Interagency Helicopter Rappel Guide

2011

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The Interagency Helicopter Rappel Subcommittee (IHRSC) has developed this information for the guidance of its member agencies and is not responsible for the interpretation or use of this information by anyone except the member agencies.

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Helicopter Rappel Mission Statement

The Interagency Helicopter Rappel Program embodies a highly specialized, safe rapid method of aerial delivery of personnel and cargo in areas with limited landing sites.

The primary mission of the Interagency Helicopter Rappel Program is the safe and efficient aerial delivery of firefighters and cargo in support of local, regional, and national firefighting efforts, when appropriate.

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National Interagency Aviation Committee
NIAC

MEMORANDUM

To: Users of the Interagency Helicopter Rappel Guide (IHRG)

From: NIAC Chair

Date: May 26, 2011

Re: Approval for publication of the 2011 IHRG

The Interagency Helicopter Rappel Unit (formally the Rappel Working Group) has revised the IHRG. The Interagency Helicopter Operations Subcommittee has endorsed this document and recommended it to NIAC for approval.

This memo serves as the NIAC approval of and authority to publish the submitted 2011 edition of the Interagency Helicopter Rappel Guide.

The IHRG will be maintained and updated as a Web-based document. Published hardcopies will not be available.

The 2011 IHRG is available online at: http://www.nifc.gov/aviation/av_reference.html

The Interagency Helicopter Rappel Guide constitutes operational policy for those federal and state agencies who have formally adopted it as such. All changes contained in the new guide are effective at this time.

The IHRG will be reviewed at a minimum of every three years and revisions will be made as warranted. With the issuance of this memo, The Interagency Helicopter Rappel Unit has the authority to update the IHRG, with the concurrence of the Interagency Helicopter Operations Subcommittee, as needed in matters relating to equipment and procedural issues. All other changes require NIAC approval.

Any questions regarding this approval can be directed to me.

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1 INTRODUCTION

1.1 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.

1.2 Objectives

The objective of the IHRG is to establish standardization of equipment, procedures and training 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 specific helicopter type.

1.3 Policies

Operations and procedures shall comply with agency aviation policy, procurement documents, Interagency Helicopter Rappel Guide, and user-specific Operations Plans.

Agencies having specific missions with technical requirements which cannot be met by this guide should provide a risk analysis and operations plan demonstrating need to utilize other methods or equipment. The plan shall be approved by the individual agency. All equipment and procedures will become the responsibility of that agency.

NOTE: If an agency chooses to incorporate the IHRG as policy within the agency's directive system, it is essential that the user understand the use of language in the IHRG regarding mandatory or optional compliance. The use of verbs "must," "will" and "shall" conveys required compliance, the use of "ought" and "should" conveys required compliance except for documented and justifiable reasons; and use of "may" and "can" conveys optional compliance.

1.4 Risk Management

All flight operations have a certain inherent degree of risk associated with them. Training and the judicious use of available resources, including helicopters, can help reduce the degree of risk associated with a particular mission. Risk assessment and the fact that it must be an on-going process during an operation is vitally important to a rappel program. Risk assessment is the subjective analysis of physical hazards and operational procedures used to arrive at a GO/NO-GO decision.

1.5 Responsibility

An Interagency Helicopter Rappel Subcommittee (IHRSC) has been established; its members include management representatives and specialists presently involved in the rappel program. The responsibility of the Subcommittee is to exchange ideas and techniques with all involved throughout the program. Any revisions to the IHRG shall be addressed to the IHRSC. The IHRSC shall maintain and approve operational procedures and equipment for this guide. The Interagency Helicopter Rappel Guide will be revised every two years or more frequently if necessary.

1.6 Utilization

1.6.1 Missions

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

1.6.2 Response

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 terrain conditions which typically limit other access.

2 RAPPEL QUALIFICATION

NOTE: **The certifying official at each level may require additional training of pilot, rappeller, spotter, or check spotter.**

2.1 Pilot

A. Meets the appropriate requirements of the contracting document.

B. Is qualified and approved by an Interagency Helicopter Inspector Pilot for Long Line.

C. Qualified Spotter will brief, demonstrate, train, and familiarize the pilot on rappel operations and equipment.

D. Pilot will attend mock-up training. (Ground simulation of rappel operations utilizing aircraft).

E. Final approval for rappel operations will be based upon:

1 Completion of spotter provided briefing and training.

2 Demonstrate the ability to maintain a stable hover without using vertical reference during a series of simulated rappels and cargo letdown operations.

3 Demonstrate the ability to coordinate with rappel spotter.

4 Demonstrates knowledge of rappel emergency procedures during emergency procedures simulation and aircraft emergency procedures effect on rappel operations.

5 Demonstrates the ability to perform Weight and Balance computations (including Center of Gravity) for rappel configuration.

F. Upon meeting all of the above requirements, the pilot may be approved by a qualified agency Helicopter Inspector Pilot for rappel or cargo let down.

G. Proficiency: Each pilot must fly at least one error-free helicopter rappel sequence within the preceding 14 days. If proficiency is lost, an error-free mockup and helicopter rappel sequence flight must be completed prior to any operational rappel. If two proficiency rappel periods pass (28 days), the spotter with the concurrence of the Helicopter Inspector Pilot will insure the pilot is capable of deploying rappellers through the use of mockups and proficiency rappel flights. It shall be the responsibility of the local program manager to ensure proficiency requirements are met and properly documented on a unit log or equivalent.

2.2 Rappel Check Spotter

NOTE: **Check spotters may suspend spotter or rappeller qualifications pending review at the next higher certifying level. Revocations of spotter/rappeller qualification will be determined at the appropriate State/Regional office.**

2.2.1 Rappel Check Spotter Duties

A. Initial spotter evaluation and certification.

B. Monitor and provide oversight for rappel training.

C. Monitor operations for standardization purposes.

2.2.2 Rappel Check Spotter Position/Prerequisites

A. Must have been a qualified spotter for three seasons.

B. Must have demonstrated ability as an instructor and assisted in training at least two spotters.

2.2.3 Rappel Check Spotter Designation

Designation of Regional Check Spotters shall be approved for model specific platforms annually by their Regional Helicopter Operations Specialist for Forest Service; by the State Aviation Manager for BLM; by the Area Manager for BIA; or by the Regional Aviation Manager for NPS in the form of a designation letter. 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.

2.2.4 Rappel Check Spotter Proficiency

Each check spotter must maintain proficiency as a rappel spotter(see 2.3.4).

2.2.5 Rappel Check Spotter Annual Certification

Each check spotter must maintain currency as a rappel spotter(see 2.3.5)

2.2.6 Rappel Check Spotter Model Specific

If conducting an evaluation from a new platform or one they have never been qualified in, the check spotter must complete model specific spotter 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.

2.3 Rappel Spotter:

2.3.1 Rappel Spotter Duties

A Safely deploy rappellers according to policy outlined in this guide.

B Ensure only standard procedures and equipment found in this guide are used and followed.

C Provide instruction and certification for initial rappeller candidates and spotter trainees.

2.3.2 Rappel Spotter Prerequisites:

A Rappel Spotter Trainee Prerequisites

1. One fire season (90 days) of helicopter rappelling.
2. Qualified as Helicopter Manager Trainee.
3. Completion of 20 live rappels, with four of those being operational.
4. Completion of National Incident Management System (NIMS) IS 700.
5. Other recommended training, Basic Supervision for First Line Supervisors, M-410 or equivalent, Contracting Officer Representative Level I, CRM, Risk Awareness (A-205) Ride along on rappel and or cargo missions.

B Rappel Spotter Certification Prerequisites

1. Meet the training, experience, and certification requirements for a helicopter manager as stated in their agency policy.
2. Currently qualified Incident Commander Type 4.
3. Assist in instruction of rappel training.
4. 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.

2.3.3 Rappel Spotter Training

A. Complete Helicopter Rappel Spotter Training Qualification Record and pass a final evaluation administered by a qualified check spotter.

B. The spotter trainee will be recommended for certification by a check spotter, reviewed by Regional Helicopter Operations Specialist for Forest Service; by the State Aviation Manager for BLM; by the Area Manager for BIA; or by the Regional Aviation Manager for NPS and certified by the local unit official. Other agencies and bureaus not listed above shall approve spotters for their operations at a level in their organization commensurate with the positions above.

2.3.4 Rappel Spotter 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), a qualified and current spotter with experience in make and model being used will insure the spotter is capable of performing the spot through the use of mockups or training spots.

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

2.3.5 Rappel Spotter Annual Certification

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

A. Meet fitness standards as outlined in prerequisites for rappeller candidates.

B. Attend and/or participate as an instructor at annual helicopter rappel training. This shall include re-qualifying as a rappeller.

C. Complete deployment of three typically configured loads of rappellers with cargo from helicopter to the satisfaction of a qualified Check Spotter with experience in make and model being used. ***Typical terrain and a full complement of Initial Attack cargo shall be utilized for at least one of the three loads.***

2.3.6 Rappel Spotter Model Specific Training and Certification

Spotter must be evaluated by a qualified spotter in each make and model of helicopter that will be utilized as an operating platform. Spotter evaluators must be current in the make and model of helicopter being utilized.

The spotter will be briefed on and familiar with:

A. Rappel anchor and hard points for the specific model.

B. Seating arrangement for rappellers and spotters.

C. Rappel cargo placement/ location and deployment sequence and method.

D. Exit procedures, sequences, and emergency procedures.

E. Weight and Balance (including Center of Gravity Calculations) for the specific make and model of aircraft.

The spotter shall, to the satisfaction of the evaluating spotter or check spotter:

A. Demonstrate proficiency using mock-ups in the helicopter model to be used including:
   1. Preparing helicopter for rappel mission.
   2. Deploying both rappellers and cargo.
   3. Briefing by pilot on any peculiarities of the specific model.

B. Perform a minimum of three training rappel cycles (one low, one medium, and one high, see definitions Appendix I) with a full load of rappellers and cargo deployment.

2.4 Rappeller

2.4.1 Rappeller Prerequisites:

To be considered as an appropriate rappeller candidate, all of the following minimum requirements must be met each year as a condition to perform the duties of the position:

A. Meet the requirements for a Helicopter Crewmember Trainee as stated in their agency policy.

2.4.2 Rappeller Initial Training

All components of the rappel training must be completed in accordance with the Rappeller Training Syllabus to include the following:

A. Ground Training:

All rappeller trainees will complete ground training to include both ground and elevated platform training. This training must be performed in accordance with Appendix D of this guide, Rappeller Training Syllabus

B. Helicopter Mock-Up:

Trainee will demonstrate a rappel sequence and emergency procedures from a helicopter on the ground as initiated by the spotter, until proficiency is demonstrated from all seating positions.

C. Helicopter Rappels:

Rappeller shall complete a minimum of 8 live helicopter rappels without procedural error. These rappels must be in accordance with Appendix D of this guide.

2.4.3 Rappeller Performance Based Requirements

To be qualified as a rappeller an individual must perform the following performance based rappel procedures from and elevated platform with the full weight of rope (or equivalent) suspended below the rappeller:

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

2.4.4 Rappeller Proficiency

Each rappeller shall make at least one error-free helicopter rappel in any 14 consecutive days. 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 and training rappels.

NOTE: Proficiency for multiple aircraft type: If certified in multiple aircraft models, proficiency may be maintained from one model to another with mock-up and safety briefing review. The 1 in 14 day proficiency rappel must still occur from at least one model.

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

2.4.5 Mid Season Error

During the operational season if a rappeller commits an error during a live rappel (proficiency or operational) the spotter will determine the severity of the error and follow one of the courses of action listed below. See Appendix D Rappeller Training lesson 1 for a full description of errors and penalties.

A Mid-Season Major

If a rappeller commits a major *error* during a live rappel (proficiency/operational) the spotter will not allow the rappeller to continue. Upon return to base the rappeller will be debriefed and be placed in loss of proficiency status (ref. IHRG) The major must be reviewed by the rappeller's supervisor and a Check Spotter. The rappeller may regain operational status once proficiency performance elements are met or may (at the Check Spotter's descretion) be removed from rappel operations. This may include additional live rappels. This option will only be available once per season.

B Mid-Season Minor

Occasional minor *errors* should be handled at the crew organizational level (spotter/ direct supervisor) and only elevated to a check spotter if it becomes habitual and cannot be rectified otherwise.

2.4.6 Annual Certification

To be certified as a rappeller a rappeller who has qualified the previous year will:

A. Meet fitness standards as outlined in prerequisites for a rappeller candidate.
B. Attend recommended Agency or Geographic Area basic helicopter safety refresher.
C. Participate in an equipment and procedures review.
D. Demonstrate knowledge of rappel principles.
E. Complete the performance based requirements outlined above in 2.4.3.
F. A rappeller will perform helicopter mock-up rappels and re-entry procedures as initiated by the spotter, until proficiency is demonstrated from all seating positions.
G. Complete three helicopter rappels without procedural error. Typical terrain shall be utilized for at least one of the three rappels.
H. Identify emergency situations and perform corrective actions without procedural error.

