstrated ability to go through mock-up procedures without hesitation and/or error.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. INTRODUCTION</p> <p>Emphasis during the mock-up training is to learn proper positioning, loading techniques, in-flight responsibility, and proper off-load procedures during rappel sequence.</p> <p>II. CONFIGURE HELICOPTER</p> <p>A. Appropriate to helicopter type, rappel anchor installed and appropriate equipment on board.</p> <ol style="list-style-type: none"> <li>1. Cargo - have on board only those items essential to the mission.</li> <li>2. Cabin configuration - set up to rappel as directed by pilot and spotter.</li> <li>3. Anchor - installed correctly and secure.</li> <li>4. Rappel ropes - sufficient number to accomplish mission (extra maybe carried for operational missions).</li> <li>5. Safety snub strap - attached to ropes.</li> <li>6. Ropes - attached to rappel anchor with carabiners locked.</li> <li>7. Abrasion protection - in place.</li> <li>8. Let-down lines - sufficient aboard for mission and include braking device.</li> <li>9. Seat belts - secured and serviceable.</li> <li>10. Hard-point connections - are secured.</li> <li>11. Spotter's tether strap - is secured, attached to hard point, and adjusted to provide for sufficient movement.</li> <li>12. Maps and mission information - accessible and secure.</li> <li>13. Hand-held radio - accessible and secure.</li> <li>14. Communication check - radios are operational and frequencies are correct.</li> </ol>	<p>Pilot must be present in helicopter. This is to acquaint the pilot with the rappel sequence and get the group working as a team. Trainees must be fully suited up and equipped during mock-up training. This is the real thing without being airborne.</p> <p>Explain and demonstrate complete mock-up procedure using these items.</p> <p>Demonstrate pilot/spotter coordination and discussion of selection and approval of rappel site.</p> <p>AIRCRAFT SPECIFIC. See appendix B for this lesson.</p> <p>Remember that we will attain 100% proficiency before moving on to the next lesson.</p>

