# WARRIOR TRAINING CENTER

# RAPPEL MASTER

## HANDBOOK

*"WHEN THE WILL IS STRONG, EVERYTHING IS EASY"*

FY2013

# TABLE OF CONTENTS

## RAPPEL MASTER OPERATIONS

CHAPTER 1
DUTIES AND RESPONSIBILITIES……..…….…..7

CHAPTER 2
EQUIPMENT AND ROPE MANAGEMENT……..……...…….23

CHAPTER 3
KNOTS AND DEPLOYMENT BAGS……..…..26

CHAPTER 4
RAPPEL MASTER PERSONNEL INSPECTION (RMPI)…….50

CHAPTER 5
HOOK-UP INSPECTION……..……78

CHAPTER 6
RAPPELLING PROCEDURES...…….80

CHAPTER 7
AIRCRAFT PREPARATION AND RIGGING...…...…...…….88

CHAPTER 8
AIRCRAFT COMMAND AND CONTROL...…...……..96

# APPENDIX

**APPENDIX A**
TOWER INSPECTION SHEET…..……..…….....101

**APPENDIX B**
KNOT EXAMINATION (TEST)……...…….104

**APPENDIX C**
KNOT EXAMINATION (RE-TEST)…….105

**APPENDIX D**
EQUIPMENT INSPECTION (TEST)……...……..106

**APPENDIX E**
EQUIPMENT INSPECTION (RE-TEST).…….107

**APPENDIX F**
DA FORM 5752-R (ROPE USAGE LOG)…..…….……..108

**APPENDIX G**
HOOK-UP EXAMINATION (TEST)...….……....….109

**APPENDIX H**
HOOK-UP EXAMINATION (RE-TEST)……..…....110

**APPENDIX I**
A/C PREPARATION AND RIGGING UH-1H (TEST).....111

**APPENDIX J**
A/C PREPARATION AND RIGGING UH-1H (RE-TEST).....112

**APPENDIX K**
A/C PREPARATION AND RIGGING UH-60 (TEST)…….113

**APPENDIX L**
A/C PREPARATION AND RIGGING UH-60 (RE-TEST)…...114

# APPENDIX CONTINUED

**APPENDIX M**
AIR MISSION BRIEF…….115

**APPENDIX N**
AIRCRAFT COMMAND AND CONTROL (TEST)…....…….119

**APPENDIX O**
AIRCRAFT COMMAND AND CONTROL (RE-TEST)..……120

# REFERENCES

TC 21-24, Rappelling, January 2008

TC 3-97.61, Military Mountaineering, July 2012
(Replaced FM 3-97.61)

# CHAPTER 1

## DUTIES AND RESPONSIBILITIES
### (TOWER OPERATIONS)

The static tower used may vary in size and height from 34ft to 90ft. These towers should resemble the structure or aircraft of their training objective. Plans and designs for static rappel towers can be obtained through the Directorate of Public Works (DPW) Engineering Division, BLDG 6, Fort Benning, Georgia 31905 (706-545-1591).

Rappel towers must be inspected annually by post safety or post engineers. Installations, MACOMs, and unit commanders may establish additional policies and safety procedures as needed to ensure safe and effective rappelling operations.

**RAPPEL MASTER (RM):**

The Rappel Master's primary responsibility is **SAFETY.** The RM maintains consistent control of the operation and is responsible for everything that happens or fails to happen. The serviceability of all equipment (installation, unit, and personal property) and the personal supervision of rappelling operations are the Rappel Master's (RM) responsibility.

RM qualification is awarded only after the successful completion of a TRADOC accredited Rappel Master course that includes the following subjects:

- Duties and Responsibilities of a Rappel Master
- Safety SOP, regulations, and references
- Construction of a deployment bag
- Conduct of an equipment rappel off the rappel tower
- Conduct a Lock-In
- Talking a rappeller through completion of a rappel
- Conduct of ground training
- Inspecting for proper hook-ups
- Inspecting and maintaining equipment

- Inspecting and maintaining snap links
- Inspecting and maintaining rappelling gloves
- Inspecting and maintaining rappel ropes
- Identifying the rappel capabilities of aircraft used
- Controlling rappels from UH-1H or UH-60 aircraft
- Tying knots (square, end-of-the-line bowline, anchor-line, bowline, and Prusik), safety lines, and rappel seats
- Inspecting a rappel seat
- Aircraft rigging for rappelling operations
- Aircraft command and control

RM's must execute their duties in a tactical or training exercise once every six months to remain current. Failure to remain current will require a refresher class taught by a current Rappel Master on the subjects listed above.

Ground training and wall-side tower rappelling can be conducted without a school-trained Rappel Master as long as a fully qualified Rappel Safety Officer (RSO) is on site to assume the duties and responsibilities of the Rappel Master. (NOTE: The RSO must be certified and appointed by the commander)

**RAPPEL SAFETY OFFICER (RSO):**

Must be the rank of SFC or above, trained on applicable Rappel Master tasks, and is certified by his commander to serve in the position.

Must have extensive training in rappel operations and risk management or graduate from one of the following courses:

- Rappel Master Course
- Air Assault Course
- Ranger Course
- Basic Military Mountaineering Course

Serves as the OIC during all rappel operations and is responsible for the overall safety of all rappellers. Ensures that all safety precautions are followed and briefs VIPs/inspecting authorities.

**RAPPEL LANE NCO:**

Commander-appointed Corporal or above who is trained in the safe and proper execution of rappelling operations. Rappel Lane NCO must be qualified to supervise their lane operations and the following subjects:

- Responsibilities and safety requirements
- Inspection and maintenance of equipment
- Identification of satisfactory anchor points
- Identification of safe and unsafe hook-ups
- Establishment of a rappel point
- Inspection of a rappel seat
- Coaching techniques
- Rappelling procedures
- Emergency procedures
- Belay control procedures

Safety is their number one priority. The Rappel Lane NCO ensures proper safety procedures are followed, proper hook-ups on their lane, and issues commands and maintains eye contact with the rappeller at all times.

**Note:** If a Rappel Lane NCO has not conducted their duties within the last six months, they must complete the training listed above under the supervision of a current Rappel Master.

**RAPPELLER:**

The following requirements, under the supervision of a Rappel Master, must be successfully completed before beginning Aircraft (A/C) rappel training.

- Identify all rappelling equipment
- Demonstrate construction of rappel seat; donning of rappel harness; proper use and hook-up of rappel device and rappel rope
- Identify unsafe attachments, equipment, rope connections, and seat construction

- Define terms used in rappelling operations
- Identify knots used in rappel operations
- Understand and demonstrate rappel commands
- Demonstrate rappelling positions
- Demonstrate belaying procedures
- Demonstrate the ability to conduct a Lock-In
- Exhibit satisfactory performance from a rappel tower of at least 34ft in height

**NOTE:** 2 rappels with equipment and weapon and 2 without equipment and weapon **(2 rappels are conducted from the free side of the tower)**

**BELAY SAFETY:**

Must be Ranger or Air Assault qualified. One Belay Safety must be present for each two rappel stations.

The Belay Safety ensures belay personnel are performing their duties properly and should possess the same qualifications as a Rappel Lane NCO.

**BELAYER:**

Responsibilities are a subtask of basic rappel requirements and Soldiers must be trained before conducting rappelling training. Proper belay procedures include:

- Assume a position at the base of the lane about one pace away from the tower area
- Ensures that the rappel ropes are even with the ground during tower rappels
- Loosely holds the rappel rope with both hands to avoid interference with the rappeller while remaining able to stop the rappeller
- Immediately stops the rappeller by pulling downward on the rappel ropes if Rappel Master shouts “FALLING” or loses control of his brake hand during descent
- Watches the rappeller at all times and maintains constant voice or visual contact
- Wears a helmet to prevent injuries from falling debris

**PREPARATION AND SAFETY:**

The Rappel Master is in charge of the tower and conducts a visual and physical inspection of every item of equipment. This includes the structural lumber and timber, the ladder, the platform floor, and all anchor points. **(Unit SOPs will establish a specific tower inspection but for an example see Appendix A)**

Static towers will not be used during thunderstorms or excessively high winds. If ice is present, or the platform is slick from rain, rappelling will be delayed until conditions are safe.