2.4.7 Rappeller Model Specific Training and Certification

A rappeller must be evaluated by a qualified spotter in each make and model of helicopter that will be utilized as an operating platform. A qualified spotter must be current in the make and model of helicopter being utilized.

The rappeller will be briefed on and familiar with:

A. Rappel anchor and hard points for the specific model.
B. Seating arrangement for rappellers and spotters.
C. Rappel cargo placement/ location and deployment sequence and method.
D. Exit procedures, sequences, and emergency procedures.

The rappeller will, to the satisfaction of the qualified spotter:

A. Demonstrate proficiency as a rappeller using mock-ups in the helicopter model to be utilized.
B. Perform a minimum of three training rappel cycles (one low, one medium, and one high) with a full load of rappellers and cargo deployment.

NOTE: If the exit procedure for the model the rappeller is current in is similar to the model being cross trained in (e.g. both exits are over skid) the rappeller will need a minimum of one rappel cycle with standard load to assure complete cycle of rappel operation and cargo.

NOTE: Only approved equipment identified in the MTDC Wildland Fire Helicopter Rappel website: http://www.fs.fed.us/t-d/programs/fire/rappel/index.htm shall be used in rappel operations. No alteration or modification of said equipment shall be made without the approval of the Interagency Rappel Subcommittee.

3 Rappel Equipment

All equipment used in rappel operations will be approved by the Interagency Helicopter Rappel Subcommittee. Agencies having specific missions with technical equipment requirements which do not follow this guide shall operate according to their agency approvals. (See Chapter 1.3)

All equipment will be monitored during use for 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.

All proposed rappel aircraft shall be subject to a screening and evaluation process. All type III rappel helicopters must be certificated in compliance with 14CFR 27.143 paragraph (c).

3.1 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:

1. A minimum height of 20 feet above ground level. Rappeller experience will be greatly enhanced from a higher platform.
2. Simulator should approximate the helicopter to be utilized as near as possible, i.e., cabin configuration, seating positions, skid height.
3. The tower, stairs, platform, handrails, rappel anchor, and spotter tether attachment point shall meet agency and OSHA requirements for construction (Walking-working surfaces/1910).
4. The rappel anchor and spotter tether anchor must meet OSHA standards for fall-arrest (Fall protection systems criteria and practices/1926.502, Safety belts, lifelines, and lanyards/1926.104).
5. Rappel tower should be inspected annually and daily before any use. Program manager may delegate inspections. Example inspection forms can be found in appendix C.

Note: See MTDC Tech. Tip 0857–2354–MTDC for more information on tower design and construction.

3.2 Individual Rappeller/Spotter Equipment

NOTE: All rappel equipment that is removed from service (retired) must be destroyed to the point that it can no longer be utilized for its intended purpose. Any equipment that requires documentation must show retirement date on the "Equipment Log" when removed from service.

3.2.1 Helmets

Spotter and Rappeller Helmets must meet minimum standards for Interagency approved flight helmets as defined in the IHOG.

3.2.2 Eye Protection

For any rappel operation, rappellers must wear eye protection that meets ANSI Z81. The visor down on flight helmets meets this requirement.

3.2.3 Gloves

A. Spotters may wear any glove approved for flight operations in the IHOG. Spotters needing additional heat protection may wear a rappel type glove for cargo letdown. Currently Sullivan PV or PVG and the PMI GL2200x rappel glove and the Metolius climbing ¾ finger glove are approved for cargo letdown operation. The Metolius glove shall only be used in conjunction with a flight glove.

B. Rappeller's gloves shall be all leather with double-leather palm and fingers and provide sufficient heat protection for rappel descent. For wildland fire rappel operations the Sullivan PV (short) or PVG (gauntlet) Rappel Gloves are the approved gloves.

C. Inspection:

1. Inspect stitching for abrasion and wear.
2. Leather should be free from cuts or holes. Pay special attention to the area between thumb and forefinger.
3. Leather should also be inspected for oils, pitch, or other contaminants.
4. Hook and pile Velcro should adhere well when pressed together.
5. Gloves must be inspected by user prior to each use.

3.2.4 Belly Deployment (BD) Bag

BD bag must be designed in accordance with drawing # MTDC-1038. The Maximum weight of the BD bag shall not exceed 25 pounds. The female end of the Click lock buckle must be attached to the harness by a webbing loop manufactured in accordance with drawing #MTDC 1023. The webbing loops/buckles must be attached to the rappel harness below the rappel hook according to the directions in appendix O.1. Loose straps must be secured to prevent entanglement during the rappel process.

A. **Inspection:**
   1. BD Bags must be inspected by user prior to operation.
   2. Inspect stitching for abrasion and wear.
   3. Zipper should function properly and store completely in pocket.
   4. Check to ensure all buckles function properly.

3.2.5 Required minimum rappeller personal equipment

The following items are essential and must be carried on each rappeller during any rappel operation. These items are to provide essential safety and survival equipment in the event cargo equipment delivery is delayed

A. Fire Shelter
B. Hard Hat
C. Leather gloves
D. Headlamp
E. 2 quarts of water
F. First Aid Kit
G. 10 AA Batteries
H. Space blanket
I. Food (1 meal)
J. 1 Fusee
K. Line Gear
L. BD Bag

The remaining items must be carried with each stick (2) of rappellers.

M. Radio
N. A map of the area
O. Compass or GPS

3.2.6 Required minimum rappeller Initial attack cargo equipment list.

In addition to the items above carried on the rappeller the following items must be delivered to each stick of rappellers in the cargo container.

A Food and water for 24 – 36 hours
B 2 Handtools
C 1 Tent fly (9x10)
D 2 sleeping bags
E 1 Roll of toilet paper
F 6 Trashbags
G 1 Firstaid kit
H 2 Pack-out bags
I 1 water treatment
J 1 box(24) AA batteries
K 2 Rolls of flagging
L 100ft. of Parachute cord
M 1 roll of fiber tape
N 1 weather kit
O 6 fusses
P 1 Bastard file
Q IC Kit / Paperwork
R 1 Pen (Sharpie)

3.2.7 Spotter Harness

Rappel and Cargo Letdown Spotters shall wear the Miller Revolution Harness during all helicopter rappel/cargo letdown and tower operations. The harness shall be issued and tagged with a unique identifier that corresponds to an in-service date. Harness tags from the manufacturer may be used. Two sizes are available.

A The small/medium size model RDT-QC/S/MBKU (will fit most spotters)
B A larger size harness model RDT-QC/UBKU is also available

C Inspection:
1. The spotter harness must be inspected by the user prior to operation.
2. Inspect stitching and webbing for abrasion, wear or other damage.
3. Check leg strap buckles, chest strap buckles, dorsal D-ring and Cam Buckle adjusters for correct adjustment and function.
4. Check PivotLink connectors for correct function.

3.2.8 Extendable Spotter Harness Tether

The extendable harness tether is the interface between the spotter harness dorsal attach point and approved hard point. The extendable spotter tether for the Miller Revolution Harness RDT-QC/S/MBKU will be manufactured in accordance to drawing # MTDC-1039 Extendable Spotter Tether.

A. The harness tether must adjust to prevent the dorsal attachment point from extending past the door plane of the helicopter in the non-extended configuration.

B. The SMC Lite Alloy Steel carabiner is attached to the free end of the spotter tether connecting to an STC or manufacturer approved helicopter hard point, tower hard point, or other approved tether attachment point.

C. The extendable spotter tether comes in two sizes, large and small. The following tether will be used with each model of rappel helicopter.

   1. Large Extendable Tether: Bell 205, Bell 210, Bell 212, Bell 214, MD 900.
   2. Small Extendable Tether: Bell 407.

The tether is designed to extend an additional 9 inches of length, as necessary to assist a rappeller in distress or to clear a letdown operation. To deploy, the spotter will free the red pull snap and lift the ejector snap releasing the v-ring. The additional tether webbing will deploy as tension is added to the tether. There is no need to manually deploy or unfasten DOT snaps.

When the extended length is no longer required, the spotter will recapture the v-ring into the ejector snap as soon as practical. Tether webbing within the pull DOT snaps will be repackaged when mission has ended.

When an extendable tether is operationally deployed, it is considered a reportable event. The SAFECOM system will be used for facilitated learning purposes.

D. Inspection:
   1. Tether is inspected with spotter harness prior to operation.
   2. Inspect stitching and webbing for abrasion, wear or other damage.

3. Metal hardware should be free from cracks, dings, or other damage.
4. Extendable tether material must be stowed by dot snaps
5. The tag end of webbing that locks the adjuster shall be tacked onto the webbing loop that passes through the dorsal D-ring using nylon 5 cord as shown in Appendix O.2.

3.2.9 Non-Extendable Spotter Harness Tether

The non extendable harness tether is the interface between the spotter harness dorsal attach point and hard point for the Miller Revolution Harness manufactured in accordance with drawing # MTDC-1062 Rappel Spotter Tether.

A. The harness tether must adjust to prevent the dorsal attachment point from extending past the door plane of the helicopter in the non-extended configuration.

B. The SMC Lite Alloy Steel carabiner is attached to the free end of the spotter tether connecting to an STC or manufacturer approved helicopter hard point, tower hard point, or approved aircraft tether attachment point.

C. The non-extendable tether will be used with the following aircraft.

1. Eurocopter A Star, Bell 206 L4.

D. Inspection:
1. Tether is inspected with spotter harness prior to operation.
2. Inspect stitching and webbing for abrasion, wear or other damage.
3. Metal hardware should be free from cracks, dings, or other damage.
4. The tag end of webbing that locks the adjuster shall be tacked onto the webbing loop that passes through the dorsal D-ring using nylon 5 cord as shown in Appendix O.2.

3.2.10 Rappel Spotter Tether Attachment

A. Rappel Spotter Tether Attachment will be manufactured in accordance with drawing # MTDC-946. The spotter tether attachment will secure the spotter harness tether to the aircraft, positioning it to the centerline of the aircraft.

B. The Spotter Tether attachment will be installed in the aircraft as outlined in model specific configurations (Appendix B of this guide.)

C Inspection:

1. Inspected by a spotter prior to each use.
2. Inspect stitching and webbing for abrasion, wear or other damage.
3. Metal adjusters and attachment ring should be free from cracks, dings, or other damage.

3.2.11 Rappel Harness System

The Rock N Rescue HR-2 Wildland Fire Rappel Harness System is comprised of several components each requiring special consideration. This harness is the only harness approved for Interagency wildland fire rappel missions.

A. This harness shall be issued and tagged with a unique identifier that corresponds to an in-service date. Harness tags from the manufacturer may be used. The harness will be donned over the user's head without disconnecting any hardware equipment.

B Harness Inspection

1. The harness and connecting hardware must be inspected by the rappeller prior to operation.
2. Inspect stitching and webbing for abrasion, wear or other damage.
3. Check snaps, v-rings, and adjuster hardware for damage and correct function.

C A 10mm Maillon Rapide Delta tri-link is the connection hardware used to attach the locking snap hook to the HR-2 harness soft loops. The tri-link is oriented with the barrel gate on the rappellers left side.

Figure 3.2

D Tri-Link Inspection

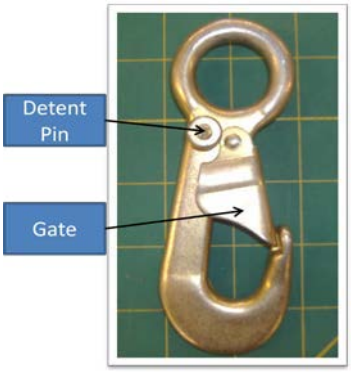
1. Tri-link assembly will be inspected by the user prior to operation.
2. Check for damage to tri link hardware.
3. Ensure gate is closed with barrel locked.
4. Check that both harness soft loops are captured inside of the tri link's hardware.

E A Bourdon 1210 is a captive eye locking snaphook and the final piece of connecting hardware to the rappel harness. The tri link is trapped within the captive eye of the hook connecting it to the harness (figure 3.2). It is the snaphook that attaches the rappel harness to the descent device.

The Bourdon hook is stamped **1210 BH** (for Bourdon Hook). These hooks have inspection criteria that will be conducted prior to any harness use.