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>III. BUDDY CHECK</p> <p>A. Rappeller &lt;--&gt; Rappeller "Buddy Check"</p> <ol style="list-style-type: none"> <li>1. Helmet - chin strap attached; no loose ends; long hair tucked in and approved eye protection.</li> <li>2. Shirt or flight suit - tucked in; buttoned to top; flight suit (Nomex) completely zipped.</li> <li>3. Sleeves - (Nomex) down.</li> <li>4. Gloves - on; secure (sleeves over gloves and fastened).</li> <li>5. Harness - correctly fitted; loose straps secured; no twists.</li> <li>6. Buckles - secured and attached correctly.</li> <li>7. Descent device - properly attached.</li> <li>8. Forgecraft hook - gate function check.</li> <li>9. Knife - (w/lanyard) easily accessible; lanyard secured, out of way.</li> <li>10. Boots - leather, lace, tops covered by Nomex while sitting.</li> </ol> <p>B. Spotter &lt;--&gt; Rappeller</p> <ol style="list-style-type: none"> <li>1. Helmet - aviator's protective-type, properly fitted; avionics cord long enough to accommodate movement in cabin; chin strap secured; long hair tucked in.</li> <li>2. Shirt - tucked in; buttoned to top; flight suit (Nomex) completely zipped.</li> <li>3. Sleeves - (Nomex) down.</li> <li>4. Gloves - on; secure (sleeves over gloves and fastened).</li> <li>5. Harness - correctly fitted; loose straps secured; no twists.</li> <li>6. Buckles - secured and attached correctly.</li> <li>7. Safety strap - properly attached.</li> <li>8. Locking Carabiner - (for safety strap) locked.</li> <li>9. Knife - (w/lanyard) easily accessible; lanyard secured, out of way.</li> <li>10. Boots - leather, lace, tops covered by Nomex.</li> </ol> <p>IV. LOADING</p> <p>A. Helicopter-type specific (see Appendix B).</p> <p>V. SEATING</p> <ol style="list-style-type: none"> <li>A. Position - Helicopter-type specific.</li> <li>B. Safety belts - fastened; snugly tightened.</li> <li>C. Cargo placement             <ol style="list-style-type: none"> <li>1. System-specific</li> <li>2. Cargo deployment sequence                     <ol style="list-style-type: none"> <li>a. Before rappel</li> <li>b. After rappel</li> </ol> </li> </ol> </li> </ol>	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>VI. SYSTEMS CHECK</p> <p>A. Rappeller --&gt; System. Check conducted by buddy and spotter.</p> <ol style="list-style-type: none"> <li>1. Rigging               <ol style="list-style-type: none"> <li>a. Carabiner on rappel anchor.</li> <li>b. Rope connection.</li> </ol> </li> <li>2. Equipment               <ol style="list-style-type: none"> <li>a. Descent control device.</li> <li>b. Forgecraft hook.</li> <li>c. Harness</li> </ol> </li> <li>3. PPE               <ol style="list-style-type: none"> <li>a. Shirt</li> <li>b. Sleeves</li> <li>c. Gloves</li> <li>d. Trousers</li> </ol> </li> <li>4. Seat belt               <p>"Thumbs-up" as "OK" signal.</p> </li> </ol> <p>B. Spotter &lt;--&gt; Rappeller(s) system - "Check" conducted by rappellers.</p> <ol style="list-style-type: none"> <li>1. Rigging               <ol style="list-style-type: none"> <li>a. Carabiner on hard-point.</li> <li>b. Spotter tether connection.</li> </ol> </li> <li>2. Equipment               <ol style="list-style-type: none"> <li>a. Safety tether</li> <li>b. Carabiner.</li> <li>c. Harness.                   <ol style="list-style-type: none"> <li>(1) Full body</li> <li>(2) Connection points</li> </ol> </li> </ol> </li> <li>3. PPE</li> <li>4. Seat belt               <p>"Thumbs-up" as "OK" signal</p> </li> </ol> <p>VII. SIMULATED FLIGHT/APPROACH</p> <p>A. Determine rappel site.</p> <p>B. Rappellers' pay attention to spotter.</p> <p>C. Spotter Actions.</p> <ol style="list-style-type: none"> <li>1. Communication's with pilot.</li> <li>2. Discussion about site.</li> <li>3. Preparation of rappellers.</li> </ol> <p>D. Power check.</p> <ol style="list-style-type: none"> <li>1. High hover</li> <li>2. On-site.</li> <li>3. "OK."</li> </ol> <p>E. "Go Around"</p> <p>F. Short Final</p> <ol style="list-style-type: none"> <li>1. Pilot declares short final.</li> <li>2. Spotter initiates rappeller.               <ol style="list-style-type: none"> <li>a. UNBUCKLE</li> <li>b. Prepare to rappel.</li> </ol> </li> </ol>	

Rappeller Training

COURSE:	INSTRUCTOR:
TITLE OF LESSON: Interagency Helirappel Training	DATE:
TIME PERIOD (TOTAL): 3 Hours	PLACE:
TYPE OF LESSON: VI - Helicopter Mock-Up, cont.	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: Rappel-equipped Helicopter, Rappel-qualified Pilot	
OBJECTIVE(S):	
* Familiarize the trainee with the rappel equipment and procedures in the helicopter to be used.	
* Demonstrated ability to go through mock-up procedures without hesitation and/or error.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>VII. ESTABLISH HOVER</p> <p>A. Check power.</p> <p>B. Drop rope(s).</p> <ol style="list-style-type: none"> <li>1. Check for knots.</li> <li>2. Assure they reach the ground.</li> </ol> <p>C. Rappel sequence.</p> <ol style="list-style-type: none"> <li>1. Control rappel to minimize jerking motions and sudden stops.</li> <li>2. Prior to ground contact, check for undiscovered hazards (i.e., logs, loose rocks, etc.).</li> <li>3. Upon ground contact, squat while feeding to gain slack in rope.</li> <li>4. Disconnect from rope while standing up from squat.</li> <li>5. Clear rappel site.</li> <li>6. Spotter drops rope(s).</li> </ol> <p>D. Post-Rappel for Spotter</p> <ol style="list-style-type: none"> <li>1. Secure loose items in helicopter.</li> <li>2. "OK" for pilot to initiate forward flight.</li> <li>3. Fasten seat belt.</li> <li>4. Establish contact with rappellers (Ground Personnel), either by radio or ground panels.</li> <li>5. Area recon and report to ground personnel.</li> <li>6. Contact dispatch. <ol style="list-style-type: none"> <li>a. Establish flight following.</li> <li>b. Notify mission complete.</li> <li>c. Other requests.</li> <li>d. Information on other aircraft in the area.</li> </ol> </li> </ol> <p>IX. SIMULATE RETURN TO BASE</p> <p>A. Inspect remaining equipment</p> <p>B. Set-up helicopter.</p> <p>C. Documentation of mission.</p>	