Following personnel and equipment must be present during static tower training:

- Two military rappel ropes for each rappel station
- One Rappel Safety Officer (RSO)
- One Rappel Master for each rappel site
- One Rappel Lane NCO per rappel station
- One medic with medical kit and backboard
- One safety or medical evacuation vehicle with driver
- One Belayer for each rope station
- One Belay Safety for each two rappel stations

Safety briefing must be conducted prior to rappel operations and must include the following instructions:

- Each rappeller must secure loose clothing and equipment
- Rappellers climb the tower only when directed by the RM or Rappel Lane NCO
- Rappellers stay in the center of the tower until instructed to move to a rappel point
- When using the troop ladder only three Soldiers are on the ladder at one time and they must wait until directed to move up by the RM
- All personnel working within 3ft of the edge of the top of the tower must wear a restraining strap, safety rope attached to the anchor, or safety rope attached to the rappel rope with break applied. **3FT MUST BE SECURED**

- No one should lean or sit on the railing or banisters of the tower
- When attaching the rappel rope to the snap link, rappellers pull the slack toward the anchor point **(Must be check by the Rappel Master or Rappel Lane NCO)**
- All personnel weighing more than 200lbs will conduct a standard hook-up rappel to determine if they require a friction hook-up **(Friction hook-up is created by placing an additional two ropes in the gate of the snap link for a total of 6 ropes)**
- Combat equipment is positioned on the rappeller so it does not interfere with the brake hand and the weapon must be slung diagonally across the back with the muzzle pointing down/opposite side of brake hand
- Heavy duty gloves are required for all rappel training
- Ballistic or safety helmets with chin straps fastened are worn during tower rappel training
- Rappellers must maintain eye contact with the RM or Rappel Lane NCO while receiving commands from them
- Rappellers ensure that they have a Belayer on their rope
- Belayer keeps both hands on the rope at all times and always faces the rappeller
- All tower rappelling is performed with a double strand of rope
- No running is allowed on the tower
- No smoking or eating is allowed near the tower
- All participants who are unable to rappel, lack confidence, or refuse to rappel are reported to the RM or OIC
- RSO and RM must be aware of the overconfidence and carelessness of some rappellers
- RM ensures all personnel are tower qualified before beginning A/C rappel training
- Rappel seats are tied (or harnesses donned) by Soldier and inspected by the Rappel Master before climbing the tower.
- Rappel seats are removed upon completion of every rappel
- Seats must be re-tied and re-inspected by a qualified RM or Rappel Lane NCO before subsequent rappels

All rope stations are rigged with two anchor points **(SEE FIGURE 1.1)**. The first anchor point is a middle-of-the-rope knot; the second is an end-of-the-rope anchor knot. The Rappel Master removes all slack between the knots to create equal tension on the anchor points. Also, they ensure rappel ropes reach all the way to the ground.

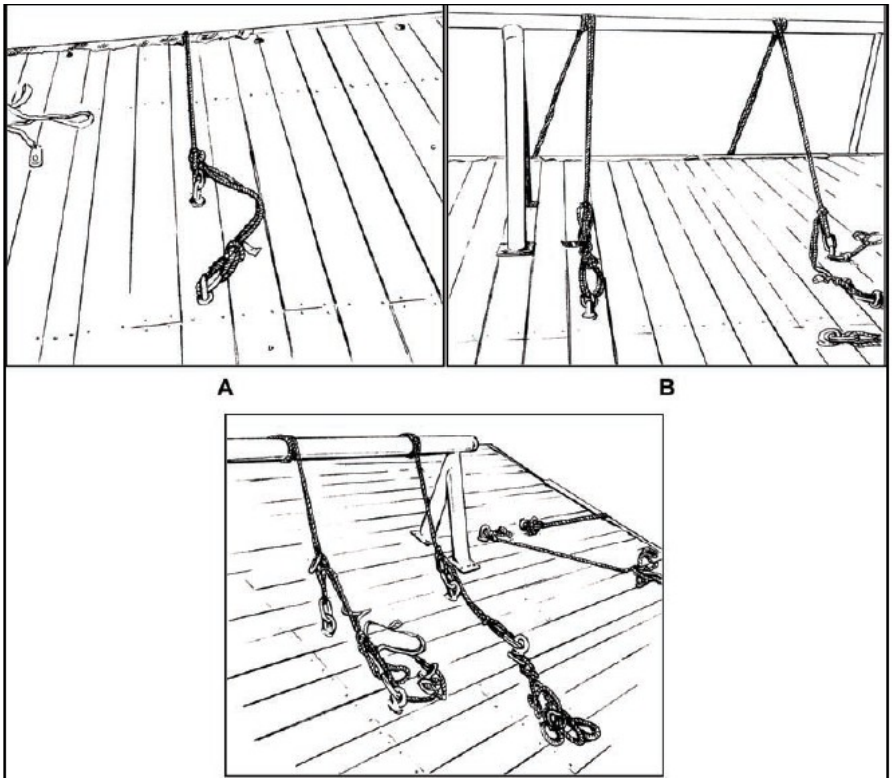



**FIGURE 1.1**

**RAPPELLER PREPARATION:**

Each rappeller must prepare their individual clothing and equipment. Focus on the following:

- Secure shirt tails, loose clothing, equipment, straps, and long hair
- Properly fasten all straps and ensure the helmet is in serviceable condition
- Wear heavy leather workman's gloves or rappelling gloves

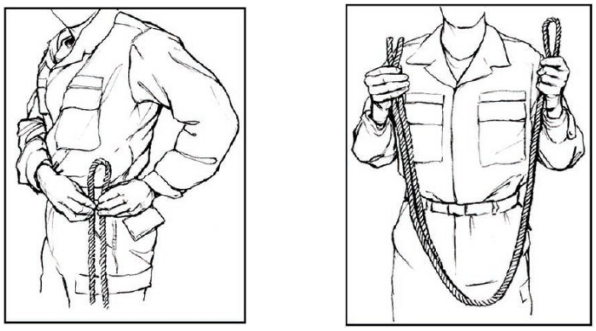
- Wear identification tags
- Load-bearing equipment (LBE) or load-bearing vests (LBV) should be unfastened in the front or fastened loosely behind the back of the rappeller
- Rucksack should be worn high and tight on the back of the rappeller to allow the brake hand to reach the small of the back **(Rucksack adjustment straps will be tied across the chest or tucked away)**
- Sling the weapon diagonally across the back with the muzzle down/away from the brake hand side

**NOTE: Failure to properly prepare rappellers could result in bodily injury or damage to equipment**

**RAPPELLING PROCEDURES:**

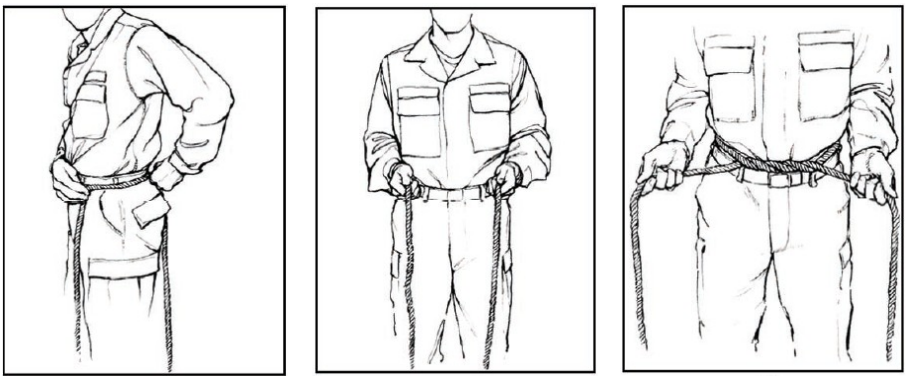
Friction is created by a snap link that is inserted in a sling rope seat and fastened to the rappeller. This method provides a faster and more controlled descent than other methods.

Hip-Rappel Seat is constructed as follows **(SEE FIGURE 1.2 A THROUGH 1.2 O):**



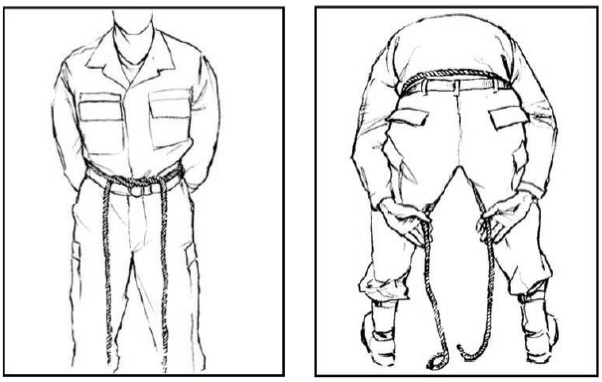
**A** **B**

**FIGURE 1.2 A/B** (Place the midpoint (center) of the length of the sling rope on the hip opposite the brake hand (dominant hand).



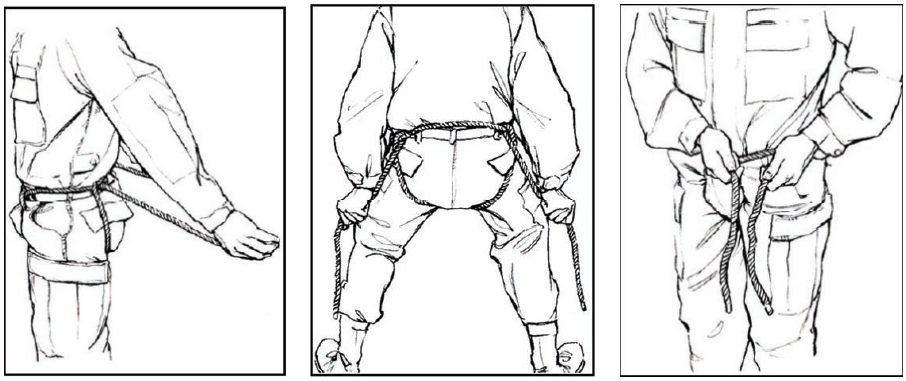
**C** **D** **E**

**FIGURE 1.2 C/D/E** (Bring the sling rope around the waist above the hip bone. Tie a double over-hand knot over the navel.)