F Snaphook Inspection:

1. Snaphooks will be inspected by the user prior to operation.
2. Check the hook and hook gate for cracks and wear.
3. Check the function of the spring-loaded gate and detent pin.
4. Ensure the end of the detent pin is peened and functions correctly.
5. Attempt to unscrew (turn left to loosen) the two halves of the detent pin. This pin can turn up to 360 degrees and still be within spec. If the pin unscrews completely, or the gate opens without the detent pin depressed, it is defective and **WILL BE REMOVED FROM SERVICE.**



G Replacement of Connecting Hardware: The tri-link and locking snap hook may only be replaced by a qualified rappel spotter. After replacing any component of the HR-2 connecting hardware, the spotter shall tighten the locking nut on the tri-link with a wrench until it is not possible to unscrew the locking nut by hand (using fingers only). The spotter and rappeller will each independently verify the work performed and document their inspections by signing off in the harness log.

3.2.12 Rappeller Gunner Strap

For rappellers requiring a secondary restraint, Rappeller Gunner Strap shall be used. It shall be manufactured in accordance with drawing #MTDC-984.

A. Inspection:

1. Inspect stitching and webbing on belt and tether for abrasion, wear or other damage.
2. Ejector snap, v-ring, and adjuster should be free from cracks, dings, or other damage.
3. Ejector snap should release and reset to closed/ready position with minimal force.
4. Spring loaded gate on ejector snap should open when pushed and return to closed position when released.
5. The gunner strap and connecting hardware must be inspected by a spotter prior to each use.

3.3 Rappel Rope

All fire rappel operations will use Descent Control L4 Nylon Type 4 Rope This rope manufactured by Descent Control, Inc. is one-half inch braided nylon manufactured in 250 foot lengths. Three metal swages, one inch apart, attach a metal eye (thimble) to each end of the rope.

The type of rope and length is stamped on the first (closest to the thimble) swage. The date of manufacture is stamped on the second (middle) swage and a manufacturer's unique serial number is stamped on the third swage. This unique serial number will meet the intent of the identification for documentation purposes. A different "unit" number can also be engraved locally or stamped by the manufacturer.

To maintain even wear and to maximize each ropes useful life , rope ends will be rotated after each rappel sequence. To track this, each end shall marked A and B respectively.

All ropes shall have a rubber jacket, 18" in length. This is to provide protection sufficient to minimize direct right angles to the rope, such as passing through a carabiner.

3.3.1 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. This document is available on the web at: http://fsweb.mtdc.wo.fs.fed.us/search/ and search with keyword "rappel". 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. Final retirement determination will be made by a qualified spotter. Inspection of any rappel rope should be done carefully and methodically.

When rope is in service, it shall be thoroughly inspected after every use. 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, burrs, or 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.

Swages and thimbles shall be inspected for deformity, cracks, and sharp edges (see Safety Alert IA 08-08). Sharp edges on swages or thimbles may be smoothed using emery cloth or a fine file. Make sure metal filings

do not drop into rope weave. Thimbles and swages should be snug. If not, return to manufacturer or retire it.

After the rope has been inspected and ok'd for service, a tag will placed through the thimble to signify the rope is OK for use.

A. Inspection / Retirement Criteria

1. Ensure rope is not used more than five years after its manufacture date.
2. Ensure rope is not used more than 100 rappels per end
3. Any portion of the rope has been cut or severed in any way.
4. There are burns or significant wear marks over 50% of the rope length.
5. There is visible damage which would compromise its strength or safety.
6. When more than 25% of surface strands have been pulled out in a loop, and cannot be worked back into rope.
7. There is evidence of several bundles bonded together by heat.
8. The rope is contaminated with foam concentrate, retardant, or any petroleum product.
9. There is any damage which affects more than 25% of any woven strand of the rope, such as a cut.
10. Cracks or gross deformities appear on metal components.
11. Any evidence of incorrect rope splicing
12. Any rope found to meet the definition of a "twisty rope" (See Appendix I)

3.3.2 Rope Use Care and Storage

A Factors that affect service life of ropes

1. 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.

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.

2. 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, cheat grass, or other particles that could possibly work into the rope. Avoid dragging the rope over the ground.

3. 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 damaging to nylon. Nylon is unaffected by hydrocarbons; however, additives in these agents may adversely affect the rope.

4. Cross-Contamination: Any surface that ropes or other rappel gear may potentially contact should be inspected for the presence of contaminants that can damage ropes, gloves, harnesses, and other gear. Textiles and leather can absorb and transfer contaminants to other gear. Petroleum products can reduce the friction between rope and Sky Genie, making a rappeller's descent harder to control. Pitch from coniferous trees

can increase the friction between rope and Sky Genie, making it more difficult to descend. Fire retardant contains powerful corrosive agents that can damage metal hardware. Any source of contamination, including dirty fire shirts with chainsaw bar oil stains on the shoulder, dirty Nomex pants, and dirty/retardant covered line gear, must not be allowed to come into contact with ropes, gloves, harnesses, Sky Genies, carabiners, and other rappel gear. Ropes and rappel gear should always be stored in a clean, dry, chemical-free, rodent-proof locker or vehicle compartment when not in use. The interior seats and cabin of helicopters used for rappelling must be kept exceptionally clean.

B Rope Care

1. Ropes that are redirected at an angle, such as over a doorsill or through a carabiner, shall 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 edges. All ropes used for rappelling shall be ordered with a protective hose.
2. 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 clothes dryer. The temperatures are hard to control and heat damage may occur.
3. To extend service life of equipment be sure to: Avoid stepping on ropes.
   - Avoid prolonged exposure to sunlight; dry ropes in the shade.
   - Never expose ropes to rough surfaces.
   - Avoid dragging ropes on the ground.
   - Descent devices will be removed whenever ropes will be stored more than one operational period.
   - After ropes have been released from helicopter, avoid dragging ropes across limbs and brush whenever possible. The fine nylon fibers that make up the Descent Control rope are very susceptible to snagging.
   - Avoid contact with all chemicals that may contaminate rope.
   - Keep ropes away from heat sources.
   - Avoid laying ropes on concrete or asphalt.

- Avoid contact of the rope with Velcro.

C Storage

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, dry storage conditions prevail.

3.3.3 Procedures for Conditioning New rappel Ropes

A. Remove new rope from plastic shipping bag and randomly flake into a pile on a clean, dry surface (not concrete or asphalt).

B. Carefully inspect entire rope, including swages and thimbles, for visible defects. If no significant defects are discovered and rope appears serviceable, enter initial rope data into rappel equipment log and record pre-use inspection.

C. Randomly flake rope into rappel rope bag.

D. Select an open, flat area with a clean dry surface to lay out rope. Secure swivel to a fixed hard point 2 to 3 feet above ground level.

E. Use carabiner to attach eye of free rope end to swivel.

F. Walk with rope bag away from attach point to lay out rope in a straight line. Do not drag rope over the ground.

G. Stretch full length of rope by pulling on opposite end from swivel; apply tension by having one or two personnel pull on the rope end (**do not** use mechanical means to accomplish this task, such as pulling on the rope with an ATV, winch, or block-and-tackle). If tension on rope causes the swivel to spin, hold tension until spinning ceases. The amount of tension applied should be sufficient to briefly lift most or all of the rope off the ground.

H. Attach the Sky Genie to the rope in the same way it would be rigged for rappel, with the upper (thumbscrew) end toward the swivel.

I. Starting at the end to which the swivel is attached, walk the full length of the rope while - sliding the Sky Genie along the rope. When the end is reached, remove the Sky Genie, walk back to the starting point, and re-attach the Sky Genie to the rope. Walk the rope 9 more times in this direction.

J. Disconnect rope from swivel and re-bag rope. Attach opposite end of rope to swivel. Repeat steps F through I. This process must be

documented in the rope log. However it does not count toward the use life of the rope.

K. If at any time during this process the rope begins coiling below the Genie to the extent that it interferes with the rappeller's ability to slide the Sky Genie to the end of the rope, the rope should be logged as a twisty rope and removed from service. No more conditioning or rappelling with this rope should be permitted. In addition, a Safecom should be filed for any rope that is removed from service because of excessive twisting.

L. If the rope does not show signs of twistiness during the break-in process, completion of the conditioning process should be recorded in the rope log.

3.4 Descent Device

A For helicopter rappelling, the one-half inch Sky Genie. (Model no. # 14GO), 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). Users shall engrave identical identification numbers on both the Genie shaft section and cover to insure that these components remain together for the life of the Sky Genie. Engrave the unique indentifying number on the shaft section across the top of the lock-off horns. A matching number will be engraved on the lower left corner of the genie cover with a small decal area removed for easy engraving.

B A standard of 2½ wraps around the shaft shall be used. The rope shall 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 Genies shall be retired after a 1/16-inch deep wear groove is observed.

C To extend service life of equipment be sure to:

1 Avoid rough handling
2 Not drop or drag on the ground
3 Store Genies with covers installed when not in use
4 Keep Clean

D Post Rappel Inspection
After each rappel, inspect for:

1 Dents in cover
2 Rough or sharp surfaces on cover and shaft
3 Scratches or excessive wear on shaft
4 Faulty detent pin or locking screw
5 Cracks or breaks
6 Cover fitting on shaft
7 Dirt, tree sap, etc.
8 Wear on cover, inside or out, at thumb screw slot or detent pin hole
9 Reference IA 09-03

3.5 Ancillary Equipment

3.5.1 Carabiners

Only the SMC Lite Alloy Steel Locking carabiner is authorized for all rappel and cargo letdown use. (Exception: carabiners specifically identified by supplemental type certificate (STC) for direct attachment to anchor).

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

A. For programs wishing to identify their equipment, Seattle Manufacturing Corporation (SMC) has released guidelines for the proper way to permanently mark their mountaineering, rescue, industrial and work-safety products. Additional information can be obtained http://www.smcgear.net/news/4-smc-announces-guidelines-for-permanent-marking-of-gear

1. It is only acceptable to use a hand held electric type engraver to place identifying marks on hardware. DO NOT strike with a hammer and stamps or ever use other similar methods. Once the marking process has been completed ALWAYS inspect the product for proper fit and function PRIOR to returning it to service. If you ever have concerns or questions you are advised to contact SMC directly at 1-800-426-6251 or info@smcgear.net
2. For carabiners it is recommended to mark along the spine of the frame. DO NOT mark on or near the lock or pivot tabs of the frame and stay away from rope bearing areas. DO NOT mark on the gate. For steel and stainless products use a medium setting with medium to heavy pressure. For Aluminum products use a low setting with light to medium pressure. Depth of engraving equal to the thickness of a piece of paper should be enough to last the life of the product.

B. Inspection:
1. Inspect to be sure that gates and locking mechanism function properly. If gate becomes sticky, remove from service.
2. Look for abrasion, burrs, or rough edges. If there is any visual indication that raises question, retire it.
3. When using for rappel or cargo letdown operations 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.
4. Carabiners shall be inspected by a spotter prior to each use.

3.5.2 Knife / Knife Sheaths

All rappellers and spotters are required to have a hook knife, with lanyard, readily accessible for emergency use. The Raptor knife is required for use by rappellers and spotters. Spotter may elect to remove lanyards from their knives to allow greater range of movement.

A. The rappeller Raptor knife shall be enclosed within the MTDC rappeller Raptor sheath (MTDC drawing 1041) and attached to the rappel harness in the manner shown in rappel bulletin 021103.
B. The spotter Raptor knife shall be enclosed within the MTDC rappel spotter Raptor sheath (MTDC drawing # 1042) and attached to the spotter harness in the manner shown in rappel bulletin 051005.
C. Certain STC's for rappel anchor installations require an additional Raptor knife be installed inside the aircraft.

D. Inspection:

1. Knife sheaths are to be inspected with any harness inspection.
2. Knives shall be inspected annually or prior to being installed on a harness. Ensure knives used for rappel have properly installed blades.
3. Knife blades must be changed after any use and will be closely supervised by a rappel spotter. See Appendix O.4
4. Handle/body of knife should be free from damage, screws should be tight.
5. The sheath should be in good condition.
6. Ensure the lanyard is stowed and attached correctly.
7. Pull snap(s) should close/open with enough resistance to prevent inadvertent opening.

3.5.3 Safety Snub Strap

An approved safety snub strap will be utilized as a backup device to securely connect rope(s) to the rappel anchor(s) or to one another. The snub straps shall be manufactured in accordance with MTDC drawing #958 for double rope capable anchors. Single anchor, single rope snub straps shall be manufactured in accordance with MTDC drawing #995 for overhead anchor.

A. Inspection:

1. Inspect stitching and webbing for abrasion, wear or other damage.
2. Body of static line snap(s) should be free from cracks, dings, or other damage.
3. Detent button(s) should depress and reset to closed/ready position with minimal force.
4. Sliding cover should open and return to the closed position easily.
5. Inspect body and cover for burrs or sharp edges that could damage ropes.
6. Snub Straps shall be inspected by a spotter prior to each use.

3.6 Rappel Anchors

Rappel anchors are evaluated for use by the Aviation Management Directorate (AMD) for DOI operations or the National Airworthiness Logistics Officer 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.