Rappeller Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>X. CRITIQUE</p> <ul style="list-style-type: none"><li>A. Spotter and pilot.</li><li>B. Rappeller and Spotter.</li></ul> <p>XI. FIELD PRACTICE</p> <ul style="list-style-type: none"><li>A. Instructor (and assistants) will now start individual trainee instruction on procedures and techniques just demonstrated.</li><li>B. Follow the same sequence as just demonstrated.</li></ul>	



TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>A. Loading</p> <ol style="list-style-type: none"> <li>1. Helicopter-type specific. See Appendix B.</li> <li>2. Seating               <ol style="list-style-type: none"> <li>a. Position - helicopter-type specific.</li> <li>b. Safety belts                   <ol style="list-style-type: none"> <li>(1) Fastened</li> <li>(2) Snuggly tightened</li> </ol> </li> </ol> </li> <li>3. Cargo placement - system specific.</li> </ol> <p>B. Systems check</p> <ol style="list-style-type: none"> <li>1. Rappeller --&gt; System - "check" conducted by buddy or spotter.                "Thumbs-up" as "OK" signal.               <ol style="list-style-type: none"> <li>a. Rigging                   <ol style="list-style-type: none"> <li>(1) Carabiner on rappel anchor.</li> <li>(2) Rope connection.</li> </ol> </li> <li>b. Equipment                   <ol style="list-style-type: none"> <li>(1) Descent control device</li> <li>(2) Forgecraft hook</li> <li>(3) Harness</li> <li>(4) Knife</li> </ol> </li> <li>c. PPE                   <ol style="list-style-type: none"> <li>(1) Collar</li> <li>(2) Sleeves</li> <li>(3) Gloves</li> <li>(4) Legs</li> </ol> </li> <li>d. Seat belt</li> </ol> </li> <li>2. Spotter &lt;--&gt; Rappeller(s) system. "Check" conducted by rappellers.                "Thumbs-up" as "OK" signal.               <ol style="list-style-type: none"> <li>a. Rigging                   <ol style="list-style-type: none"> <li>(1) Carabiner on hard-point.</li> <li>(2) Spotter tether connection.</li> </ol> </li> <li>b. Equipment                   <ol style="list-style-type: none"> <li>(1) Safety strap</li> <li>(2) Carabiner</li> <li>(3) Harness                       <ol style="list-style-type: none"> <li>(a) Full body</li> <li>(b) Connection points</li> </ol> </li> <li>(4) Knife</li> </ol> </li> <li>c. PPE                   <ol style="list-style-type: none"> <li>(1) Collar</li> <li>(2) Sleeves</li> <li>(3) Gloves</li> <li>(4) Legs</li> </ol> </li> <li>d. Seat belt</li> <li>e. Extra rappel/cargo equipment</li> </ol> </li> </ol>	<p>Rappeller Quals, Chapter 2.</p>