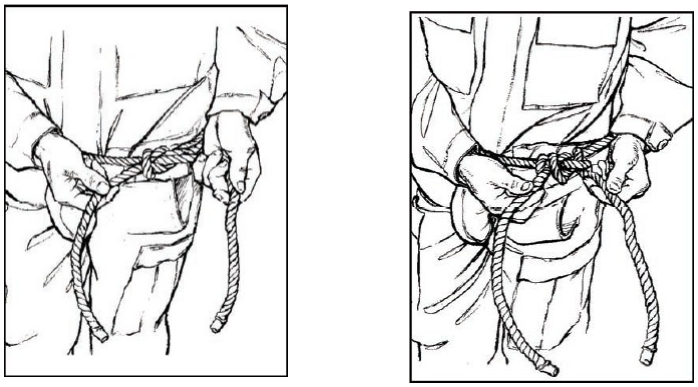
**F** **G**

**FIGURE 1.2 F/G** (Let the two free ends of the sling rope fall to the ground in front. Then, bring the two free ends of the sling rope down between the legs and up over the buttocks ensuring that the two free ends do not cross.)



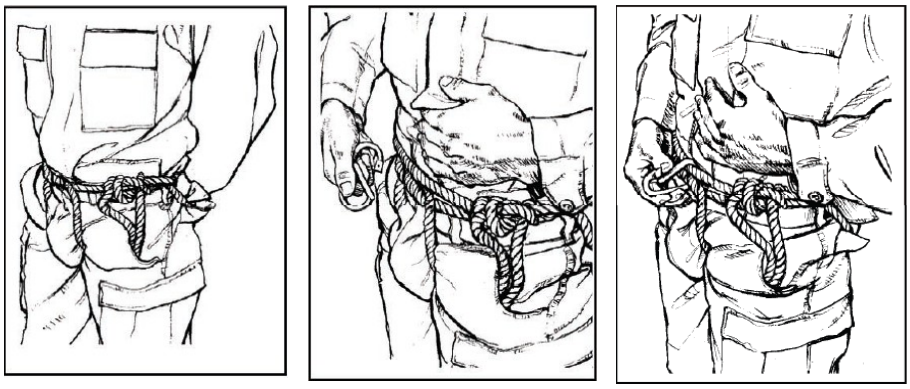
**H** **I** **J**

**FIGURE 1.2 H/I/J** (Pass the ends of the ropes over the rope that is tied around the waist at the two points above the center of the two rear seat pockets. Grab the free end of the rope that is on the left side of the body with the left hand, and the free end of the rope that is on the right side of the body with the right hand. Squat down and simultaneously pull on both running ends of the ropes and stand up. Take the two running ends of the rope down the back over the waist rope from the inside. Bring the running ends back under the ropes that are going across the buttocks. Secure both free ends of the rope and move to the opposite side of your brake hand.)



**K** **L**

**FIGURE 1.2 K/L** (Tie the two running ends with a square knot and two over-hand knots on the hip.)



**M** **N** **O**

**FIGURE 1.2 M/N/O** (Place any excess rope in the trouser pocket near the square knot. Gate down/hook end of the snap link against the navel, place the end of the snap link through both sets of ropes. Rotate the snap link a half turn so the gate is facing up and will open away from the body.)

## (HELICOPTER OPERATIONS)

Helicopter rappelling can provide a means of quick insertion with or without a Landing Zone (LZ).

Personnel required for helicopter operations include the Rappel Master, the Rappel Safety Officer, the Rappellers, and the Belayers. In addition, we will discuss the duties and responsibilities of the Pilot-In-Command (PIC).

### RAPPEL MASTER (RM):

A qualified RM is aboard each aircraft and **SAFETY** is their number one priority. Rappel Masters are responsible for the following:

- Ensures internal communication between the pilot and RM
- Ensures external communication between the A/C and the Ground-to-Air (GTA)
- Inspects all equipment and uses only authorized, serviceable equipment
- Inspects and tests all anchor points and knots before the mission starts
- Ensures that all rappellers receive a safety briefing and the pilots and aircrew receive an Air Mission Brief (AMB)
- Ensures rappellers are rappel qualified before conducting helicopter rappelling
- Maintains communications with the pilot at all times

### RAPPEL SAFETY OFFICER (RSO):

RSO is a SFC or above who is either Air Assault or Ranger qualified. They have overall responsibility for the safety of all rappellers and ensures that all safety precautions are followed.

RSO maintains communication at all times with the pilot and RM through FM radio. Alert the RM and pilot of any unsafe acts.

**RAPPELLER:**

In addition to the tower qualification requirements outlined on Page 8 & 9, the individual rappeller must complete advance training under the supervision of a qualified RM to participate in **TACTICAL** helicopter rappelling operations. This includes:

- Satisfactorily complete three rappels from a helicopter from a height of 60ft **(2 rappels with combat equipment and weapon)**
- Demonstrate confidence and proficiency in the techniques, procedures, and equipment used in rappelling from a helicopter
- Know the rappelling equipment used in helicopter operations and any special equipment required for helicopter rappelling.

**BELAYER:**

Assigned to **EACH** rope and is responsible for walking the rope **(removing slack from underneath the helicopter by walking backward with the rope as the helicopter descends to land)** beneath the helicopter during the descent. Belayer ensures the ropes are not caught on the A/C skids or tires or entangled with another rope to ensure a safe landing.

**PILOT-IN-COMMAND (PIC):**

PIC of the aircraft has the following duties and responsibilities:

- Ensures that the aircrew and all non-aircrew personnel are briefed and understand their responsibilities during rappelling operations **(Includes A/C safety and action in the event of an emergency)**
- Ensures that the donut ring anchoring device assembly and/or aircraft anchor points have been inspected for completeness and functionality
- Emphasizes procedural techniques for clearing, recovery, and/or jettison of ropes
- A/C centered over the target with corrections from RM

**TRAINING:**

Sustainment training must be conducted before an element or unit can perform helicopter rappelling.

- Review of the construction of a rappel seat, equipment to be used, and hook-up procedures
- Conduct of two rappels on the 34ft or higher tower wall **(One with equipment)**
- Conduct two rappels from the open side of a 34ft or higher rappel tower

Refresher training must be conducted if a Soldier has not performed a helicopter rappel during the past six months. Consists of three satisfactory rappels from a tower, to include:

- One rappel with a weapon and equipment
- One rappel executing a Lock-In

**PREPARATION AND SAFETY**

Medical coverage must consist of a qualified, equipped medic to respond to any mishap. Also, medical transportation must be available. **(Absence of a medic, medical equipment, or transportation will terminate training)**

If the situation warrants, and the installation cannot support a MEDEVAC mission, the rappel aircraft may be used as CASEVAC vehicle as a last resort.

During helicopter rappel training, the RSO will have radio communications with the A/C. Voice communications are required before starting A/C rappelling. Additionally, the RSO will inform the PIC to stop operations if an unsafe condition develops.

Rappel operations will not be conducted under the following conditions:

- Ambient temperature is 30-degrees Fahrenheit or less

- Winds in excess of 30 knots
- Lightning strikes within one nautical mile of rappelling operations
- Wind chill factors caused by the helicopter's rotor wash or extraction cruise air speeds **(Cold weather injuries)**
- Water or ice on the rope inhibiting the ability of the rappellers to control their descent
- The rope is exposed to the elements for a sufficient length of time to freeze, thereby reducing its tensile strength
- Blowing particles produced by rotor wash causes the air-crew or the RM to lose visual contact with the ground

The following requirements are necessary for night rappelling operations:

- One chemlight will be attached to the end of the rope and one on each rappeller
- One chemlight will be secured to the attachment point of the rope
- Night Vision Goggles (NVG's) will not be worn by rappellers during the descent **(Aircrew members will wear NVG's as required during night operations)**

The following safety measures must be discussed during the safety briefing and enforced during the operation:

- Loose clothing and equipment are secured
- Helmets are worn with chin straps fastened
- Rappellers wear identification tags and earplugs, carry identification cards, and role down their sleeves
- Weapons are slung diagonally across the back with the muzzle pointing down on the guide hand side
- All seats and rappelling equipment must be inspected by a RM before rappelling
- No running is allowed within 50ft of the A/C
- Personnel approach and depart the helicopter from the front and forward of the rear of the cargo doors **(Personnel bend their bodies forward at the waist to ensure clearance of the rotor blades)**

- Upon boarding the A/C, the rappeller sits or kneels down, hook-ups, and applies his brake hand to the small of their back
- While in the helicopter, the rappeller maintains eye-to-eye contact with the RM and receives commands from them
- The rappeller ensures that they have a Belayer on their rope at all times when conducting training at a hover site
- During the descent, the rappeller maintains eye-to-ground contact
- If the rappeller sees their rope coming off the ground or sees that their Belayer has lost control of their rope, the rappeller immediately brakes and executes a Lock-In **(Wait for commands from the RM)**
- The rappeller brakes once every 30ft during descent
- Belayer does not wear gloves and keeps both hands on the rope **(Eyes on the rappeller at all times)**
- All rappelling will be conducted using a double strand of rope

CHAPTER 2

# EQUIPMENT AND ROPE MANAGEMENT

This Chapter discusses basic equipment used for rappelling operations, rope types, rope selection, and care procedures for each rope type.

## GLOVES:

The gloves are inspected for serviceability and are unserviceable if holes are found in the friction-bearing surfaces or along the seams.

### UNSERVICEABLE:

- Broken Stitches: 3 consecutive stitches or 5 broken or loose stitches in a general area
- Cuts, rips, burns, or tears that show exposed skin
- Missing glove inserts when wearing gloves without friction bearing pad

## SNAP LINKS:

Snap links are used to join equipment, rope, and people into a functioning system. When used properly they are strong, versatile items. Snap links are metal (steel, aluminum, or alloys) loops with a hinged, spring-loaded gate on one side. They come in many sized shapes, and strengths (with and without locking gates), and in many types of metal. Though the heaviest of available snap link metals, steel is the strongest.