A. Rappel Anchor Inspection

Rappel Anchor inspection will occur in accordance with the applicable STC, continuing airworthiness instructions, or manufacturers standards in the flight manual or maintenance manual. In addition an annual inspection shall also be conducted.

The designer (or manufacturer) of the anchor is responsible for developing a maintenance inspection criteria, which ensures the continued airworthiness of the anchor. The owner of the anchor is responsible for ensuring that the inspection(s) is conducted. Prior to each day of use, the rappel anchor shall be visually inspected by the spotter for general condition.

Additional information regarding existing rappel anchors is available from MTDC.

4 DOCUMENTATION

All rappel logs are official documents and will be kept in RAPREC or on the forms contained in Appendix C. Rappel logs will be archived for a minimum of 7 years.

NOTE: All electronic records (RAPREC) need to be backed up to an external drive or server. A hard copy of electronic record will be printed at least once annually.

NOTE: All rappel equipment that is removed from service (retired) must be destroyed to the point that it can no longer be utilized for its intended purpose. Any equipment that requires documentation must show retirement date on the "Equipment Log" when removed from service. All rappel equipment retired remains government property and should be handled according to policy.

4.1 Training, Certification, and Proficiency

NOTE: For fire operations, copies of certifying and recertifying documentation will be maintained in individual permanent records and forwarded to the IQCS Account Manager.

4.1.4 Rappeller

The rappel crewmember training record shall document each individual step in the training. Competency at each level of the training must be demonstrated by the trainee before the spotter shall permit advancement to the next step. Each rappeller will maintain a record of training, proficiency and operational rappels. See Appendix C.

4.1.5 Spotter (Rappel and Cargo-letdown)

The Helicopter Rappel or Cargo-letdown Spotter Qualification Record shall document each individual step in the training. Competency at each level of the training must be demonstrated by the trainee before the spotter shall permit advancement to the next step. Each spotter will maintain a record of training, proficiency and operational spots of rappellers and cargo. See Appendix C.

4.2 Rappel Unit Log

All rappels must be entered into a rappel unit log. Unit logs shall be readily available for review. Information will be documented on Rappel Unit Log in appendix C or RapRec equivalent.

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

4.3 Equipment logs

All equipment requiring documentation will be assigned a unique identification number. The number will be retired with the piece of equipment. The following equipment shall have a log assigned. See Appendix C.

4.3.4 Rope

A. Documentation must be maintained for all rappel ropes. A log shall be maintained from the date of purchase until the rope is removed from service. The rope log shall be readily available for review. Each rope must have an identification number and be marked at both ends, one end marked "A" and the other end marked "B" (reference Chapter 3.3.1).

B. All rope uses shall 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. Use Rappel Rope Log in Appendix C or RapRec equivalent.

4.3.5 Personnel Descent Devices

Use and inspection of any descent device shall be documented on a Descent device log. Cover and shaft shall have the same identification number and shall always be used together. Numbers shall be engraved according to Chapter 3.3.2. After each rappel, the descent device shall be inspected for wear or deformity and remarks noted. When a rappel device is retired, it shall be destroyed to eliminate further use. Use Descent Device Log from Appendix C or RapRec equivalent.

4.3.6 Rappeller / Spotter Harness

Harness will be inspected annually and recorded. Any deficiencies during pre-use inspections and or repairs or component replacement will be noted. The harness log form in Appendix C or RapRec equivalent must be used for harness documentation.

4.3.7 Cargo Letdown Line

All cargo letdown line use shall be documented. After inspection, any irregularities will be noted. Use the Letdown Line Log from Appendix C or RapRec equivalent.

4.3.8 Rappel Tower Anchor

Use and inspection of rappel tower anchors shall be documented. Example forms are located in Appendix C. Bases may use other forms, provided the forms provide at a minimum the information listed below.

A. Date put in service
B. ID number
C. Remarks/problems
D. Type of use (Helicopter or tower)
E. Inspector's name/date inspected

5 Rappel Operations

5.1 Administrative Responsibilities

The spotter shall be responsible for coordinating all rappel activities (pre and post rappel). Before departure the spotter must consider the operational factors and local unit recommendations that influence departing the base of operations configured or equipped.

5.2 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. Prior to any rappel operations the pilot and spotter will identify the performance limitations for that aircraft used. These limitations will ensure the performance is in the maximum continuous range. Before replying "Power is Good" during the following sequence, the pilot must ensure these limitations are not exceeded.

NOTE: Weight &Balance (W&B) calculations will be performed for standard rappel configurations and emergency rappel scenarios prior to the commencement of rappel operations each season. The purpose is to ensure the center of gravity (CG) will remain within limits. Because of the dynamic environment of the rappel operation where rappellers and spotters move inside and out of the aircraft in flight, it may be possible, particularly in light helicopters, to exceed the aircraft's CG limitations during rappel operations. In cases where it may be possible to exceed a CG limit during normal or emergency situations, W&B calculations will be performed prior to each rappel mission accounting for actual rappeller, spotter, and cargo weights. If a mission specific W&B calculation indicates the CG could be exceeded during any phase of the rappel operation the load configuration must be adjusted or the mission aborted. Calculation documentation must be maintained at base of operations.

5.3 Pre-Flight Procedures

5.3.1 Aircraft Configuration

Configure Helicopter for rappel operations following model specific instruction in Appendix B of this guide.

5.3.2 Seating Configuration

Specific seating arrangement for each aircraft must be approved in the aircraft flight manual or Supplemental Type Certificate (STC).

Seating Configuration will follow instructions for specific aircraft in Appendix B.

5.3.3 Loading Cargo

Spotter oversees loading and securing of cargo.
Cargo shall be installed in the aircraft as described in appendix B.
Cargo shall be restrained utilizing approved restraint system.

5.3.4 Anchor

Spotter visually inspects rappel anchor (see chapter 3, Rappel Anchor inspection.)

5.3.5 Rigging Anchor

Rig helicopter rappel anchor for rappel operations following model specific instruction in Appendix B of this guide.

5.3.6 Buddy Check

NOTE: All steps of the Buddy Check are to be performed visually or visually and tactilely for thoroughness. Rappeller being checked will be attentive to each step of the Buddy Check process. If a discrepancy is found this check needs to be started over from the beginning.

***Items below in bold must be checked both visually and tactilely.**

A. FLIGHT HELMET

1. Condition - (no cracks or damage)
2. Eye protection –
   - **visor down & tight** or approved eye protection on with **visor up & locked**
3. **Mic boom up and tight**
4. Chin strap secured, adjusted to fit snuggly, with no loose ends.
5. Avionics cord tucked into Nomex shirt or flight suit (As Appropriate)

B. NOMEX

1. Shirt tucked in collar up, buttoned to the top, flight suit fully zipped. Pockets with Velcro or buttons empty, pockets with zippers zipped
2. Sleeves - (no holes, clean & tight at wrist)

C. RAPPEL GLOVES

1. **Fastened & in good condition with no loose ends, pitch or contaminants**
2. **Stitching and Padding with no holes (palms, between fingers, flap, thumb/forefinger gusset)**

D. HARNESS

1. Risers –
   - **snuggly fitted**

- webbing and visible stitching in good condition
- no twists
- buckles secured with no visual defects

2. Lat Straps -
   - **snuggly fitted**
   - webbing & stitching in good condition
   - no twists
   - plastic or nylon keepers in place
3. Soft Loops - webbing & stitching in good condition
4. Both Soft Loops **CAPTURED INTO** Tri-link
5. Rubber Gasket captures Tri-Link & harnesses right side Soft Loop & is in good condition
6. **Tri-link is locked, barrel down & tight to Rappellers left, and physically try to loosen.**
7. **Snap hook is CAPTURED IN Tri-link**
8. **Snap hook locked, Snap hook opens, Snap hook locks again**
9. Visually check snap hook detent pin, no obvious gap and the center shaft is peened
10. **PULL ENTIRE SNAP HOOK/TRI-LINK/SOFT LOOP ASSEMBLY – (LOOK, SEE & FEEL-METAL INTO METAL)**

E. BD Bag

1. **Click locks secured**, horns out
2. Top straps through handle, buckles secured
3. Side straps tight
4. Zippers on left side of BD Bag with pull tab stowed under cover.
5. Double tap on BD Bag to indicate rappeller to lift bag.
6. Bottom of BD Bag in good condition

F. Leg Straps

1. Buckles attached, no fabric caught
2. Webbing & stitching in good condition
3. No twists, snug fit, loose ends secured

G. Raptor Knife

1. **Secured in sheath on Rappellers left, both snaps secured.**
2. **Lanyard stowed, horn facing aft**

H. NOMEX & BOOTS

1. Nomex pants/flight suit in good condition,
   - Velcro in good condition and no hooks showing
   - Velcro or button pockets empty, pockets with zippers zipped
2. Waist belts clear of cases or pouches etc.
3. Pant cuffs over approved laced leather boots

I. Single tap on BD bag to indicate rappeller to turn around

J. RAPPELLER'S BACK SIDE

1. Helmet in good condition

2. Hair tucked into Nomex shirt, flight suit, or helmet
3. Avionics cord tucked in if necessary, collar up & no loose ends
4. Harness –
   - webbing & visible stitching in good condition
   - no twists
   - Buckles & loose ends secured
5. Nomex shirt & pants –
   - Velcro in good condition and no hooks showing
   - waist belts clear of cases or pouches
   - Velcro or button pockets empty
   - pockets with zippers zipped
   - Pant cuffs over approved leather boots with no accessories attached to boots.
6. Indicate rappeller to turn around With a tap on the left shoulder

K. EXCHANGE THUMBS UP - "I AGREE, I AM O.K."

L. ROPE / DESCENT DEVICE INSPECTION (type 3 aircraft)

1. **Check thimble**
2. **Inspect swages**
3. **Inspect rope protector (if applicable)**
4. **Descent Device rigged correctly (rope in the front, out the back 2 wraps in the window to the right)**
5. **Check that descent device detent pin is out**
6. **Thumb screw snug**

M. EXCHANGE THUMBS UP - "I AGREE, I AM O.K."

5.3.7 Rappeller / Spotter Check

NOTE: Spotter being checked will be attentive to each step of the equipment check process. If a discrepancy is found this check needs to be started over from the beginning.

A. FLIGHT HELMET

1. Good Condition - no cracks or damage avionics in place.
2. Eye protection – Not required for a spotter.
3. Chin strap secured, adjusted to fit snuggly, with no loose ends.

B. NOMEXSHIRT / FLIGHTSUIT

1. Good Condition Shirt tucked in collar up, Buttoned to the top, Flight suit fully zipped up.
2. Sleeves - (no holes, clean & tight at wrist)

C. GLOVES

1. Gloves in good condition,fastened with no loose ends, pitch or contaminants

D. MILLER HARNESS – Front Side

1. Risers –
   - visible webbing & stitching in good condition
   - no twists
   - buckles secured with no cracks
2. Chest Strap
   - Positioned Mid Chest
   - Buckled &snuggly fitted
3. Visible webbing & stitching in good condition with no twists & keepers in place
4. Leg Straps
   - Buckles attached, no fabric caught
   - Visible Webbing & stitching in good condition
   - No twists, snug fit, loose ends secured keepers in place
5. Raptor Knife
   - Secured in sheath on left riser
   - Horn facing to left side
   - Lanyard stowed

E. NOMEX & BOOTS

1. Nomex pants/ flightsuit in good condition, no Velcro showing
2. Pant cuffs over approved leather boots

F. Indicate Spotter to turn around With a tap on the left shoulder

G. SPOTTER'S BACK SIDE

1. Helmet in good condition
2. Collar up
3. Harness - visible webbing & stitching in good condition with no twists
4. Spotter tether attached to dorsal O-Ring through double pass adjustor and tacked.
5. Extendable tether stowed, all snaps in place.
6. Ensure Carabiner in place at end of tether
7. Buckles & loose ends secured
8. Nomex shirt/ flightsuit & pants - (no Velcro showing)
9. Pant cuffs over approved leather boots

H. Tap on shoulder to indicate spotter to turn around.

I. EXCHANGE THUMBS UP - "YOU ARE O.K., I AGREE"

5.3.8 Boarding Sequence Medium Helicopters

A. Rappellers complete buddy check (5.3.7), organize into proper rappel order and prepare to board the aircraft. Rappellers load from inboard seats out.

B. Starting with rappellers boarding on right side of aircraft then moving to left side, spotter performs equipment check on each rappeller. If all is correct, a thumbs up signal is exchanged. If a discrepancy is identified, it will be immediately corrected and the spotter will restart the equipment check from the beginning.

C. Once complete, each Rappeller boards aircraft and takes pre-assigned seat. The first rappeller boarding on each side will perform a full inspection of the rigged descent device(s), rope attachment, and safety snub strap, then attaches their gunner strap.