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>C. Flight/Approach</p> <ol style="list-style-type: none"> <li>1. Designate alternate rappel site.</li> <li>2. Rappellers attention to spotter. Remember the spotter gives the commands, so watch what they are doing.</li> <li>3. Spotter actions.</li> </ol> <p>a. Communication's with pilot</p> <ol style="list-style-type: none"> <li>b. Discussion about site</li> <li>c. Preparation of rappellers</li> </ol> <ol style="list-style-type: none"> <li>4. Power check.             <ol style="list-style-type: none"> <li>a. On site</li> <li>b. "OK"</li> <li>c. "GO AROUND"</li> </ol> </li> <li>5. Short final.             <ol style="list-style-type: none"> <li>a. Pilot declaration</li> <li>b. Spotter initiates rappeller.                 <ol style="list-style-type: none"> <li>(1) UNBUCKLE</li> <li>(2) Prepare to rappel.</li> </ol> </li> </ol> </li> </ol> <p>D. Establish hover.</p> <ol style="list-style-type: none"> <li>1. Check power.</li> <li>2. Drop rope(s).             <ol style="list-style-type: none"> <li>a. Check for knots</li> <li>b. Assure they reach the ground</li> </ol> </li> <li>3. Rappel sequence.</li> </ol> <p>AIRCRAFT SPECIFIC</p> <ol style="list-style-type: none"> <li>a. Control rappel to minimize jerking motions and sudden stops.</li> <li>b. Prior to ground contact check for undiscovered hazards (i.e., logs, loose rocks, etc.). <b><u>Slow before landing, assess landing area before final ground contact.</u></b></li> <li>c. Upon ground contact, squat while feeding slack in rope.</li> <li>d. Disconnect from rope while standing from squat.</li> <li>e. Clear rappel site.</li> <li>f. Additional rappellers descent (helicopter and procedure dependent).</li> </ol> <ol style="list-style-type: none"> <li>4. Spotter drops rope.</li> <li>5. Post-Rappel.             <ol style="list-style-type: none"> <li>a. Rappeller(s)                 <ol style="list-style-type: none"> <li>(1) Equipment packaging                     <ol style="list-style-type: none"> <li>(a) Rope inspection</li> <li>(b) Package rope</li> <li>(c) Package rappel gear</li> </ol> </li> </ol> </li> <li>b. Spotter                 <ol style="list-style-type: none"> <li>(1) Secure loose items in helicopter.</li> <li>(2) "OK" for pilot to initiate forward flight.</li> </ol> </li> </ol> </li> </ol>	<p>Rappellers should be exposed in practice sequences of rappel/cargo deployment. Deployment of cargo may be at either the beginning or at the end of the rappel sequence.</p> <p>The ground observer must critique each rappeller as soon as they get their rope and equipment packaged. Cover each point on the checklist.</p>

Rappeller Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<ul style="list-style-type: none"> <li>(3) Fasten seat belt.</li> <li>(4) Establish contact with rappellers (ground personnel), either by radio or ground panels.</li> <li>(5) Area recon and report to ground personnel.</li> <li>(6) Contact flight following entity.                             <ul style="list-style-type: none"> <li>(a) Notify mission complete</li> </ul> </li> <li>6. Return to staging area.                             <ul style="list-style-type: none"> <li>a. Inspect remaining equipment.</li> <li>b. Set-up helicopter.</li> <li>c. Documentation of mission.</li> </ul> </li> <li>7. Critique                             <ul style="list-style-type: none"> <li>a. Rappeller and ground spotter.</li> </ul> </li> </ul> <p>REMEMBER! - DO IT UNTIL IT'S RIGHT!</p>	