### TYPES:

1. STANDARD SNAP LINK

2. LOCKING SNAP LINK

    - Steel

- 2,000 lbs with the gate closed
- Spring-loaded gate without locking sleeve
- Weight 3.9 ounces

**INSPECTION:**

- Should be inspected daily, before, during, and after use.
- The metal should be checked for cracks, grooves, burrs, rust, and flaws.
- There should be no lateral movement when the gate is open.
- The gate spring action should snap shut when released.
- The locking notch should have a slant or slot so the gate remains shut under the impact of a rappellers fall.
- Gate pins should not work their way out of their holes and should not be shorter than their holes.
- Locking mechanism should not have stripped threads and should lock completely

**NOTE: The snap link must be boiled in water for 20 to 30 seconds to remove the cleaning agents.**

**ROPES:**

Ropes are the rappeller's most important items of equipment. They provide access down the obstacle or aerial platform while ensuring individual safety.

**CONSTRUCTION:**

1. KERMANTLE ROPE

2. LAID ROPE

**TYPES:**

1. STATIC ROPE

2. DYNAMIC ROPE

**INSPECTION:**

- Ropes should be inspected before and after each use, especially when working around loose rock or sharp edges (KEEP A ROPE LOG FOUND ON APPENDIX F OF THIS HANDBOOK)
- Check Kermantle rope by carefully inspecting how the rope feels as it runs through the hands. Ensure there are no lumps or depressions
- Ensure ends of the rope are either whipped and dipped or taped and burned
- Check for any cuts or frays in the rope

CHAPTER 3

# KNOTS AND DEPLOYMENT BAGS

This chapter discusses rope terminology, knots, deployment of ropes, and coiling techniques.

## TERMINOLOGY:

When using ropes, understanding basic terminology is important. Most commonly used terms in rappelling include:

- A **BIGHT** of rope is a simple bend of rope in which the rope does not cross itself

BIGHT

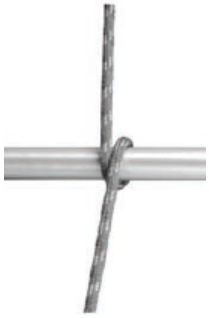
LOOP

- A **LOOP** is a bend of a rope in which the rope crosses itself

- A **HALF HITCH** is a loop that runs around an object in such a manner as to lock or secure itself

HALF HITCH

- A **TURN** wraps around an object providing 360-degree contact

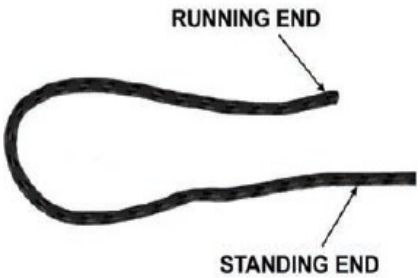


TURN

ROUND-TURN

- A **ROUND TURN** wraps around an object one and one-half times

- **RUNNING END** is the loose or working end of the rope
- **STANDING END** is the static, stationary, or non-working end of the rope




- **LAY** is the direction of twist used in construction of the rope

- **PIGTAIL** is the portion of the rope's running end located between the safety knot and end of the rope

- **DRESS** is the proper arrangement of all knot parts. Removal of unnecessary kinks, twists, and slack to ensure all rope parts of the knot make contact is ensured during the dress arrangement

**KNOTS:**

All knots used by a rappeller are divided into four classes:

- **CLASS I:** JOINING KNOTS
- **CLASS II:** ANCHOR KNOTS
- **CLASS III:** MIDDLE ROPE KNOTS
- **CLASS IV:** SPECIAL KNOTS

**NOTE:** The following knot classes are provided as a general guide and some knots may be appropriate in more than one class.

Knot tying is an important skill that can be lost if not used and practiced. Experience/practice in tying knots, bights, bends, and hitches help the rappeller in many situations.

**SQUARE KNOT** is used to tie the ends of two ropes of equal diameter. Therefore, it is a Joining Knot (CLASS I). Listed below are the steps to tying the Square Knot:

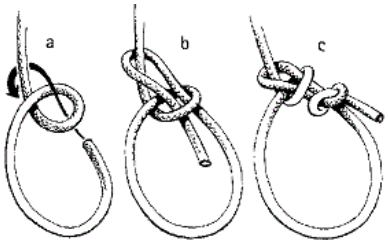
**STEP 1.** Holding one working end in each hand, place the working end in the right hand over the one in the left hand.
**STEP 2.** Pull the working end under and back over the top of the rope in the left hand.
**STEP 3.** Place the working end in the left hand over the one in the right hand and repeat **STEP 2.**
**STEP 4.** Dress the knot down and secure it with an over-hand knot on each side of the Square Knot.

**CHECKPOINTS**

**(1)** There are two interlocking bights.
**(2)** The running end and standing end are on the same side of the bight formed by the other rope.
**(3)** The running ends are parallel to and on the same side of the standing ends with 4in minimum pigtails after the over-hand safeties are tied.

**END-LINE BOWLINE** is used to tie a single fixed loop in the end of a rope. It is an Anchor Knot (CLASS II). Listed below are the steps to tying the End-Line Bowline Knot:

**STEP 1.** Bring the working end of the rope from right to left (as the climber faces the anchor).
**STEP 2.** Form an over-hand loop in the standing part of the rope (on the climber's right) toward the anchor.
**STEP 3.** Reach through the loop and pull up a bight**.**
**STEP 4.** Place the working end of the rope (on the climber's left) through the bight and bring it back onto itself. Now dress the knot down.
**STEP 5.** Form an over-hand knot with the tail from the bight.

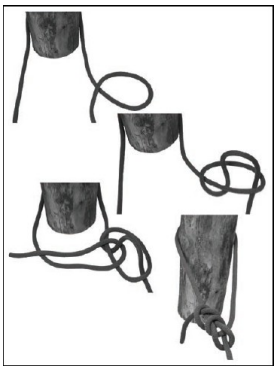



**CHECKPOINTS**

**(1)** The bight is locked into place by a loop.
**(2)** The short portion of the bight is on the inside of the fixed loop.
**(3)** There is a minimum 4in pigtail after tying the over-hand safety.

**IN-LINE BOWLINE** is used to tie the end of a rope around an anchor. It is an Anchor Knot (CLASS II). Listed below are the steps to tying the In-Line Bowline Knot:

**STEP 1.** Bring the working end of the rope around the anchor, from right to left (as the climber faces the anchor).
**STEP 2.** Form an over-hand loop in the standing part of the rope (on the climber's right) toward the anchor.
**STEP 3.** Reach through the loop and pull up a bight**.**
**STEP 4.** Place the working end of the rope (on the climber's left) through the bight and bring it back onto itself. Now dress the knot down.
**STEP 5.** Form an over-hand knot with the tail from the bight.



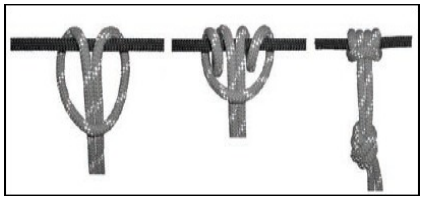
**CHECKPOINTS**

**(1)** The bight is locked into place by a loop.
**(2)** The short portion of the bight is on the inside of the loop around the anchor.
**(3)** There is a minimum 4in pigtail after tying the over-hand safety.

**MIDDLE-OF-THE-ROPE PRUSIK** is used to put a moveable rope on a fixed rope such as a Prusik ascent or a tightening system. It is a Special Knot (CLASS IV). Listed below are the steps to tying the Middle-of-the-Rope Prusik Knot:

**STEP 1.** Double the short rope forming a bight with the working ends even. Lay it over the long rope so the closed end of the bight is 12in below the long rope and the remaining part of the rope (working ends) are the closest to the climber; spread the working end apart.
**STEP 2.** Reach down through the 12in bight. Pull up both working ends and lay them over the long rope. Repeat this process making sure the working ends pass in the middle of the first two wraps. Now there are four wraps and a locking bar working across them on the long rope.
**STEP 3.** Dress the wraps and locking bar down to ensure they are tight and not twisted. Tying an over-hand knot with both ropes will prevent the knot from slipping during periods of variable tension.

**CHECKPOINTS**

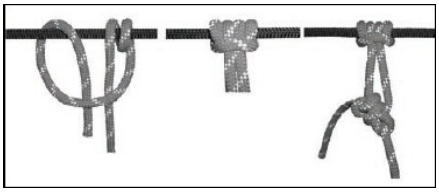


**(1)** Four wraps with a locking bar.
**(2)** The locking bar faces the climber.
**(3)** The knot is tight and dressed down with no ropes twisted or crossed.
**(4)** Knot should contain an over-hand knot.

**END-OF-THE-ROPE PRUSIK** is used to put a moveable rope on a fixed rope such as a Prusik ascent or a tightening system. It is a Special Knot (CLASS IV). Listed below are the steps to tying the End-of-the-Rope Prusik Knot:

**STEP 1.** Using an arm's length of rope, place it over the long rope.
**STEP 2.** Form a complete round turn in the rope.
**STEP 3.** Cross over the standing part of the short rope with the working end of the short rope**.**
**STEP 4.** Lay the working end under the long rope.
**STEP 5.** Form a complete round turn in the rope, working back toward the middle of the knot.
**STEP 6.** There are four wraps and a locking bar running across them on the long rope. Dress the wraps and locking bar down. Ensure they are tight, parallel, and not twisted.
**STEP 7.** Finish the knot with a bowline to ensure that the Prusik knot will not slip out during periods of varying tension.