D. When attached, the gunner belt ejector snap will be on the right, v-ring on the left, the connection will be on right side of rappeller's body. Gunner strap will be worn taut around rappeller's waist. Rappellers then buckle seatbelt and plug into ICS system if appropriate. Gunner strap and seatbelt must be below the snaphook.

E. Last rappeller to be checked completes equipment check on spotter (5.3.8) prior to boarding the aircraft. If all is correct, a thumbs up signal is exchanged, then rappeller boards aircraft.

F. Spotter completes preflight walk around.

G. Spotter enters aircraft, checks descent devices, ropes, snub strap, and hard point connections. Spotter taps inboard rappellers knees and points to rigging. Thumbs up signal between spotter and inboard rappellers indicating inspections have been performed.

H. Spotter, checks rappellers seatbelts and gunner straps, and ensures doors are shut and secure.

I. Spotter ,connects tether, plugs into radio system, takes seat, fastens seatbelt, displays tether showing carabiner attached to hard point and seatbelt secure. If all is correct, a thumbs up signal is exchanged with all rappellers on board.

5.3.9 Boarding Sequence Light Helicopters

A. Rappellers complete buddy check, organize into proper rappel order and prepare to board the aircraft.

B. Starting with rappellers boarding on right side of aircraft then moving to left side, spotter performs buddy check(5.3.7) on each rappeller. If all is correct, a thumbs up signal is exchanged. If a discrepancy is identified, it will be immediately corrected and the spotter will restart the buddy check from the beginning.

C. Once complete, each rappeller perform a full inspection of the rigged descent device, rope attachment, and safety snub strap, then hooks up to descent device, adjusts rope length from the anchor, positions themselves on the skid and locks-off and waits for spotter. Spotter then checks rappeller's rope and connection in the following order.

1. Anchor Bolts Secure
2. Carabineer captures anchor and is oriented correctly.
3. Carabineer captures thimble, check tactilely to insure gate is locked
4. Snub snap attached between first and second swage
5. Check that rope protector is adjusted correctly if applicable
6. Verify descent device is rigged correctly
7. Verify snaphook is hooked into descent device.

If all is correct a thumbs up signal is exchanged. Rappeller then enters aircraft, takes seat, buckles seatbelt and plug into ICS system. Seatbelt must be below the snaphook.

D. Last rappeller to be checked completes equipment check on spotter (5.3.8) prior to boarding a/c. If all is correct, a thumbs up signal is exchanged.

E. Spotter completes preflight walk around.

F. Spotter enters aircraft, checks rappeller's seatbelts and ensures aircraft cabin is secure.

G. Spotter ,connects tether, plugs into radio system, takes seat, fastens seatbelt, displays tether showing carabiner attached to hard point and seatbelt secure. If all is correct, a thumbs up signal is exchanged with all rappellers on board.

5.3.10 Rope Security

Prior to flight, spotter will ensure rope(s) and rope bag(s) are secured in the aircraft. After rappel configuration is complete spotter ensures positive control of rope bag is maintained by the rappeller closest to the exit door, throughout the duration of the flight or until rope(s) are deployed for rappel.

5.4 IN-FLIGHT PROCEDURES

All communications between spotter and pilot will be done in the form of challenge and response.

5.4.1 Pre-Rappel Sequence

The safety of personnel and aircraft must be the primary consideration when the spotter and pilot select rappel or landing sites. The pilot shall be the final authority on flight procedures. Fire behavior and safety shall also be considered when selecting the site. Before deploying personnel, the spotter shall brief the rappellers on the site selection and fire safety.

A. Pilot(s) flies a high level reconnaissance of the area. The spotter works with the pilot to select an appropriate rappel site, identify hazards and an emergency site.

B. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the rappel operation. Spotter communicates with flight following authority & pilot regarding number of rappellers to be deployed.

C. Confirm the number of descent devices match the number of rappellers being deployed. When necessary remove and stow unneeded descent devices.

D. Adjust radios as needed to ensure pilot and spotter communication will not be compromised by excessive radio chatter. Radios must remain on and dialed to the appropriate flight following frequency.

E. Where possible helicopter should maintain at least 50ft. clearance above any obstacles before starting a rappel.

F. If this is not possible and helicopter must descend below the canopy, rotor clearance must meet the current standards in the IHOG

G. Before starting rappel operations, A HOGE Power check is accomplished at an altitude comparable to the rappel site or greater. A Positive rate of climb must be established without exceeding aircraft limitations. Pilot states" **hover established, positive rate of climb, power is good."**

H. Spotter responds **"power is good"**

I. If configured spotter directs rappellers to unplug and stow ICS communications.

5.4.2 Rappel Sequence Medium Helicopters

A. Pilot states to spotter **"1 minute out airspeed below 40 knots."**

B. Spotter responds**"1 minute out, below 40 Knots, coming out of my seatbelt."**

C. Spotter activates hot mike if not done already.

D. Spotter states to pilot, **"opening aircraft door(s)."** Once spotter has opened aircraft doors, spotter states to pilot "**reset Master Caution"**.

E. Pilot responds **"Master Caution reset"**.

F. Spotter / pilot communicate adequate rotor clearance, power assessments, and rappel spot status throughout the rappel sequence. Using pilot's perspective (left, right, forward, back, and up or down relative to altitude above the ground.)

G. Once over the rappel site Spotter states to pilot, **"Ready to drop ropes. How's the Power".**

H. Pilot confirms power, if within limits; pilot responds to spotter **"power good, drop ropes".**

I. Spotter drops rope outside skid and ensures it is free of knots and rope bag is on the ground. Spotter repeats process for second rope. If the spotter identifies a knot or other problem on the rope, this must be communicated to the rappeller. The rappeller must acknowledge.

J. Spotter states to pilot, **"Rappellers hooking up,"**

K. Pilot responds**" hooking up rappellers".**

L. Spotter then gives "Remove Seatbelt signal" to each rappeller.

M. Rappeller(s) remove seat belt, slides to outboard position, grasp descent device, orient, and hook up and lock off, places right hand on gunner release and presents hook up and lock off to the spotter. Rappeller does not leave seat for this procedure.

N. Spotter confirms the rappeller's hook-up and lock off by visual and tactile inspection

O. Spotter states to pilot, **"Rappellers to the skids,"**

P. Pilot responds **"Rappellers to skids"**

Q. Spotter gives "Move into Position" hand signal to rappeller(s). Rappellers remove gunner strap, move to the skid, gets set, clears rope, returns focus on the spotter. If the rappeller identifies a knot or other problem on the rope, this must be communicated to the spotter. The spotter must acknowledge.

R. Spotter states to pilot, **"Ready to send rappellers, How's the Power**".

S. Pilot confirms power, if within limits; pilot responds to spotter **"power good, send rappellers".**

T. Spotter responds "**Sending rappellers**" and gives "Begin Descent" signal to each rappeller.

U. Rappeller(s) unlock, transition over skid, and descend to the ground.

V. Spotter states to pilot, **"Rappeller off the skid… half way… on the ground."**

W. After reaching the ground, rappeller(s) disconnect from rope(s), feed approximately 10 feet of rope through the descent device to place descent device on the ground, and move to a safe area. Rappeller(s) must use appropriate hand signal to inform spotter if there is a bad rope or rappel site. Spotter will assure that the descent devices are on the ground before sending next set of rappellers or de-rigging ropes.

X. Once rappellers move to a safe area spotter may repeat rappel process from step 5 as necessary.

Y. Once complete, spotter states to pilot, **"De-rigging ropes**",

Z. Spotter states **("Right side/ Left Side) rope away",("Right Side/Left Side) door shut"**, repeat process for off side.

AA. Spotter states **"clear to depart."**

BB. Pilot responds**" clear to depart ?"**.Spotter states **"affirmative clear to depart".**

CC. The spotter with concurrence from the pilot may initiate the internal cargo procedure at this time. Pilot may elect to maintain hover or circle until cargo is prepared. See cargo procedures (7.6.1.D).

DD. Radio returned to normal operational mode and flight following authority is informed that rappel operation has been completed. The helicopter shall remain in the area until rappellers have positive communication with dispatch, division, etc.

EE. Rigging ropes in flight

After the completion of the first mission and prior to landing, there may be a need to deploy additional rappellers at a different location. In this case ropes and descent devices must be rigged in flight. Remaining rappellers must perform visual check once the spotter completes the rigging process. Once complete, a thumbs up is exchanged.

5.4.3 Rappel Sequence Light Helicopters

A. Spotter / pilot communicate adequate rotor clearance, power assessments, and rappel spot status throughout the rappel sequence. Using pilot's perspective (left, right, forward, back, and up or down relative to altitude above the ground.)

B. Spotter states to pilot, **"Removing Seatbelts,"** then give signal to rappeller(s).

C. Spotter states to pilot, **"Ready to drop ropes. How's the Power".**

D. Pilot confirms power, if within limits; pilot responds to spotter **"power good, drop ropes".**

E. Spotter gives "drop ropes" signal to both rappellers. Rappellers drops rope outside skid. Spotter ensures both ropes are free of knots and rope bag is on the ground. If the spotter identifies a knot or other problem on the rope, this must be communicated to the rappeller. The rappeller must acknowledge.

F. Spotter states to pilot, **"Rappellers to the skids,"**

G. Pilot responds **"Rappellers to skids"**

H. Spotter gives "Move into Position" hand signal to rappeller(s). Rappellers move to the skid, gets set, clears rope, returns focus on the spotter. If the rappeller identifies a knot or other problem on the rope, this must be communicated to the spotter. The spotter must acknowledge.

I. Spotter states to pilot, **"Ready to send rappellers, How's the Power**".

J. Pilot confirms power, if within limits; pilot responds to spotter **"power good, send rappellers".**

K. Spotter responds "**Sending rappellers**" and gives "Begin Descent" signal to each rappeller.

L. Rappeller(s) unlock, transition over skid, and descend to the ground.

M. Spotter states to pilot, **"Rappeller off the skid… half way… on the ground."**

N. After reaching the ground, rappeller(s) disconnect from rope(s), and move to a safe area.

O. Once complete, spotter states to pilot, **"De-rigging ropes**",

P. Spotter states **("Right side/ Left Side) rope away"**

Q. Spotter states **"clear to depart."**

R. Pilot responds**" clear to depart?"**

S. Spotter states **"affirmative clear to depart".**

T. The spotter with concurrence from the pilot may initiate the internal cargo procedure at this time. Pilot may elect to maintain hover or circle until cargo is prepared. See cargo procedures (7.6.1.D)

U. Radio returned to normal operational mode and flight following authority is informed that rappel operation has been completed. The helicopter shall remain in the area until rappellers have positive communication with dispatch, division, etc.

5.5 Post-Rappel

The Spotter will:

A. Secure loose items in the helicopter.
B. Check to see seat belts are fastened.
C. Establish radio contact with ground personnel and flight following
D. Determine status of rappeller(s) deployed.

5.5.1 Administrative

Complete necessary documentation, pertinent to the mission.

5.5.2 Post-rappel debriefing

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

5.6 Hand Signals

The following standard hand signals shall be used (order may change dependant on A/C type):

5.6.1 **Thumbs Up**: Used by rappellers and spotters to indicate, "I agree" or "I am O.K."

5.6.2 **Remove Seatbelt**: Imitate removing lap belt. Spotter gives signal to each rappeller.

5.6.3 **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.

5.6.4 **Move Into Position**: Hands clasped at chest level with elbows out. Given by spotter to rappellers to signal move to pre-rappel position.

5.6.5 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.

5.6.6 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.

5.6.7 Begin ETO: 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.

5.6.8 **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 lifted up.

5.6.9 **Clear to Flyaway:** 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**.**

5.6.10 **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.

5.6.11 **Discontinue Rappel:** Slashing motion across throat with one arm. Signal given by rappeller spotter indicating bad rappel site, discontinue rappel.

to

5.6.12 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.

5.6.13 Knot: Finger pointing down the rope. Signal by spotter or rappeller indicating a knot in a deployed rope. This signal must be acknowledged by a head nod.

5.6.14 Return to Seat: Give "Stop and Hold" signal [arm(s) extended, fist(s) clenched] then bring fists and elbows together [arms bent 90º and fist(s) in front of body]. Signal given by spotter to indicate rappeller(s) should return to seat and buckle seat belt.

5.6.15 Communication lost: Single clenched fist. This signal is given to the pilot to indicate that intercom communication has been lost.

6 Rappel 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.

6.1 Rappeller Emergency Procedures and Signals

6.1.1 Rappeller Emergency Tie-off procedure.

A. If during a rappel the rappeller encounters a problem that will hinder their progress to the ground, the rappeller will attempt to clear the problem. The rappeller may initiate a Lock-Off to facilitate using both hands to correct the problem. If a Lock-off has been initiated, and the rappeller still cannot resolve the problem, the rappeller will return their attention to the spotter and give the Spread-Eagle Signal. If the spotter gives the signal (horizontal arm wave), the rappeller will initiate an Emergency Tie-Off (ETO) and cut the rope below. If no ETO signal is given, the rappeller will be lowered to the ground.