Rappeller Training

COURSE: Aviation - Helicopter Training	INSTRUCTOR:
TITLE OF LESSON: Interagency Helirappel Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: VIII - Cargo Delivery	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS:	
<p>OBJECTIVE(S):</p> <p>* Trainee will be able to exit hovering helicopter safely and efficiently.</p> <p>* When exposed to different rappel problems or terrain, is able to complete rappel or corrective procedure without hesitation or error.</p>	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. APPLICATIONS</p> <p>A. Fire</p> <p>B. Projects</p> <p>II. LIMITATIONS</p> <p>A. Size</p> <ol style="list-style-type: none"> <li>1. Weight                             <ol style="list-style-type: none"> <li>a. Unit specific</li> <li>b. Recommend 70-100 pounds</li> </ol> </li> <li>2. Dimensions - helicopter-specific</li> </ol> <p>B. Methods</p> <ol style="list-style-type: none"> <li>1. Let-down</li> <li>2. Belly-hook method</li> </ol> <p>C. Types of cargo</p> <ol style="list-style-type: none"> <li>1. Hazardous materials</li> <li>2. Survivability</li> </ol> <p>III. PACKAGING</p> <p>A. Concept</p> <ol style="list-style-type: none"> <li>1. Compact as possible</li> <li>2. As securely as possible</li> <li>3. No damage upon delivery</li> </ol> <p>B. Containers</p> <ol style="list-style-type: none"> <li>1. Air boxes</li> <li>2. Double boxes with compression padding</li> <li>3. Cushion bottom boxes</li> <li>4. Soft packs</li> </ol>	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>5. Equipment only! NO PACKAGING!</p> <p>IV. EQUIPMENT</p> <ul style="list-style-type: none"> <li>A. Let-down lines</li> <li>B. Braking device</li> <li>C. Carabiners</li> <li>D. Knife</li> <li>E. Line bags</li> <li>F. Equipment bag</li> <li>G. Helicopter anchor point</li> </ul> <p>V. SEQUENCING</p> <ul style="list-style-type: none"> <li>A. Cargo only</li> <li>B. Pre-rappel</li> <li>C. Post-rappel</li> </ul> <p>VII. OPERATING PROCEDURES</p> <ul style="list-style-type: none"> <li>A. Pre-flight briefing</li> <li>B. Pre-flight inspection                             <ul style="list-style-type: none"> <li>1. Spotter's equipment</li> <li>2. Helicopter equipment</li> <li>3. Deployment equipment</li> </ul> </li> <li>C. In-flight duties</li> <li>D. Deployment</li> <li>E. Administrative</li> </ul> <p>VIII. EMERGENCY PROCEDURES</p> <ul style="list-style-type: none"> <li>A. Problems                             <ul style="list-style-type: none"> <li>1. Helicopter                                     <ul style="list-style-type: none"> <li>a. Control</li> <li>b. Precautionary</li> <li>c. Power loss</li> <li>d. Catastrophic failure</li> </ul> </li> <li>2. Deployment                                     <ul style="list-style-type: none"> <li>a. In or immediate to helicopter</li> <li>b. During descent</li> </ul> </li> </ul> </li> <li>B. Corrective actions                             <ul style="list-style-type: none"> <li>1. Lock-off</li> <li>2. Fly-away</li> </ul> </li> </ul>	

November, 2001

### Appendix F

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: Outline	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS:	
OBJECTIVE(S): * To provide a standard lesson plan for spotter training. This lesson plan is in outline form.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. INTRODUCTION</p> <p style="padding-left: 40px;">Individual experiences must be used by spotter instructor during the training.</p> <p>II. EQUIPMENT</p> <p>III. GROUND/ELEVATED PLATFORM TRAINING</p> <p style="padding-left: 20px;">A. Ground</p> <p style="padding-left: 20px;">B. Tower</p> <p style="padding-left: 40px;">1. Low</p> <p style="padding-left: 40px;">2. High (Simulator)</p> <p style="padding-left: 20px;">C. Mock-up (Configuration)</p> <p>IV. EMERGENCY PROCEDURES - SAFETY</p> <p>V. HELICOPTER RAPPELS</p> <p>VI. CARGO LETDOWN</p> <p>VII. COMMUNICATIONS - BRIEFINGS</p> <p>VIII. HAZARDS - CAPABILITIES AND LIMITATIONS</p> <p>IX. DOCUMENTATION/ADMINISTRATION</p> <p>X. POLICY AND PROCEDURES - LOCAL/CO-OP</p> <p style="padding-left: 40px;">Rappel Decision?</p>	

Spotter Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	Stick to Training	

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: I - Introduction	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: Interagency Helicopter Rappel Guide	
OBJECTIVE(S): * To introduce spotter trainees to the goals and prerequisites of this training.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p><b>I. INTRODUCTION</b></p> <p>The success of a safe rappel mission is based on the knowledge and skills of the spotter. The spotter ensures that rappel operations will be in compliance with approved Interagency Guidelines (see IHRG). Emphasis is placed on safety as being the #1 priority in all rappel missions.</p> <p>The course is performance-based, hands-on training. The trainee must pass each section at the 100% level. No deviations or variations of equipment, rappel techniques, or procedures used will be allowed without advance appropriate agency approval.</p> <p>All rappel procedures must be followed as outlined in the Interagency Helicopter Rappel Guide (IHRG). Numerous references throughout this lesson plan are made to IHRG. A copy of the IHRG must be used in conjunction with this training.</p> <p><b>OBJECTIVES:</b></p> <ul style="list-style-type: none"> <li>A. To provide necessary knowledge and skills to spotter trainees.</li> <li>B. To perform independently as fully-qualified heli-rappel spotters.</li> <li>C. Ensure standardization on a national interagency level of spotter training in all functional areas.</li> </ul> <p><b>PREREQUISITES:</b></p>	