**CHECKPOINTS**

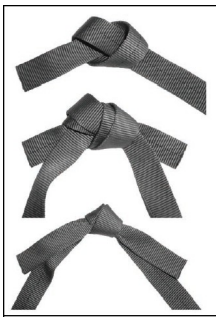


**(1)** Four wraps with a locking bar.
**(2)** The locking bar faces the climber.
**(3)** The knot is tight and dressed down with no ropes twisted or crossed.
**(4)** Knot should contain an over-hand knot.

**WATER KNOT** is used to attach two webbing ends. It is also called a ring bend, over-hand retrace, or tape knot. It is a Joining Knot (CLASS I). Listed below are the steps to tying the Water Knot:

**STEP 1.** Tie an over-hand knot in one of the ends.
**STEP 2.** Feed the other end back through the knot following the path of the first rope in reverse.

**STEP 3.** Draw tight and pull all of the slack out of the knot. The remaining tails must extend at least 4in beyond the knot in both directions**.**

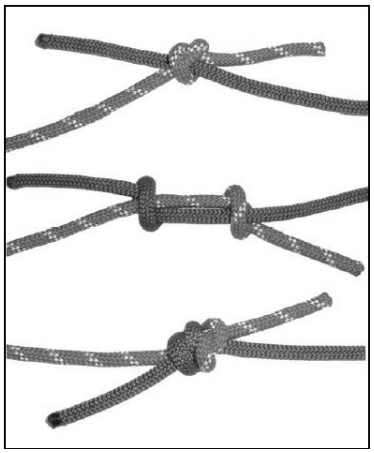


**CHECKPOINTS**

**(1)** There are two over-hand knots, one retracing the other.
**(2)** There is no slack in the knot and the working ends come out of the knot in opposite directions.
**(3)** There is a minimum 4in pigtail.

**FISHERMAN'S KNOT** is used to tie two ropes of the same or approximately the same diameter. It is a Joining Knot (CLASS I). Listed below are the steps to tying the Fisherman's Knot:

**STEP 1.** Tie an over-hand knot in one end of the rope.
**STEP 2.** Pass the working end of the other rope through the first over-hand knot. Tie an over-hand knot around the standing end of the first rope with the working end of the second rope.
**STEP 3.** Tightly dress down each over-hand knot and tightly draw the knots together.

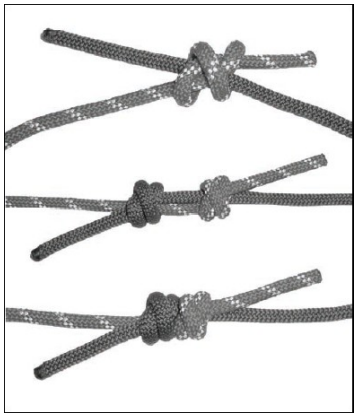


**CHECKPOINTS**

**(1)** The two separate over-hand knots are tied tightly around the long standing end of the opposing rope.
**(2)** The two over-hand knots are drawn snug.
**(3)** Ends of rope exit knot opposite each other with 4in pigtails.

**DOUBLE FISHERMAN'S KNOT** (Double English or Grapevine Knot) is used to tie two ropes of the same or approximately the same diameter. It is a Joining Knot (CLASS I). Listed below are the steps to tying the Double Fisherman's Knot:

**STEP 1.** With the working end of one rope, tie two wraps around the standing end of another rope.
**STEP 2.** Insert the working end (STEP 1) back through the two wraps and draw it tight.
**STEP 3.** With the working end of the other rope, which contains the standing end (STEPS 1/2), tie two wraps around the standing end of the other rope (the working end in STEP 1). Insert the working end back through the two wraps and draw tight.
**STEP 4.** Pull on the opposing ends to bring the two knots together.



**CHECKPOINTS**

**(1)** Two double over-hand knots securing each other as the standing ends of the rope are pulled apart.
**(2)** Four rope parts on one side of the knot form two "X" patterns. Four rope parts on the other side of the knot are parallel.
**(3)** Ends of rope exit knot opposite each other with 4in pigtails.

**FIGURE-EIGHT BEND** is used to join the ends of two ropes of equal or unequal diameter within a 5mm difference. It is a Joining Knot (CLASS I). Listed below are the steps to tying the Figure-Eight Bend:

**STEP 1.** Grasp the top of a 2ft bight.
**STEP 2.** With the other hand, grasp the running end (short end) and make a 360-degree turn around the standing end.

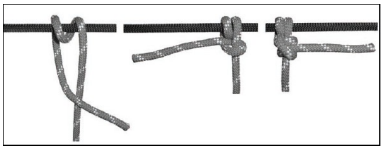
**STEP 3.** Place the running end through the loop just formed creating an in-line figure-eight.
**STEP 4.** Route the running end of the other rope back through the figure-eight starting from the original rope's running end. Trace the original knot to the standing end.
**STEP 5.** Remove all unnecessary twists and crossovers. Dress the knot down.

**CHECKPOINTS**

**(1)** There is a figure-eight with two ropes running side by side.
**(2)** The running ends are on opposite sides of the knot.
**(3)** There is a minimum 4in pigtail.

**ROUND TURN AND TWO HALF HITCHES** is used to tie the end of a rope to an anchor, so it must have constant tension. It is an Anchor Knot (CLASS II). Listed below are the steps to tying the Round Turn and Two Half Hitches:

**STEP 1.** Route the rope around the anchor from right to left and wrap down (must have two wraps in the rear of the anchor, and one in the front). Run the loop around the object to provide 360-degree contact, distributing the load over the anchor.
**STEP 2.** Bring the working end of the rope left to right and over the standing end, forming a half hitch (first half hitch).
**STEP 3.** Repeat STEP 2 (last half hitch has a 4in pigtail).
**STEP 4.** Dress the knot down.

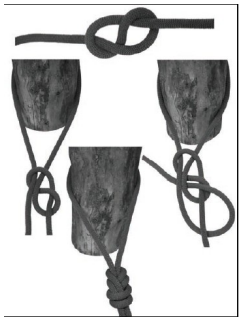


**CHECKPOINTS**

**(1)** A complete round turn should exist around the anchor with no crosses.
(2) Two half hitches should be held in place by a diagonal locking bar with no less than a 4in pigtail remaining.

**FIGURE-EIGHT RETRACE** is used in the same way as the figure-eight bend. However, by tying the knot in a retrace it can be used to fasten the rope to trees or to place where the loop cannot be used. It is an Anchor Knot (CLASS II). Listed below are the steps to tying the Figure-Eight Retrace:

**STEP 1.** Use a length of rope long enough to go around the anchor, leaving enough rope to work with.
**STEP 2.** Tie a figure-eight knot in the standing end of the rope, leaving enough rope to go around the anchor. To tie a figure-eight knot form a loop in the rope, wrap the working end around the standing part and route the working end through the loop. The finished knot is dressed loosely.
**STEP 3.** Take the working end around the anchor point.
**STEP 4.** With the working end, insert the rope back through the loop of the knot in reverse.
**STEP 5.** Keep the original figure-eight as the outside rope and retrace the knot around the wrap and back to the long-standing end.
**STEP 6.** Dress the knot down.



**CHECKPOINTS**

**(1)** A figure-eight with a doubled rope running side-by-side, forming a fixed loop around a fixed object or harness.
**(2)** There is a minimum 4in pigtail.

**CLOVE HITCH** is used at the end of the rope or middle of the rope. The knot must have constant tension on it once tied to prevent slipping. It is an Anchor Knot (CLASS II) or Middle Rope Knot (CLASS III). Listed below are the steps to tying the Clover Hitch:

**MIDDLE OF THE ROPE**:

**STEP 1.** Hold rope in both hands, palms down with hands together. Slide the left hand to the left from 5 to 7in.

**STEP 2.** Form a loop away from and back toward the right.

**STEP 3.** Slide the right hand from 5 to 7in to the right. Form a loop inward and back to the left hand.

**STEP 4.** Place the left loop on top of the right loop. Place both loops over the anchor and pull both ends of the rope in opposite directions. The knot is tied.

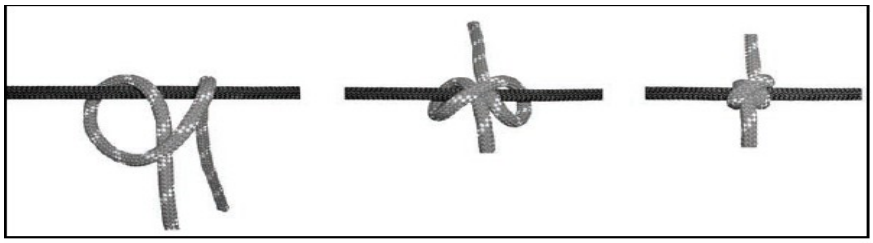
**END OF THE ROPE:**

**STEP 1.** Place 2ft of rope over the top of the anchor. Hold the standing end in the left hand. With the right hand reach under the horizontal anchor, grasp the working end and bring it inward.

**STEP 2.** Place the working end of the rope over the standing end (to form a loop). Hold the loop in the left hand. Place the working end over the anchor from 5 to 7in to the left of the loop.