B. Emergency Tie-Off (ETO) 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:

1. The rope becomes entangled, preventing the rappeller from descending or creates a hazard to the helicopter.
2. The rappeller cannot descend because of pitch (sap) on the rope.
3. A knot on the rope has become lodged in the descent device.
4. The rappeller has a descent device malfunction.

C. When a problem occurs and the helicopter has insufficient clearance from obstacles to lower rappeller to ground or; there is a problem with rappel site/landing area; the spotter will signal the rappeller to begin the Emergency Tie-Off procedure.

D. The Tie-Off procedure is as follows:

1. Bring running end of rappel rope through between the harness webbing and rappeller's body from right to left where the descent device is attached. Pull up three to four feet of slack to form a running loop.
2. Bring loop up and over descent device in a clockwise direction going behind the rappel rope and form a half-hitch around the fixed-end (to helicopter) of rope. Pull half-hitch tight.
3. Form another half-hitch on top of the first one. Pull tight. A 6 – 12 inch looped tail should remain.

4. Cut the running end of rope approximately four to six feet below the descent device.
5. After the rope has been cut, the rappeller gives the spotter the 'Lift-Out'
6. 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 to Flyaway 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.
7. Once on the ground the rappeller shall wait for slack in the rope preventing possible snap back toward helicopter rotors. Then remove raptor knife and cut the rappel rope above the half-hithches.

6.1.2 Rappeller in distress

A Emergency Descent Arrest

If the rappeller cannot control the rate of descent, rappeller should reach across body with left hand and grasp rope above right hand then use both hands for braking. A term referred to as "Double Braking." The rappeller may also, in addition to Double Braking, move the brake hand around to the back of the body in an attempt to use the added friction of the clothing to assist braking.

A rappeller on the ground may slow the descent of a rappeller on a rope by pulling directly down on the rope. This procedure is called belaying.

B Problems After Rappel

For operations where multiple rappellers are deployed from a single rope, procedures are in place to allow the first rappellers to the ground to signal problem to the spotter.

1 If 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.

2 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.

6.2 Helicopter Emergency

NOTE: There are many circumstances that can constitute an in-flight emergency. Pilots, spotters and rappellers must understand that the consequences of an emergency change significantly once rappellers are committed to the rope. It is extremely important for a pilot and spotter to have a firm understanding of the situation and discuss up front as many circumstances as possible prior to operations. In the midst of an emergency is NOT the place to discover that, "What you heard is not what I meant." This should be accomplished through briefings and on-ground emergency exercises.

6.2.1 Emergency Communications

In the rappel environment, clear and concise communication culminating in a coordinated response between the spotter and pilot is critical to a successful outcome.

There are two basic categories of emergencies:
1. Those that require an **immediate** response.
2. Those that permit a **delayed** response.

6.2.2 Immediate Response Emergencies:

There are a limited number of emergencies that fall into this category. In the rappel environment these emergencies are characterized by a need to depart the rappel hover without delay. In this type of emergency, the possibility of affecting a positive outcome will be impacted by the ability to jettison ropes quickly.

Examples of Possible Emergencies:
-Engine Failure
-Tail Rotor Failure
-Hard over of controls
-Engine over speed/driveshaft failure
-Compressor Stall (Single engine)
-Governor Failure Low Side (Twin Engine)
-Governor Failure (Single Engine)

A. **Challenge/Response Communications- Immediate Response Emergency**

PILOT: "Cut, Cut, Cut"

SPOTTER:

1. If ropes have not been deployed:
   - state **"Clear"**
   - immediately take seat and buckle-up.

2. If ropes have been deployed, state **"Cutting Ropes"** and:

   a. If ropes have been deployed but rappellers are still in their seats:
      - cut ropes at the anchor below swedges,
      - state **"Clear"** when second rope has been cut
      - take seat and buckle-up.

   b. If rappellers seatbelts are removed:
      - Give rappellers signal to "return to seats"
      - Cut ropes below the descent device on either side as rappellers re-enter aircraft
      - State **"Clear"** when second rope has been cut
      - Take seat and buckle-up.

   c. If rappellers have departed the skid:
      - Confirm emergency
      - Cut ropes at the anchor below the swedges
      - State **"Clear"** when second rope has been cut
      - Take seat and buckle-up.

NOTE: The "Cut, Cut …" and the subsequent actions taken by the pilot and spotter will occur almost simultaneously. Pilot, will attempt to gain forward flight, if possible, which will require that the spotter clear ropes without hesitation. The pilot is not expected to wait for the "Clear" from the spotter before taking action to appropriately respond to the emergency. Any failure to immediately clear the aircraft of ropes may pose a threat to the aircraft and personnel onboard, as well as increase the risk to rappeller(s) on the rope(s).

6.2.3 Delayed Response Emergencies:

There are any numbers of events, typically mechanical or environmental, that fall into this category. In the rappel environment, these events are characterized by an ability to delay the departure from the rappel hover. In events of this nature there is typically time to complete a rappel sequence prior to departing the rappel hover**.**

Caution: These procedures may not require immediate action and responses can vary in time from seconds to minutes

Examples of Possible Problems:

-Transmission/Engine/Tail Rotor Gear Box Chip Light
-Hydraulic Failure
-Oil temp/Oil pressure light
-Hydraulic temp or pressure light
-Unknown Master Caution
-Fire light (require pilot check of controls and for fire on board)
-Stuck pedal
-Fuel control or governor failure high side (Twin Engine)
-Electrical failure
-Fuel/air filter clog
-Fuel pump failure
-Decrease in rotor RPM
-Compressor Stall (twin engine)
-Severe up or down drafts

A. Challenge/Response Communications - Delayed Response Emergency

1. Events of a **mechanical** nature require termination of the rappel mission until such problem(s) can be resolved. An event of this nature requires that the pilot announce the problem, describe the problem and inform the spotter of the actions required to address the event. The ensuing discussion between pilot and spotter will determine a course of action and the time available.

   a. If ropes *have not* been deployed:
      - Spotter states **"Clear"**
      - Immediately take seat and buckle-up.
      - Aircraft will depart immediately and comply with Pilot Operating Handbook (POH) direction.

   b. If ropes *have been* deployed and rappellers *have not* departed the skids:
      - The spotter will return rappellers to their seats

- Cut ropes freeing the aircraft for immediate departure and compliance with POH direction.

c. If you are in mid sequence (ropes deployed and rappellers departed the skids)
   - Continuation of the rappel is permissible if circumstances warrant.
   - Once the rappellers are on the ground the spotter will cut the ropes freeing the aircraft for immediate departure and compliance with POH direction

2. Events of an **<u>environmental</u>** nature may be resolved by waiting for the event to subside or relocating to an alternate rappel site. An event of this nature requires that the pilot inform the spotter of the actions required to address the event. **The ensuing discussion between pilot and spotter will determine a course of action and whether relocation is necessary.**

   a. If relocation is not required:
      - Once the pilot and spotter concur that the event is no longer of concern rappel operations can resume.

   b. If relocation is required:
      1. If ropes have not been deployed,
         - Spotter state **"Clear"**
         - Immediately take seat and buckle-up.
         - Aircraft will depart immediately and comply with Pilot Operating Handbook (POH) direction.
      2. If ropes have been deployed and rappellers have not departed the skids:
         - the spotter will return rappellers to their seats.
         - cut ropes freeing the aircraft for immediate departure and compliance with POH direction.
      3. If you are in mid sequence (ropes deployed and rappellers departed the skids):
         - Continuation of the rappel is permissible if circumstances warrant.
         - Once the rappellers are on the ground the spotter will cut the ropes freeing the aircraft for immediate departure and compliance with POH direction.

6.2.4 Loss of Inter-Cabin Communication:

In the event the pilot and/or the spotter become aware of a loss of inter-cabin communication the rappel process shall be suspended:

A. Spotter will signal to pilot loss of communication with a shoulder tap and presentation of a single clenched fist.

B. If ropes have not been deployed, rappel operations will be suspended. If the problem persists, signal pilot with a shoulder tap and thumbs up when ready to depart. The aircraft will proceed to a location where the problem can be resolved.

C. If ropes have been deployed and rappellers have not departed the skids, the spotter will return rappellers to their seats. If problem persists, ropes will be jettisoned, rappel operations will be terminated and then signal pilot with shoulder tap and thumbs up when ready to depart. The aircraft will proceed to a location where the problem can be resolved.

D. If ropes have been deployed and the rappellers have departed the skids, the rappellers will descend to the ground, rappel operations will be suspended. If problem persists the spotter will jettison the ropes and then signal pilot with a shoulder tap and thumbs up when ready to depart. The aircraft will proceed to a location where the problem can be resolved.

7 CARGO LETDOWN OPERATIONS

7.1 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 rappel operations; ***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.

7.2 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.

7.3 Utilization

7.3.1 Missions

Cargo-letdown expands the flexibility of the helicopter and crew and may enhance the safety of an operation. Cargo Letdown can be considered a resource when formulating response plans for a Bureau, Region, Forest, Park, etc.

7.3.2 Response

Initial response on an incident can be expedited where travel time by conventional methods is time intensive and arduous. Cargo Letdown can be utilized under a variety of terrain conditions which typically limit other access.

7.4 Qualifications

7.4.1 Pilot

Cargo-Letdown Pilots shall meet the same certification and proficiency requirements as a rappel pilot outlined in 2.1 of this guide. The only exception is any pilot carded only for cargo-letdown will perform a cargo sequence where rappel is referenced.

7.4.2 Cargo Letdown Check Spotter

A. Requirements and Qualification

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

NOTE: New programs will be approved by National Aviation Offices for DOI or Forest Service.

B. Annual Check Spotter currency

Each cargo-letdown check spotter must maintain currency and proficiency as a cargo letdown spotter. (7.4.3 C & D)

C. Designation

Designation of Check Spotters shall be approved for model specific platforms annually by their Regional Helicopter Operations Specialist for Forest Service; by the National Aviation Office for BLM; by the Area Manager for BIA; or by the Regional Aviation Manager for NPS in the form of a designation letter. 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.

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.

7.4.3 Cargo Letdown Spotter

A. Cargo letdown Spotter Trainee Requirements

To be considered for spotter training, the trainee must meet the following requirements:

1. Completion of S-372 Helicopter Manager and initiate Helicopter Manager Taskbook.
2. Completion of National Incident Management System(NIMS) IS 700.
3. Other recommended training, Basic Supervision for First Line Supervisors, M-410 or equivalent, Contracting Officer Representative Level I, CRM, Risk Awareness (A-205) Ride along on rappel and or cargo missions

B. Cargo-letdown Spotter Training and Qualification

Cargo-letdown spotter trainees must complete the following requirements to be considered for spotter certification.

1. Meet the training, experience and certification requirements for a Helicopter Manager as stated in their agency policy.
2. Demonstrate ability to rig helicopter and gear for cargo letdown operations.
3. Complete five (5) simulated deployments without procedural error. Perform all of the duties of the spotter from the initial call through return to base.
4. Under the supervision of a qualified spotter, must spot ten (10) loads from the helicopter, five (5) of which are in typical terrain.
5. Show principles of inspection, care, maintenance, and repair of cargo letdown equipment.
6. Identify the spotter's duties and responsibilities.
7. Pass a final evaluation administered by a qualified cargo-letdown or rappel check spotter.
8. The spotter trainee will be recommended for certification by a check spotter, reviewed by Regional Helicopter Operations Specialist for Forest Service; by the State Aviation Manager for BLM; by the Area Manager for BIA; or by the Regional Aviation Manager for NPS and certified by the local unit official. Other agencies and bureaus not listed above shall approve spotters for their operations at a level in their organization commensurate with the positions above.

NOTE: These are minimum requirements and the certifying official may request additional training due to the complexity of the expected operations, or an individual's needs for training in specific areas. If an individual cannot meet all of the above minimum requirements, the certifying official will not approve the spotter for cargo letdown operations.

C. Spotter Proficiency

Individuals shall make at least one cargo letdown spot 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.

D. Annual Spotter certification

1. Must attend and successfully complete annual cargo letdown training.
2. Simulate a deployment without error.
3. Complete deployment of three loads of cargo without procedural error.
4. Demonstrate knowledge of standard procedures of cargo letdown.
5. Reference 4.1.2 for documentation requirements.

7.5 Cargo Deployment Equipment

7.5.1 Figure 8 with ears

For wildland fire rappel and cargo-letdown operations the steel or aluminum CMC rescue 8 with ears is the only approved letdown device. To rig: a loop of the line is passed through the center opening of the figure 8 and over the top. A technique referred to as a double wrap can be used for heavier loads. To perform a double wrap merely repeat original process.