Spotter Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<ul style="list-style-type: none"> <li>* Four (4) operational rappels: helispot, fire, etc.</li> <li>* At least twenty (20) live helicopter rappels.</li> <li>* Must assist instruction of basic rappel training as outlined in IHRG.</li> <li>* Additional requirements for fire program spotters: Meet the requirements for fire helicopter managers as stated in IHOG.</li> </ul> <p>At each new base, an instructor must be utilized or assigned to instruct and certify new spotters, assuring the spotter has demonstrated ability to rig helicopter; conduct rappels and cargo letdown to the satisfaction of the instructor; and meets requirements of IHRG.</p>	

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: II - Equipment	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: All necessary rappel equipment to be demonstrated.	
OBJECTIVE(S): * To ensure trainee is familiar with use and care of spotter related equipment, including rappel equipment, anchor, and spotter safety.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p><b>I. EQUIPMENT</b></p> <p>All equipment will be monitored, and life expectancy limitations will be followed in order to maintain an adequate margin of safety. If integrity of any piece of equipment is suspected of being compromised, it shall be immediately retired for service.</p> <p>Logbooks must be kept up-to-date for all pieces of equipment requiring service history documentation. The spotter is responsible for ensuring that all logbooks are maintained.</p> <p>Equipment:</p> <ul style="list-style-type: none"> <li>* PPE appropriate for helicopter missions</li> <li>* Nomex (registered trademark of DuPont)</li> <li>* Safety snub straps</li> <li>* Rappel anchor and carabiners</li> <li>* Flight gloves and heater gloves</li> <li>* Spotter harness/rappel harness</li> <li>* SPH-4/5 helmet with foam microphone cover</li> <li>* Motorcycle helmet</li> <li>* Spotter tether</li> <li>* Figure "8" with ears and letdown equipment</li> <li>* Rappel knife</li> <li>* Ropes, sky genie, rope bags</li> <li>* Eye protection</li> </ul> <p>Rappeller Equipment: Even though the rappeller has responsibility for daily inspections, the spotter is ultimately responsible for monitoring the use and care of the equipment. All equipment requirements and standards can be found in IHRG, Chapter 3.</p>	<p>Instructor must demonstrate each piece of equipment to trainee, emphasizing spotter equipment.</p>

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: III - Ground/Elevated Platform Training	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: All rappel equipment, tower, and simulator.	
OBJECTIVE(S): * To ensure the trainee attains advanced skill level sufficient to instruct and spot new rappellers. Also, to ensure trainee is completely knowledgeable of all rappel and spotter equipment.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. TRAINING</p> <p>Becoming proficient in training new rappellers is essential for a new spotter. It reinforces what the spotter has learned and it creates trust and rapport with the rappellers (rappel training must be accomplished with a qualified spotter as lead instructor).</p> <p>The ground training is divided into three parts:</p> <p>A. Equipment Operations and Demonstrations</p> <p>B. Elevated Platform/Low Tower (fixed rope descents)</p> <p>C. High Tower/with Simulator Rappels from simulator must include complete rappel sequence.</p> <p>A. Equipment Operations and Demonstrations</p> <p>Refer to Rappel Lesson Plan.</p> <p>All equipment must be demonstrated and properly fitted. Instructor must cover limitations and proper use of equipment.</p> <p>The Buddy Check must be accomplished at this time in accordance with IHRG and emphasis must be made that this check is performed the same way <u>every time</u>.</p> <p>Proper hand signals must be demonstrated by the instructor.</p> <p>Instructor shall ensure that trainee transitions from</p>	<p>Must attain 100% proficiency before moving to the next lesson.</p> <p><b>See IHRG for specific numbers of cycles for items A-C.</b></p> <p>Must attain 100% proficiency before moving to the next lesson.</p>

Spotter Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>thinking about personal rappel equipment to total system management.</p> <p>B. Elevated Platform/Low Tower</p> <p>Instructor must demonstrate proper spotting techniques. Trainee must spot a number of fixed rope descents from low tower and high tower, including one lock-off and one tie-off with proper hand signals, as determined by instructor.</p>	<p>Must attain 100% proficiency before moving to the next lesson.</p>