**STEP 3.** With the right hand, reach down to the left hand side of the loop under the anchor. Grasp the working end of the rope. Bring the working end up and outward.

**STEP 4.** Dress down the knot.



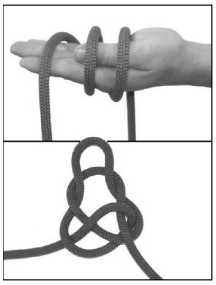
## CHECKPOINTS

**(1)** The knot has two round turns around the anchor with a diagonal locking bar.
**(2)** The locking bar is facing 90-degrees from the direction of pull.
**(3)** The ends exit 180-degrees from each other.
**(4)** The knot has more than a 4in pigtail remaining.

**WIREMAN'S KNOT** forms a single, fixed loop in the middle of the rope. It is a Middle Rope Knot (CLASS III). Listed below are the steps to tying the Wireman's Knot:

**STEP 1.** When tying this knot, face the anchor that the tie-off system will be tied to. Take up the slack from the anchor, and wrap two turns around the left hand (palm up) from left to right.
**STEP 2.** A loop 9in is taken up in the second round turn to create the fixed loop of the knot.
**STEP 3.** Name the wraps from the palm to the fingertips: heel, palm, and fingertip.
**STEP 4.** Secure the palm wrap with the right thumb and forefinger and place it over the heel wrap.
**STEP 5.** Secure the heel wrap and place it over the fingertip wrap.
**STEP 6.** Secure the fingertip wrap and place it over the palm wrap.
**STEP 7.** Secure the palm wrap and pull up to form a fixed loop.
**STEP 8.** Dress the knot down by pulling on the fixed loop and the two working ends.
**STEP 9.** Pull the working ends apart to finish the knot.

## CHECKPOINTS



**(1)** The completed knot should have four separate bights locking down on themselves with the fixed loop exiting from the top of the knot and laying toward the near side anchor point.
**(2)** Both ends should exit opposite each other without any bends.

**BOWLINE-ON-A-BIGHT** (Two-Loop Bowline) is used to form two fixed loops in the middle of a rope. It is a Middle Rope Knot (CLASS III). Listed below are the steps to tying the Bowline-On-A-Bight Knot:

**STEP 1.** Form a bight in the rope about twice as long as the finished loops will be.
**STEP 2.** Tie an over-hand knot on a bight.
**STEP 3.** Hold the over-hand knot in the left hand so the bight is running down and outward.
**STEP 4.** Grasp the bight with the right hand and fold it back over the over-hand knot so the over-hand knot goes through the bight.
**STEP 5.** From the end (apex) of the bight, follow the bight back to where it forms the cross in the over-hand knot. Grasp the two ropes that run down and outward and pull up, forming two loops.
**STEP 6.** Pull the two ropes out of the over-hand knot and dress the knot down.
**STEP 7.** A final dress is required. Grasp the ends of the two fixed loops and pull, spreading them apart to ensure the loops do not slip.

**CHECKPOINTS**

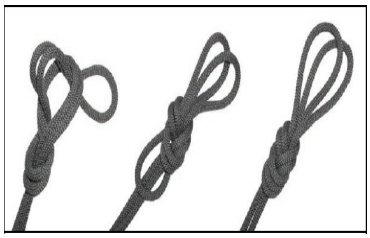
(1) There are two fixed loops that will not slip.
(2) There are no twists in the knot.
(3) A double loop is held in place by a bight.

**TWO-LOOP FIGURE-EIGHT** is used to form two fixed loops in the middle of a rope. It is a Middle Rope Knot (CLASS III). Listed below are the steps to tying the Two-Loop Figure-Eight Knot:

**STEP 1.** Using a doubled rope, form an 18in bight in the left hand with the running end facing to the left.

**STEP 2.** Grasp the bight with the right hand and make a 360-degree turn around the standing end in a counterclockwise direction.
**STEP 3.** With the working end, form another bight and place that bight through the loop just formed in the left hand.
**STEP 4.** Hold the bight with the left hand and place the original bight (moving toward the left hand) over the knot.
**STEP 5.** Dress the knot down.

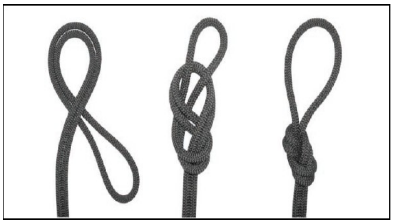
**CHECKPOINTS**



**(1)** There is a double figure-eight knot with two loops that share a common locking bar.
**(2)** The two loops must be adjustable by means of a common locking bar.
**(3)** The common locking bar is on the bottom of the double figure-eight knot.

**FIGURE-EIGHT LOOP** (Figure-eight-on-a-bight) is used to form a fixed loop in a rope. It is a Middle Rope Knot (CLASS III). Listed below are the steps to tying the Figure-Eight Loop Knot:

**STEP 1.** Form a bight in the rope about as large as the diameter of the desired loop.
**STEP 2.** With the bight as the working end, form a loop in rope (standing end).
**STEP 3.** Wrap the working end around the standing end 360-degrees and feed the working end through the loop. Dress the knot tightly.



**CHECKPOINTS**

**(1)** The loop is the desired size.
**(2)** The ropes in the loop are parallel and do not cross over each other.
**(3)** The knot is tightly dressed.

**THREE-LOOP BOWLINE** is used to form three fixed loops in the middle of a rope. It is a Special Knot (CLASS IV). Listed below are the steps to tying the Three-loop Bowline Knot:

**STEP 1.** Form an approximate 24in bight.
**STEP 2.** With the right thumb facing toward the body, form a doubled loop in the standing part by turning the wrist clockwise. Lay the loops to the right.
**STEP 3.** With the right hand, reach down through the loops and pull up a doubled bight from the standing end of the rope.
**STEP 4.** Place the running end (bight) of the rope (on the left) through the doubled bight from left to right and bring it back on itself. Hold the running end loosely and dress the knot down by pulling on the standing end.
**STEP 5.** Safety it off with a doubled over-hand knot.

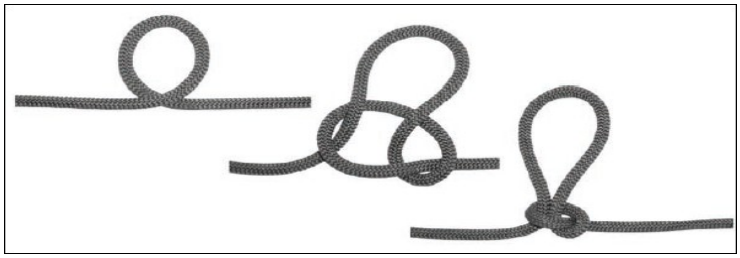
**CHECKPOINTS**

**(1)** There are two bights held in place by two loops.
**(2)** The bights form locking bars around the standing end.
**(3)** The running end (bight) must be on the inside of the fixed loops.
**(4)** There is a minimum 4in pigtail after the double over-hand safety knot is tied.

**TRANSPORT KNOT** (Over-Hand Slip Knot/Mule Knot) is used to secure the transport tightening system. It is a Special Knot (CLASS IV). Listed below are the steps to tying the Transport Knot:

**STEP 1.** Pass the running end of the rope around the anchor point passing it back under the standing end (leading to the far side anchor) forming a loop.

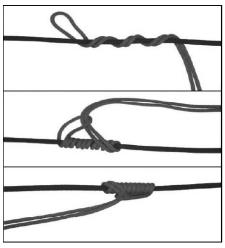
**STEP 2.** Form a bight with the running end of the rope. Pass over the standing end down through the loop and dress it down toward the anchor point.
**STEP 3.** Secure the knot by tying a half hitch around the standing end with the bight.



**NO CHECKPOINTS**

**KLEIMHIEST KNOT** provides a moveable, easily adjustable, high-tension knot capable of holding extremely heavy loads while being pulled tight. It is a Special Knot (CLASS IV). Listed below are the steps to tying the Kleimhiest Knot:

**STEP 1.** Using a utility rope or webbing, offset the ends by 12in. With the ends offset, find the center of the rope and form a bight. Lay the bight over a horizontal rope.
**STEP 2.** Wrap the tails of the utility rope around the horizontal rope back toward the direction of pull. Wrap at least four complete turns.
**STEP 3.** With the remaining tails of the utility rope, pass them through the bight (SEE STEP 1).
**STEP 4.** Join the two ends of the tail with a joining knot.
**STEP 5.** Dress the knot down tightly so all wraps are touching.

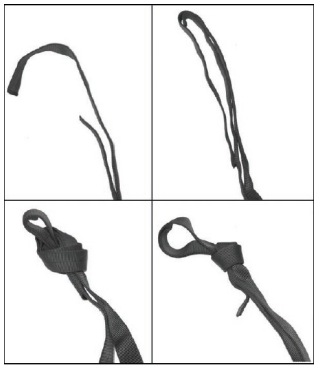


**CHECKPOINTS**

**(1)** The bight is opposite the direction of pull.
**(2)** All wraps are tight and touching.
**(3)** The ends of the utility rope are properly secured with a joining knot.

**FROST KNOT** is used when working with webbing and you need to create the top loop of an etrier. It is a Special Knot (CLASS IV). Listed below are the steps to tying the Frost Knot:

**STEP 1.** Lap one end (a bight) of webbing over the other about 10 to 12in.
**STEP 2.** Tie an over-hand knot with the newly formed triple-strand webbing; dress tightly.