A. **Inspection**:

1. Inspect for grooves developing or flaking occurring in aluminum figure 8's. 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.
2. Inspect the figure 8 for aluminum flaking. This develops rough edges that could cause excessive wear on the line. If flaking is evident, remove the figure 8 from service. Although the acquisition cost is double, steel figure 8's have proven more durable and service life is considerably longer than aluminum, however, steel may cause heat damage more easily because it does not dissipate heat as readily as aluminum.
3. Inspect for cracks or breaks. If cracks are evident, retire figure 8.
4. Figure 8's must be inspected by a spotter prior to each use.

B. Take care to

1. Avoid rough handling.
2. Not drop or drag on ground.
3. Keep clean.

7.5.2 Carabiners

Only the SMC Lite Alloy Steel Locking carabiner is authorized for cargo letdown use. (Exception: carabiners specifically identified by supplemental type certificate (STC) for direct attachment to anchor). Reference 3.5.1 for specific carabiner information.

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

7.5.3 Cargo Letdown Line

To maintain even wear and maximize each lines useful life, line ends will be rotated after each use. To track equipment use, each end shall be marked A or B.

Let-down lines are available in lengths of 250ft or 300 ft. Both let-down lines shall conform to Mil-W-5625K Webbing, Textile, Nylon, Tubular, ¾". Webbing conforming to this standard has a minimum breaking strength of 2300lbs.

Let-down lines 250 feet in length will be of white tubular nylon webbing and conform to drawing #MTDC-983, let-down lines of 300ft will be of yellow tubular nylon webbing and conform to drawing #MTDC-983.

Accordion packs will be constructed as to easily identify a 250ft let-down line from a 300ft let-down line. Accordion packs for 250ft let-down lines will be constructed of white cotton duck cloth, and accordion packs for 300ft let-down lines will be made from white cotton duck cloth with yellow seam tape. To further identify accordion packs, 1 inch stencils will be used to mark the outside surface of accordion packs with the length of let-down line to be used with each size accordion pack. 250 ft Accordion Packs will conform to drawing #MTDC-974 and 300 ft Accordion Packs will conform to drawing number #MTDC-1037. Both lines 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 or helicopter skids to prevent abrasion of the line.

250 foot line: White ¾" tubular nylon webbing, dyed appropriately, with stenciled accordion pack.

300 foot line: Yellow ¾' tubular nylon webbing, dyed appropriately, with stenciled accordion pack

A. Inspection:

1 Let-down lines will be inspected for wear and burns after cargo deployment, and ends reversed for the next let-down sequence.

2 Inspect stitching and webbing for abrasion, wear, cuts, chemical contamination or other damage.

B. Marking:

A twenty five foot section from each end of the let-down lines shall be clearly marked in red and a ten foot section in the center of the line should be marked with a contrasting color. Use only Rit dye to mark lines.

7.5.4 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. Sources for approved cargo letdown containers are also listed on the rappel website. Maximum allowable suspended weight per internal cargo let down container shall be 125 lbs. Approved cargo let down containers shall pass a static strength test with no failure or ruptured stitches when loaded to a minimum weight of 468.75 lbs. (safety factor of 3.75 to 1).

A Internal cargo letdown containers shall consist of the following:

1. Cardboard box with harness, the cardboard box shall consist of double wall construction with minimum burst strength of 275 lbs. The box harness and attachment hardware shall have minimum burst strength of 275 lbs. The box harness and attachment hardware shall have a minimum tensile strength of 1125 lbs.
2. A-5/Metolius style Haul Bag.
3. Large Klamath Bag.
4. Small Klamath Bag.

B External cargo letdown containers shall consist of the following:

1. Tuna Net (NFES #0795).
2. Large Klamath Bag.
3. Small Klamath Bag.

The maximum weight and the minimum weight for the large and small Klamath bags will be stenciled on the container with 3 inch letters in a high contrast color. The limitations will be illustrated on opposing sides of the container.

NOTE: Maximum weight and minimum weight for external cargo deployment containers.

- **Large Klamath Bag**
  - **Maximum Weight: 300 lbs.**
  - **Minimum Weight: 150 lbs.**

- **Small Klamath Bag**
  - **Maximum Weight: 300 lbs.**
  - **Minimum Weight: 80 lbs.**
- **Tuna Net**
  - **Maximum Weight: 300 lbs.**
  - **Minimum Weight: 40 lbs.**

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

NOTE: During flight testing of external containers, loads became unstable above 60 knots indicated airspeed. External load operations shall be conducted at an airspeed that ensures the load remain stable.

7.5.5 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 drawing # MTDC 980 Helicopter Rappel External Cargo Break Away strap and drawing # MTDC 982 Helicopter Rappel External Cargo Strap.

A. Inspection

1. Equipment will be inspected prior to use by a qualified spotter.
2. Inspect stitching and webbing for abrasion, wear, cuts, chemical contamination or other damage.

7.5.6 Figure 8 Extender

Relocates the Figure 8 away from an aircraft hardpoint. Figure 8 extender conforms to MTDC Drawing # 1040.

A. Inspection:

1. Equipment will be inspected prior to use by a qualified spotter.
2. Inspect stitching and webbing for abrasion, wear, cuts, chemical contamination or other damage.

7.5.7 External Cargo Swivel

All external cargo-letdown loads must be attached to the helicopter with an approved swivel.

The Petzl P58 S, P58 L and swivels approved for cargo in the IHOG

are the approved swivels for external cargo letdown operations.

A. Inspection

1. Equipment will be inspected prior to use by a qualified spotter.
2. Spinning action of the swivel
3. Physical damage
4. Inspection criteria as outlined in chapter 9 of IHOG approved equipment.

7.6 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.

7.6.1 Internal cargo deployment procedures

A. Pre-Flight Duties for Cargo Only Missions

1. Prior to departure, the pilot(s) and involved personnel shall receive a briefing on mission objectives, communications, known hazards, and emergency procedures.
2. Spotter puts on harness, ensures safety knife is attached to harness..
3. Load calculations and manifests complete and posted.
4. Spotter completes necessary pre-flight inspections.
5. Prior to flight, the spotter must receive a spotter equipment check (see 5.3.9). When ground personnel are unavailable, the spotter shall have the pilot perform this check. Positive communication between the spotter and pilot must occur to ensure Spotter has attached their tether to an approved hard point.

B. Rigging and Loading Cargo

1. Spotter will configure Helicopter to meet the needs of the specific cargo mission.
2. Rig cargo with carabiner(s) and secure in helicopter. Cargo should be secured in accordance with model specific configurations in Appendix B
3. Check cargo delivery equipment to ensure proper number of letdown lines, extra carabiners, and figure 8 are available and secured in accessible location.
4. Spotter visually inspects anchor. (See Chapter 3, Rappel Anchor Inspection)
5. Spotter connects tether, plugs into avionics, boards aircraft, and secures seatbelt.
6. **Spotter tells pilot, “Tether attached OK to depart,” Pilot Responds “Tether attached, departing.”**

C. Pre-Cargo Sequence

1. Pilot(s) flies a reconnaissance of the area to look for hazards and works with spotter to select an appropriate cargo delivery site.
2. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the cargo operation. Spotter communicates with flight following authority & pilot regarding number of loads to be deployed.
3. Inform ground personnel to stay clear of cargo during deployment.

4. Adjust radios as needed to ensure pilot and spotter communication will not be compromised by excessive radio chatter. Radios must remain on and dialed to the appropriate flight following frequency.
5. Where possible helicopter should maintain at least 50ft. clearance above any obstacles before starting a cargo operation.
6. If this is not possible and helicopter must descend below the canopy, rotor clearance must meet the current standards in the IHOG.
7. Before starting cargo operations, A HOGE Power check is accomplished at an altitude comparable to the cargo site or greater. A Positive rate of climb must be established without exceeding aircraft limitations. Pilot states **"hover established, positive rate of climb, power is good."**
8. Spotter responds **"Power is Good"**
9. Spotter activates hot mike if not done already
10. If not performed on the ground, spotter rigs Figure 8 with cargo letdown line and attaches figure 8 using one (1) carabiner in anchor bracket barrel down gate facing inboard. Attach end of letdown line to cargo with steel locking carabiner. Lock carabiner.
11. Cargo letdown pack must be connected to a hard point.
12. Spotter removes restraining straps from cargo, ensure remaining cargo is secure, and positions cargo in doorway. Spotter relays to pilot when rigging is complete.
13. Aircraft with sliding doors will follow the procedures in the following three bullets
    - Pilot states to spotter **"below 40 knots moving into cargo delivery site.**
    - Spotter states to pilot, **"opening aircraft door(s)."** Once spotter has opened aircraft door spotter states to pilot "**reset master caution".**
    - Pilot responds **"Master Caution Reset."**
14. Spotter finalizes proper position over cargo site. Using pilot's perspective (left, right, forward, back, and up or down relative to altitude above the ground.)

D. Cargo Deployment Sequence

1. Spotter states to pilot, **"Cargo ready.How is the power."**
2. Pilot **"powers good send cargo".**

3. Spotter will communicate with pilot regarding adequate rotor clearance, power assessments, and cargo spot status throughout the cargo operation. Using pilot's perspective (left, right, forward, back, and up or down relative to altitude above the ground).
4. Spotter states to pilot, **"Sending Cargo"** then eases cargo out the door, over the flight step and skid.
5. 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"**
6. When cargo is on the ground, unhook figure 8 from carabiner/Anchor and remove letdown line. Hold slack in line to prevent billowing and unhook letdown line bag from hard point. Wrap excess letdown line around bag and throw clear of aircraft.
7. Inform pilot if more cargo is to be lowered. Pilot/spotter will determine whether to hold hover or orbit area until cargo is ready for subsequent deployment.
8. When cargo deployment is complete spotter states to pilot, **"Lines are away, clear to depart."**
9. Pilot responds "**lines away, clear to depart**."
10. Spotter states"**affirmative lines are clear, clear to depart."**
11. Spotter closes doors (if necessary), returns to seat and fastens seatbelt**.**
12. Radio returned to normal operational mode and flight following authority is informed that cargo operation has been completed.

7.6.2 External Cargo Deployment Procedures

A. Pre-Flight Duties For Cargo Only Missions.

1. Prior to departure, the pilot(s) and involved personnel shall receive a briefing on mission objectives, communications, known hazards, and emergency procedures.
2. Spotter puts on harness, ensures safety knife is attached to harness..
3. Load calculations and manifests complete and posted.
4. Spotter completes necessary pre-flight inspections.
5. Prior to flight, the spotter must receive a spotter equipment check (see 5.3.9). When ground personnel are unavailable, the spotter shall have the pilot perform this check. Positive communication between the spotter and pilot must occur to ensure Spotter has attached their tether to an approved hard point.

B. Rigging and Loading Cargo (see Appendix B for specific aircraft rigging and configuration)

1. Loaded cargo container is set up in the front of the helicopter.
2. Attach one end of the cargo strap to the cargo container and the other end to the swivel. Light weight nets (tuna) are attached directly to the swivel.
3. External cargo must be attached to the belly hook, with hardware that meets flight manual specs.
4. 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.
5. Rig letdown line through figure 8 and attach a carabiner to the hard loop on the free end of the line.
6. Anchor
   - Overhead Anchor: Attach the steel-lite carabiner and the rigged figure 8 to the outer attachment point on the left side overhead anchor. Once complete, pull the free end of the line and carabiner down to the floor and attach to the Velcro loop on the breakaway strap. Spotter must secure the breakaway strap attached to the carabiner during flight.
   - Floor anchor: Attach the rigged figure 8 to the forward attach point on the left side of the floor anchor. Attach locking carabiner on rigged letdown line to the Velcro loop on the

breakaway strap. Extender strap may be used to move figure 8 away from the floor anchor.

7. Lock off letdown line on figure 8.
8. Cargo letdown pack must be connected to a appropriate hard point.
9. Spotter connects tether, plugs into avionics, completes necessary external cargo checks, boards aircraft, and secures seatbelt.
10. Spotter tells pilot**, "Tether attached, load on the hook OK to depart,"**
11. Pilot Responds **"Tether attached, load on the hook, departing."**

C. Pre-Cargo Sequence

1. Pilot(s) flies a reconnaissance of the area to look for hazards and works with spotter to select an appropriate cargo delivery site.
2. Contact appropriate flight following authority (ATGS, HLCO, dispatch, etc.) prior to commencing the cargo operation. Spotter communicates with flight following authority & pilot regarding number of loads to be deployed.
3. Inform ground personnel to stay clear of cargo during deployment.
4. Adjust radios as needed to ensure pilot and spotter communication will not be compromised by excessive radio chatter. Radios must remain on and dialed to the appropriate flight following frequency.
5. Where possible helicopter should maintain at least 50ft. clearance above any obstacles before starting a cargo operation.
6. If this is not possible and helicopter must descend below the canopy, rotor clearance must meet the current standards in the IHOG.
7. Before starting cargo operations, A HOGE Power check is accomplished at an altitude comparable to the cargo site or greater. A Positive rate of climb must be established without exceeding aircraft limitations. Pilot states **"hover established, positive rate of climb, power is good."**
8. Spotter responds **"Power is Good"**
9. Spotter activates hot mike if not done already
10. Spotter states to pilot "removing seatbelt" and "moving into position".
11. Spotter attaches hard loop on the breakaway strap and ensures carabiner is locked. Spotter states to pilot "**Cargo connected hard**" Pilot confirms "**Hooked Hard**"

12. Spotter unlocks the figure 8 and ensures the carabiner is clear of the skid.
13. Spotter finalizes proper position over cargo site. Using pilot's perspective (left, right, forward, back, and up or down relative to altitude above the ground.)