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: IV - Emergency Procedures	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS:	
OBJECTIVE(S): * To ensure trainee has comprehensive knowledge of possible emergency situations and demonstrates ability to take corrective action.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p><b>I. EMERGENCY PROCEDURES</b></p> <p>Intensive emergency procedure training by the instructor will be accomplished in order to effectively deal with any potential situation which may occur.</p> <p>Emergency procedures must be discussed by the instructor throughout the training process, including ground, tower, and simulator sessions, in the mock-up, and in live practice rappels.</p> <p>The emergencies are divided into three categories:</p> <p>A. Helicopter Related B. Rappeller C. Environmental</p> <p>A. Helicopter Related 1. Mechanical - Helicopter problems 2. Human - Pilot error</p> <p>Comprehensive pre-flight briefings will occur between all mission personnel during initial training and pre-rappel briefings. Briefings will cover helicopter-related emergencies and possible remedies.</p> <p>Ensure primary and relief pilots also take part in briefings.</p> <p>Refer to IHRG and Rappel Lesson Plan.</p> <p><b>B. Rappeller/Spotter</b></p>	<p>Must attain 100% proficiency before moving to the next lesson.</p> <p>Practice cutting retired loaded ropes and letdown lines.</p>

Spotter Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>Comprehensive pre-flight briefings and effective communications between pilot, spotter, and rappellers are required. Instructor will re-emphasize procedures and corrective actions as outlined in the IHRG. Possible emergencies and corrective actions must be covered by the instructor. It is then the trainee's responsibility to demonstrate proficiency and awareness of emergencies and corrective actions.</p> <p>C. Environmental Hazards - See Chapter VII</p> <p>Environmental hazards may lead to emergency situations.</p>	

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: V - Helicopter Rappels	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: Carded helicopter and rappel-qualified pilot.	
OBJECTIVE(S): * Trainee will demonstrate ability to configure helicopter for rappel and to safely conduct rappel sequence without hesitation or error.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. HELICOPTER RAPPELS</p> <p>Trainee must display complete competence in all previous phases of training before beginning live rappels.</p> <p>Refer to Chapter VII for proper in-flight communications.</p> <p>A. Mock-Ups</p> <p>Trainee proficiency and cabin management will be demonstrated at this stage and in all phases of training and operations. Proper storage and configuration of equipment must be repeated by trainee.</p> <p>A minimum of eight (8) rappel cycles will be spotted by the trainee without procedural error in the mock-up phase.</p> <p>B. Live Rappels</p> <p>Trainee must spot 10 complete cycles without procedural error, and must be with cargo.</p> <p>Communications between spotter trainee and pilot must be maintained during this sequence and checked by instructor.</p> <p>It is recommended that each trainee go through at least one (1) simulated aborted mission. Instructor will discuss procedure prior to mock-ups.</p>	<p>Must attain 100% proficiency before moving to the next lesson.</p> <p><b><u>All instruction will be conducted by a qualified spotter.</u></b></p> <p><b>See IHRG for specific numbers of cycles for items A-C.</b></p>

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: VI - Cargo Letdown	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS:	
OBJECTIVE(S): * To have trainee demonstrate proficiency in all phases of cargo letdown that are specific to that base.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. CARGO DELIVERY</p> <p>Trainee must demonstrate proficiency in all aspects of cargo letdown specific to make and model being used.</p> <ul style="list-style-type: none"> <li>* Coordinate cargo deployment with pilot</li> <li>* Ability to configure all equipment and helicopter for the successful completion of a mission</li> <li>* Demonstrate acceptable packaging techniques for various letdown items</li> </ul> <p>NOTE: This chapter of the lesson plan is intended as part of overall spotter training. In order to train a non-rappeller for cargo letdown, refer to IHRG Appendix C.</p>	<p>Instructor must use IHRG Appendix C.</p> <p>Must attain 100% proficiency before moving to the next lesson.</p>

See "Model Specific Procedures - Cargo Letdown" and Lesson Plan in IHRG for Cargo Letdown.