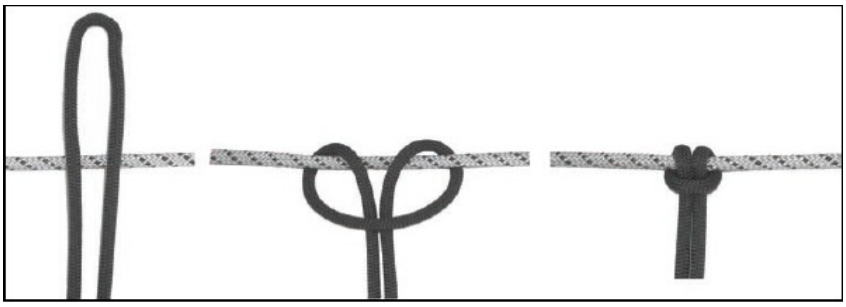


**CHECKPOINTS**

**(1)** The tails of the webbing run in opposite directions.
**(2)** Three strands of webbing are formed into a tight over-hand knot.
**(3)** There is a bight and tail exiting the top of the over-hand knot.

**GIRTH HITCH** is used to attach a runner to an anchor or piece of equipment. It is a Special Knot (CLASS IV). Listed below are the steps to tying the Girth Hitch:

**STEP 1.** Form a bight.
**STEP 2.** Bring the runner back through the bight.
**STEP 3.** Cinch the knot tightly.



**CHECKPOINTS**

**(1)** Two wraps exist with a locking bar running across the wraps.
**(2)** The knot is dressed tightly.

**MUNTER HITCH** is used in conjunction with a pear-shaped locking snap link, the Munter Hitch is used to form a mechanical belay. It is a Special Knot (CLASS IV). Listed below are the steps to tying the Munter Hitch:

**STEP 1.** Hold the rope in both hands, palms down about 12in apart.
**STEP 2.** With the right hand, form a loop away from the body toward the left hand. Hold the loop with the left hand.
**STEP 3.** With the right hand, place the rope that comes from the bottom of the loop over the top of the loop.
**STEP 4.** Place the bight that has just been formed around the rope into the pear shaped snap link. Lock the locking mechanism.

**CHECKPOINTS**

**(1)** A bight passes through the snap link, with the closed end around the standing or running end of the rope.
**(2)** The snap link is locked.

**DEPLOYMENT OF ROPES:**

Deployment of the ropes from a helicopter is a critical task. It can cause a planned rappelling operation to fail or it can increase the time required to conduct the operation. This is due to the likelihood of the ropes becoming entangled. To prevent this, ropes must be deployed using a positive control technique. The two techniques we will discuss are the **DEPLOYMENT BAGS** and **LOG COIL** techniques.

**DEPLOYMENT BAGS** (D-Bags):

Placed on a flat surface with the stow loop facing upward. If the D-bag still has a static line, the rappeller removes it by cutting the static line where it attaches to the bag. A 12ft section of the static line can be used as a safety line in the helicopter.

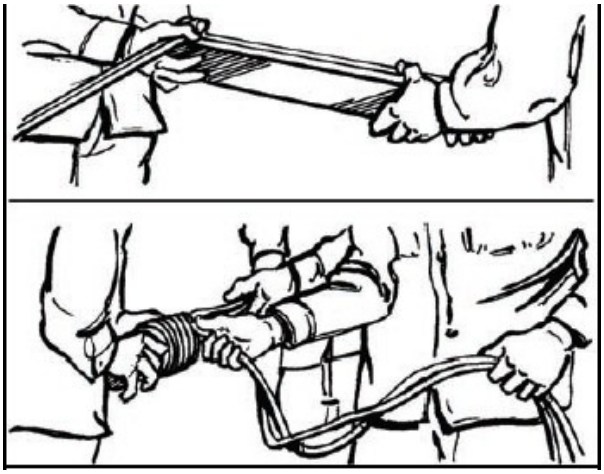
(1) Use a sandbag or something heavy (5 to 10lbs) as a weight in the deployment system. Roll the weight into a rectangular shape, tie it, then place it in a small plastic bag, rolled and taped. Place a retaining band over the middle of the weight and place the weight on top of the D-bag. The weight should be about the same width as the D-bag.
(2) Lay out and inspect the two ropes. The working ends (closest to the D-bag) should be even. Place a round turn with the two working ends of the ropes on the weight's retaining band. Working on top of the deployment bag, start forming figure-eights. The stack should consist of 8 to 10 figure-eights, one on top of another—do not exceed the width of the D-bag. Then, Starting from either side, center a retaining band over the stack. Ensure that it is over all the figure-eights in the stack. Repeat the process each time, placing one stack in front of the other. Continue until about 10ft of rope remains. If one rope is shorter than the other, the end of the shorter rope should be about 10ft from the last stack.
(3) For primary anchor point, measure down about 4ft from the end of the shortest rope. Using both ropes, tie a bowline without a half hitch. This knot is the primary anchor point.
(4) For a secondary anchor point, tie an end-of-the-rope bowline with a half hitch toward the end of the ropes. The dressed knot should be 18 to 22 in from the primary anchor point knot when using the UH-1H helicopter and 22 to 30in when using the UH-60 helicopter. If excess rope remains, S-Fold and tape it between the two knots. Ensure that 3 to 6 ft of rope remain from the last stack of figure-eights.

(5) To place the ropes in the D-bag, remove the bag from under the stack of rope. Place the weight into the bottom of the D-bag, and place all the stacks of figure-eights, in the order they were made, one on top of the other into the bag.
(6) Two left, two right, and two rear loops are in the opening of the D-bag. *DO NOT USE THE TWO REAR LOOPS.* Close the flap on the D-bag and push the loops through the aligning holes on the flap. Using an 8in piece of gutted Type III Nylon (550-cord), tie the two loops together with a square knot and two hitches. Ensure that two 120ft ropes are coming out of the center of the flap—not to one side. Repeat the process and tie the right loops together. Wrap the excess rope lengthwise around the bag.

**NOTE:** The sizes of the loops of the bowline should be no larger than an average size fist.

**LOG COIL:**

Rappeller lays the running end of the double rope along the length of the coiling log. Then, rappeller coils the double rope around both the running end of the rope and the coiling log. The rope must be coiled evenly and tightly.



**COILING TECHNIQUES:**

The ease and speed of rope deployment and recovery greatly depends upon technique and practice. Each coil technique is easy to accomplish and results in a minimal amount of kinks, twists, and knots during deployment.

**MOUNTAIN COIL:**

(1) To start a mountain coil, grasp the rope approximately 1m from the end with one hand. Run the other hand along the rope until both arms are outstretched. Grasping the rope firmly, bring the hands together forming a loop, then lay the loop in the hand closest to the end of the rope. This is repeated forming uniform loops that run in a clockwise direction until the rope is completely coiled. The rope may be given a 1/4 twist as each loop is formed to overcome any tendency to twist or form figure-eights.

(2) In finishing the mountain coil, form a bight approximately 30cm long with the starting end of the rope and lay it along the top of the coil. Uncoil the last loop. Using this length of rope, begin making wraps around the coil and the bight, wrapping toward the closed end of the bight. Make the first wrap bind across itself to lock it into place. Make six to eight wraps to adequately secure the coil, then route the end of the rope through the closed end of the bight. Pull the running end of the bight tight, securing the coil.

(3) The mountain coil may be carried in the pack (by forming a figure-eight), doubling it and placing it under the flap or by placing it over the shoulder and under the opposite arm, slung across the chest.

**BUTTERFLY COIL:**

(1) To start the double butterfly, grasp both ends of the rope and begin back feeding. Find the center of the rope forming a bight. With the bight in the left hand, grasp both ropes and slide the right hand out until there is approximately one arm's length of rope. Place the doubled rope over the head, draping it around the neck and on top of the shoulders. Ensure that it hangs no lower than the waist. With the rest of the doubled rope in front of you, make doubled bights placing them over the head in the same manner as the first bight. Coil alternating from side to side (left to right, right to left) while maintaining equal-length bights. Continue coiling until approximately two arm-lengths of rope remain. Remove the coils from the neck and shoulders carefully and hold the center in one hand. Wrap the two ends around the coils a minimum of three doubled wraps, ensuring that the first wrap locks back on itself.

(2) Take a doubled bight from the loose ends of rope and pass it through the apex of the coils. Pull the loose ends through the doubled bight and dress it down. Place an overhand knot in the loose ends, dressing it down to the apex of the bight securing coils. Ensure the loose ends do not exceed the length of the coils. In this configuration the coiled rope is secure enough for hand carrying or carrying in a rucksack, or for storage. Figure 5-5 shows a butterfly coil tie-off.

**NOTE:** The Butterfly Coil is the quickest and easiest technique for coiling.

## UNCOILING, BACK-FEEDING, AND STACKING:

When the rope is needed for use, it must be uncoiled and stacked on the ground properly to avoid kinks and snarls.

(1) Untie the tie-off and lay the coil on the ground. Back-feed the rope to minimize kinks and snarls. (This is also useful when the rope is to be moved a short distance and coiling is not desired.) Take one end of the rope in the left hand and run the right hand along the rope until both arms are outstretched. Lay the end of the rope in the left hand on the ground. With the left hand, re-grasp the rope next to the right hand and continue laying the rope on the ground.
(2) The rope should be laid or stacked in a neat pile on the ground to prevent it from becoming tangled and knotted when throwing the rope or feeding it to a lead climber. This technique can also be started using the right hand.