D. Cargo Deployment Sequence

1. Spotter will communicate with pilot regarding adequate rotor clearance, power assessments, and cargo spot status throughout the cargo operation. Using pilot's perspective (left, right, forward, back, and up or down relative to altitude above the ground).
2. **Spotter states to pilot, "Cargo is ready for deployment on your count."**
3. Pilot gives a three (3) count and releases cargo from belly hook.
4. 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 away"**
   - **"Cargo halfway down"**
   - **"Cargo on the ground"**
5. When cargo is on the ground, unhook figure 8 from carabiner/anchor and remove letdown line. Hold slack in line to prevent billowing and unhook letdown line bag from hard point. Wrap excess letdown line around bag and throw clear of aircraft.
6. When cargo deployment is complete **spotter states to pilot, "Lines are clear, returning to seat, seatbelt on, clear to depart."**

7.7 Cargo Delivery Emergency Procedures: Internal Cargo

"*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. In the cargo delivery environment, clear and concise communication culminating in a coordinated response between the spotter and pilot is critical to a successful outcome.

Types of Helicopters Emergencies

There are two basic categories of emergencies:

1. Those that require an **immediate** response.
2. Those that permit a **delayed** response.

7.7.1 *Immediate Response Emergencies*:

There are a limited number of emergencies that fall into this category. In the cargo delivery environment these emergencies are characterized by a need to depart the hover without delay. In this type of emergency, the possibility of affecting a positive outcome will be impacted by the ability to jettison lines quickly.

Examples of Possible Emergencies:

- Engine Failure
- Tail Rotor Failure
- Hard over of controls
- Engine over speed/driveshaft failure
- Compressor Stall (Single engine)
- Governor Failure Low Side (Twin Engine)
- Governor Failure (Single Engine)

7.7.2 Challenge/Response Communications - Immediate Response Emergency

PILOT: "Cut, Cut, Cut"

SPOTTER:

A. If cargo is still secure:
   - state **"Clear"**
   - immediately take seat and fasten seatbelt
   - Aircraft will depart immediately and comply with Pilot Operating Handbook (POH) direction.

B. If the cargo process has begun and the cargo has been unsecured:
   - State **"Clearing Cargo"** and:

a. If cargo is still in the aircraft:
   - Re-secure cargo or Cut line directly above cargo container and Jettison cargo out open door.
   - State "**Clear**"
   - take seat and buckle-up.

b. If cargo has been delivered outside the aircraft:
   - Cut line
   - State **"Clear"** when the cargo container has cleared the aircraft
   - Take seat and buckle-up.

NOTE: The "Cut, Cut …" and the subsequent actions taken by the pilot and spotter will occur almost simultaneously. Pilot, will attempt to gain forward flight, if possible, which will require that the spotter clear cargo without hesitation. The pilot is not expected to wait for the "Clear" from the spotter before taking action to appropriately respond to the emergency. Any failure to immediately clear the aircraft of cargo and line may pose a threat to the aircraft and personnel onboard.

7.7.3 *Delayed Response Emergencies*:

There are any numbers of events, typically mechanical or environmental, that fall into this category. In the cargo delivery environment, these events are characterized by an ability to delay the departure from the hover. In events of this nature there is typically time to complete a cargo sequence prior to departing the hover**.**

Caution: These procedures may not require immediate action and responses can vary in time from seconds to minutes

Examples of Possible Problems:

- Transmission/Engine/Tail Rotor Gear Box Chip Light
- Hydraulic Failure
- Oil temp/Oil pressure light
- Hydraulic temp or pressure light
- Unknown Master Caution
- Fire light (require pilot check of controls and for fire on board)
- Stuck pedal
- Fuel control or governor failure high side (Twin Engine)
- Electrical failure
- Fuel/air filter clog
- Fuel pump failure
- Decrease in rotor RPM
- Compressor Stall (twin engine)
- Severe up or down drafts

7.7.4 Challenge/Response Communications - Delayed Response Emergency

Events of a **mechanical** nature require termination of the cargo mission until such problem(s) can be resolved. An event of this nature requires that the pilot announce the problem, describe the problem and inform the spotter of the actions required to address the event. The ensuing discussion between pilot and spotter will determine a course of action and the time available.

A. If cargo is still secure:
- Spotter states **"Clear"**
- Immediately take seat and buckle-up.
- Aircraft will depart immediately and comply with Pilot Operating Handbook (POH) direction.

B. If cargo has been unsecured but not delivered outside the aircraft:
- The spotter will state **"Clear"**
- Secure the cargo as quickly as possible
- Take seat and buckle seatbelt.

C. If you are in mid sequence (cargo has been delivered past the skids)
- Continuation of the cargo delivery may be permissible if circumstances warrant.
- Once cargo is on the ground the spotter will cut the line freeing the aircraft for immediate departure and compliance with POH direction

Events of an **environmental** nature may be resolved by waiting for the event to subside or relocating to an alternate cargo site. An event of this nature requires that the pilot inform the spotter of the actions required to address the event. **The ensuing discussion between pilot and spotter will determine a course of action and whether relocation is necessary.**

A. If relocation is not required:
- Once the pilot and spotter concur that the event is no longer of concern cargo operations can resume.

B. If relocation is required:

- If cargo is still secure:
  a. Spotter states **"Clear"**
  b. Immediately take seat and buckle-up.

c. Aircraft will depart immediately and comply with Pilot Operating Handbook (POH) direction.

- If cargo has been unsecured but not delivered outside the aircraft:
  a. The spotter will state **"Clear"**
  b. Secure the cargo as quickly as possible
  c. Take seat and buckle seatbelt.

- If you are in mid sequence (cargo has been delivered past the skids)
  a. Continuation of the cargo delivery may be permissible if circumstances warrant.
  b. Once cargo is on the ground the spotter will cut the line freeing the aircraft for immediate departure and compliance with POH direction

7.8 Cargo Delivery Emergency Procedures: External Cargo

"*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. In the cargo delivery environment, clear and concise communication culminating in a coordinated response between the spotter and pilot is critical to a successful outcome.

Types of Helicopters Emergencies

There are two basic categories of emergencies:

1. Those that require an **immediate** response.
2. Those that permit a **delayed** response.

7.8.1 *Immediate Response Emergencies*:

There are a limited number of emergencies that fall into this category. In the cargo delivery environment these emergencies are characterized by a need to depart the hover without delay. In this type of emergency, the possibility of affecting a positive outcome will be impacted by the ability to jettison lines quickly.

Examples of Possible Emergencies:

- Engine Failure
- Tail Rotor Failure
- Hard over of controls
- Engine over speed/driveshaft failure
- Compressor Stall (Single engine)
- Governor Failure Low Side (Twin Engine)
- Governor Failure (Single Engine)

7.8.2 *Challenge/Response Communications - Immediate Response Emergency*

A. Cargo still secure on the belly hook and cargo process has not yet commenced while aircraft is in a hover or in forward flight with breakaway strap hooked **"Soft".**

PILOT: Declares emergency, while jettisoning external cargo from the aircraft.

SPOTTER:

- States "Clear"
- Immediately take seat and fasten seatbelt

B. If cargo process has started, break away strap is hooked **"hard"** w/ figure 8 locked off and cargo is still on the hook.

- State **"**Clearing Breakaway Strap"
- Cut letdown line below the figure 8
- State "Clear- Jettison Load"
- Immediately take seat and fasten seatbelt

C. If cargo process has started break away strap is hooked **"hard"** w/ figure 8 unlocked and cargo still on the belly hook
- state **"**Clearing Breakaway Strap"
- Cut letdown line below the figure 8
- State "Clear- Jettison Load"
- Immediately take seat and fasten seatbelt

D. If the cargo process has begun and the cargo has been released off the belly hook.

- Cut line below the figure 8
- State **"Clear"** when the let down line has cleared the aircraft
- Take seat and buckle-up.

NOTE: The "Cut, Cut …" and the subsequent actions taken by the pilot and spotter will occur almost simultaneously. Pilot, will attempt to gain forward flight, if possible, which will require that the spotter clear cargo without hesitation. The pilot is not expected to wait for the "Clear" from the spotter before taking action to appropriately respond to the emergency. Any failure to immediately clear the aircraft of cargo and line may pose a threat to the aircraft and personnel onboard

7.8.3 *Delayed Response Emergencies*:

There are any numbers of events, typically mechanical or environmental, that fall into this category. In the cargo delivery environment, these events are characterized by an ability to delay the departure from the hover. In events of this nature there is typically time to complete a cargo sequence prior to departing the hover**.**

Caution: These procedures may not require immediate action and responses can vary in time from seconds to minutes

Examples of Possible Problems:

- Transmission/Engine/Tail Rotor Gear Box Chip Light
- Hydraulic Failure
- Oil temp/Oil pressure light

- Hydraulic temp or pressure light
- Unknown Master Caution
- Fire light (require pilot check of controls and for fire on board)
- Stuck pedal
- Fuel control or governor failure high side (Twin Engine)
- Electrical failure
- Fuel/air filter clog
- Fuel pump failure
- Decrease in rotor RPM
- Compressor Stall (twin engine)
- Severe up or down drafts

7.8.4 Challenge/Response Communications - Delayed Response Emergency

Events of a **mechanical** nature require termination of the cargo mission until such problem(s) can be resolved. An event of this nature requires that the pilot announce the problem, describe the problem and inform the spotter of the actions required to address the event. The ensuing discussion between pilot and spotter will determine a course of action and the time available.

A. Cargo still secure on the belly hook and cargo process has not yet commenced while aircraft is in a hover or in forward flight with breakaway strap hooked **"Soft".**
   - Spotter states **"Clear"** Cargo can be jettisoned at pilot and spotters discretion
   - Immediately take seat and buckle-up.
   - Aircraft will depart immediately and comply with Pilot Operating Handbook (POH) direction.

B. If cargo process has started, break away strap is hooked **"hard"** w/ figure 8 locked off and cargo is still on the hook.
   - state **"**Clearing Breakaway Strap"
   - Disconnect Breakaway strap from carabineer cut letdown line below the figure 8
   - State "Clear- "Jettison Load" at pilot and spotters discretion
   - Immediately take seat and fasten seatbelt

C. If cargo process has started break away strap is hooked **"hard"** w/ figure 8 unlocked and cargo still on the belly hook
   - state **"**Clearing Breakaway Strap"
   - Disconnect Breakaway strap from carabineer or cut letdown line below the figure 8

- State “Clear- “Jettison Load” at pilot and spotters discretion
- Immediately take seat and fasten seatbelt

D. If the cargo process has begun and the cargo has been released off the belly hook.
   - Continuation of the cargo delivery may be permissible if circumstances warrant.
   - Once cargo is on the ground the spotter will cut the line below the figure 8 freeing the aircraft for immediate departure and compliance with POH direction
   - State **“Clear”** when the let down line has cleared the aircraft
   - Take seat and buckle-up.

Events of an **environmental** nature may be resolved by waiting for the event to subside or relocating to an alternate cargo site. An event of this nature requires that the pilot inform the spotter of the actions required to address the event. **The ensuing discussion between pilot and spotter will determine a course of action and whether relocation is necessary.**

A. If relocation is not required:
   - Once the pilot and spotter concur that the event is no longer of concern cargo operations can resume.

B. If relocation is required:

   - If cargo is still secured on the belly hook:
     a. Spotter insures breakaway strap is hooked “**Soft**” if not spotter needs to ensure it is hooked “**soft”** before continuing.
     b. Spotter states **“Clear”**
     c. Immediately take seat and buckle-up.
     d. Aircraft will depart immediately and comply with Pilot Operating Handbook (POH) direction.

   - If you are in mid sequence (cargo has been released from the hook)
     a. Continuation of the cargo delivery may be permissible if circumstances warrant.
     b. Once cargo is on the ground the spotter will cut the line freeing the aircraft for immediate departure and compliance with POH direction