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: VII - Communications	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: Simulated dispatch participation.	
OBJECTIVE(S): * To provide guidelines for effective communications between pilot, spotter, and rappellers.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. COMMUNICATIONS</p> <p>A. Briefings Pre- and post-mission between pilot, rappellers, and spotter.</p> <p>B. Operational Communications</p> <ol style="list-style-type: none"> <li>1. Verbal: Use clear, concise, and standard terminology.               <ol style="list-style-type: none"> <li>a. Directional: "my side," "your side," "back," "forward," "up," and "down."</li> <li>b. Power checks and stability: "Power check."</li> </ol> </li> <li>2. Non-verbal: Hand signals - refer to IHRG and Rappel Lesson Plan.</li> <li>3. As examples:               <ul style="list-style-type: none"> <li>"Dropping rope bags"</li> <li>"Ropes on ground"</li> <li>"Rappellers to skids"</li> <li>"Sending rappellers"</li> <li>"Half-way down"</li> <li>"Rappellers on ground"</li> <li>"Rappellers clear"</li> <li>"Dropping ropes"</li> <li>"Clear to fly"</li> </ul> </li> </ol> <p>Proper use of hand signals is a must at this stage of training.</p> <p>Also, see examples in the Rappel Lesson Plan.</p> <p>Specific terminology can be dependent on make and model, to be finalized by spotter and pilot.</p>	

Spotter Training

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	C. Dispatch Communications  Notify dispatch before beginning and after completing rappel operations.	

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: VIII - Hazards	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS:	
OBJECTIVE(S): * To make trainee aware of potential hazards experienced by other spotters and to demonstrate remedies.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p><b>I. HAZARDS</b></p> <p>Pilot is ultimately responsible for making determinations for continuing or aborting missions based on changing conditions. Conditions must be acceptable to both pilot and spotter. Spotter can abort the mission if unsafe conditions exist. Sound judgment must be used.</p> <p>Exercise risk management at all times</p> <p>A. Weather factors</p> <ul style="list-style-type: none"> <li>* Terrain-affected winds</li> <li>* Thunderstorms</li> <li>* Visibility decrease</li> <li>* Snowstorms (SAR)</li> </ul> <p>B. Fire Behavior</p> <ul style="list-style-type: none"> <li>* Changing behavior due to weather</li> </ul> <p>C. Equipment Malfunction</p> <p>D. Troubleshooting</p> <p>E. Darkness or shadows decrease spotter's ability to see rappellers on ground due to terrain, height and density of canopy, or time of day</p> <p>F. Rappeller's ability to exit area safely.</p> <p>Mission Limitations: altitude, temperature, winds, payload, CG, fuel load, daylight, pilot hours, crew and pilot abilities.</p>	

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: IX - Documentation/Administration	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS: Appropriate forms packet and log books.	
OBJECTIVE(S): * To orient trainee in proper logbook and forms documentation.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. DOCUMENTATION/ADMINISTRATION</p> <p>As noted earlier, all documentation in the form of equipment and personnel logbooks must be updated and thorough. Instructor should stress the importance of this to the trainee.</p> <p>Refer to IHRG and Rappel Lesson Plan.</p>	

Spotter Training

COURSE: Interagency Helirappel Training	INSTRUCTOR:
TITLE OF LESSON: Spotter Training	DATE:
TIME PERIOD (TOTAL):	PLACE:
TYPE OF LESSON: X - Policy and Procedures	
CLASSROOM:	ASSISTANTS:
TRAINING AIDS:	
OBJECTIVE(S): * To discuss site- and agency-specific operating plans. To establish program direction at each base for spotter to follow.	

TIME	LESSON OUTLINE	KEY POINTS & AID CUES
	<p>I. POLICY AND PROCEDURES</p> <p>A written base heli-rappel operating plan must be completed and approved at the appropriate administrative level. This plan can include such items:</p> <ul style="list-style-type: none"> <li>* Rappel decision-making criteria</li> <li>* Spotter checklist</li> <li>* Model specific procedure for rappel and cargo let-down</li> <li>* Base specific procedures</li> <li>* Rappel accident action plan</li> <li>* Fitness standards and requirements</li> <li>* Large incidents and assignments</li> <li>* Search and rescue/medivac</li> <li>* Dispatch procedures/get-away time</li> <li>* Off-Forest/District rappel procedures</li> <li>* Standard Initial Attack loads</li> <li>* Booster rappeller plan</li> <li>* Proficiency and training schedule</li> <li>* Coordination with cooperating agencies</li> </ul> <p>NOTE: Instructor will stress that it is imperative to fully comply with standard set forth in this training guide and the Interagency Helicopter Rappel Guide. Any deviations must be approved by appropriate line authority.</p>	