## THROWING THE ROPE:

Before throwing the rope it must be properly managed to prevent it from tangling during deployment. The rope should first be anchored to prevent its loss over the edge when thrown. Several techniques can be used when throwing. Personal preference, situational, and environmental conditions should be taken into consideration when determining which technique is best. Basic techniques include:

(1) Back-feed and neatly stack the rope into coils beginning with the anchored end of the rope working toward the running end.
(2) Once stacked, make six to eight smaller coils in the left hand. Pick up the rest of the larger coils in the right hand. The arm should be generally straight when throwing.
(3) The rope may be thrown underhanded or over-handed depending on obstacles around the edge of the site. Make a few preliminary swings to ensure a smooth throw. Throw the large coils in the right hand first.

(4) Throw up and out. A slight twist of the wrist so the palm of the hand faces up as the rope is thrown allows the coils to separate easily without tangling. A smooth follow through is essential.
(5) When a slight tug on the left hand is felt, toss the six to eight smaller coils out. This will prevent the ends of the rope from becoming entangled with the rest of the coils as they deploy.
(6) As soon as the rope leaves the hand, the thrower should sound off with the warning, ROPE, to alert anyone below the site.

Also, the following techniques could be used when throwing ropes:

(1) Anchor, back feed, and stack the rope properly as described above.
(2) Take the end of the rope and make six to eight helmet-size coils in the right hand (more may be needed depending on the length of the rope).
(3) Assume a "quarterback" simulated stance.
(4) Aiming just above the horizon, vigorously throw the rope, over-handed, up and out toward the horizon.

When windy weather conditions prevail, adjustments must be made. When throwing into a strong cross wind, the rope should be angled into the wind so it will land on the desired target. The stronger the wind, the harder the rope must be thrown to compensate.

**TESTING STANDARD:**

On Day Two students will have 30 seconds to construct each of the four knots taught in your block of instruction:

- SQUARE KNOT W/ TWO OVER-HANDS
- IN-LINE BOWLINE
- END-LINE BOWLINE
- PRUSIK KNOT

Students will be given a rope corral and 7/16” nylon rope. Students are expected to tie each knot IAW FM 21-24.

**NOTE: EVALUATION SHEET CAN BE FOUND IN APPENDIX B OF THE RM HANDBOOK.**

CHAPTER 4

# RAPPEL MASTER PERSONNEL INSPECTION

Rappel Master Personnel Inspection (RMPI) is performed by a current and qualified Rappel Master. A Rappel Master inspects all rappellers who are rappelling off a tower or out of an aircraft. During the inspection, the hip rappel seat and equipment are inspected for deficiencies that could potentially cause serious injury or death to a rappeller.

A Rappel Masters number one priority is **SAFETY**. At no time will a rappeller attempt a rappel without being properly inspected by a certified Rappel Master. Failure to check a rappeller before conducting any type of rappel could result in serious injury or death.

On Day Three students will be evaluated on their ability to locate and correctly identify deficiencies on three rappellers. The three rappellers will consist of a Hollywood rappeller, a Semi-Combat rappeller, and a Full-Combat rappeller. Students must identify all major deficiencies and miss no more than two minor deficiencies collectively for all three rappellers. Majors are **-32**, Minors are **-15**, and incorrect nomenclature, without changing the meaning, is **-10**. Three "Seal of Approvals" are needed to stop the clock which is one "Seal of Approval" per rappeller. Students will have three minutes and thirty seconds to inspect all three rappellers.

- If students create a deficiency, they must call it or it will be counted against them.
- If the student calls a deficiency that is not there, it will be counted against them.
- Every student will begin the test with 100 points.
- A major is -32 points, a minor is -15 points, -10 for nomenclature.
- Each rappeller will receive a "Seal of Approval" after the student has finished inspecting that rappeller. (All 3 to stop time)
- The clock will stop after the third seal of approval.
- A score of 70% or above is needed to receive a GO.

| Each Major missed or created and not called will result in -32 pts. | |
|---|---|
| KNOT ON WRONG SIDE | OVER-HAND LAY NOT IN SNAP-LINK |
| GLOVE(S) NOT WORN | SNAPLINK INVERTED |
| UNSERVICEABLE GLOVE | SNAPLINK BACKWARDS |
| ACH NOT WORN | SNAPLINK THROUGH OVER-HAND LAY |
| CHIN STRAP NOT FASTENED | SNAPLINK TOUCHES SQUARE KNOT |
| IMPROPER SQUARE KNOT | ROPES CROSSED BETWEEN LEGS |
| MISSING OVER-HAND(S) | EQUIPMENT ON BRAKE HAND SIDE OF FLC |
| OVER-HAND KNOT(S) TIED THROUGH SQUARE KNOT | EQUIPMENT ON BRAKE HAND SIDE OF RUCK |
| RUCKSACK CHEST STRAP NOT SECURED | EQUIPMENT ON BREAK HAND SIDE |
| SNAPLINK MISSING | KNIFE ON BRAKE HAND SIDE |
| WAIST ROPE NOT IN SNAPLINK | MISSING ½ HITCH(S) |

| Each Minor missed or created and not called will result in -15 pts. | |
|---|---|
| SLEEVE(S) NOT DOWN | SEAT BELOW BELT |
| CHIN STRAP NOT BISECTING CHIN/TOO LOOSE | SINGLE OVER-HAND LAY |
| OVER-HAND TIED BEHIND ½ HITCH | TRIPLE OVER-HAND LAY |
| ½ HITCH(S) INSTEAD OF OVER-HAND(S) | IMPROPER OVER-HAND LAY |
| ONE ROPE USED FOR BOTH OVER-HAND(S) | ROPE ROUTED THROUGH BELT |
| OVER-HAND KNOT(S) TIED TO WAIST ROPE | ROPE ROUTED THROUGH BELT LOOP |
| OVERHAND TIED AROUND BOTH ROPES | WEAPON IMPROPERLY SLUNG |
| ROPE ENDS NOT IN POCKET | IMPROPER ½ HITCH (S) |
| FLC NOT ZIPPED | LEG ROPES TOO CLOSE TOGETHER |
| BELT IN SNAPLINK | SEAT TOO LOOSE |
| SHIRT NOT TUCKED IN | RUCKSACK POCKETS NOT SECURE |
| | RUCKSACK STRAPS NOT TAPED/SECURED |

# RMPI SEQUENCE:

# HOLLYWOOD RAPPELLER

**FOLLOWING DEFICIENCIES ARE IN THE ORDER THEY WOULD BE FOUND DURING THE INSPECTION OF ALL THREE TYPES OF RAPPELLERS**

**KNOT ON WRONG SIDE (MAJOR)**

**GLOVE(S) NOT WORN (MAJOR)**

**UNSERVICEABLE GLOVE (MAJOR)**

**SLEEVE(S) NOT DOWN (MINOR)**

**ACH NOT WORN (MAJOR)**

**CHINSTRAP NOT FASTENED (MAJOR)**

**CHINSTRAP NOT BISECTING CHIN/TOO LOOSE (MINOR)**

**IMPROPER SQUARE KNOT (MAJOR)**

**MISSING OVER-HAND(S) (MAJOR)**

**OVER-HAND TIED BEHIND 1/2 HITCH (MINOR)**

**OVER-HAND KNOT(S) TIED THROUGH SQUARE KNOT (MAJOR)**

**1/2 HITCH(S) INSTEAD OF OVER-HAND(S) (MINOR)**

**ONE ROPE USED FOR BOTH OVER-HANDS (MINOR)**

**OVER-HAND KNOT(S) TIED TO WAIST ROPE (MINOR)**

**OVER-HAND(S) TIED AROUND BOTH ROPES (MINOR)**

**ROPE END(S) NOT IN POCKET (MINOR)**

**SNAP LINK MISSING (MAJOR)**

**WAIST ROPE NOT IN SNAP LINK (MAJOR)**

**OVER-HAND LAY NOT IN SNAP LINK (MAJOR)**

**BELT IN SNAP LINK (MINOR)**

**SHIRT NOT TUCKED IN (MINOR)**

**SEAT BELOW BELT (MINOR)**

**SNAP LINK INVERTED (MAJOR)**

**SNAP LINK BACKWARDS (MAJOR)**

**SNAP LINK THROUGH OVER-HAND LAY (MAJOR)**

**SNAP LINK TOUCHES SQUARE KNOT (MAJOR)**

**SINGLE OVER-HAND LAY (MINOR)**

**TRIPLE OVER-HAND LAY (MINOR)**

**IMPROPER OVER-HAND LAY (MINOR)**

**ROPE ROUTED THROUGH BELT (MINOR)**

**ROPE ROUTED THROUGH BELT LOOP (MINOR)**

**ROPES CROSSED BETWEEN LEGS (MAJOR)**

**EQUIPMENT ON BRAKE HAND SIDE (MAJOR)**

**KNIFE ON BRAKE HAND SIDE (MAJOR)**

**MISSING 1/2 HITCH(S) (MAJOR)**

**IMPROPER 1/2 HTICH(S) (MINOR)**

**LEG ROPES TOO CLOSE TOGETHER (MINOR)**

**SEAT TOO LOOSE (MINOR)**

# RMPI SEQUENCE:

# SEMI
# &
# FULL

# RAPPELLERS

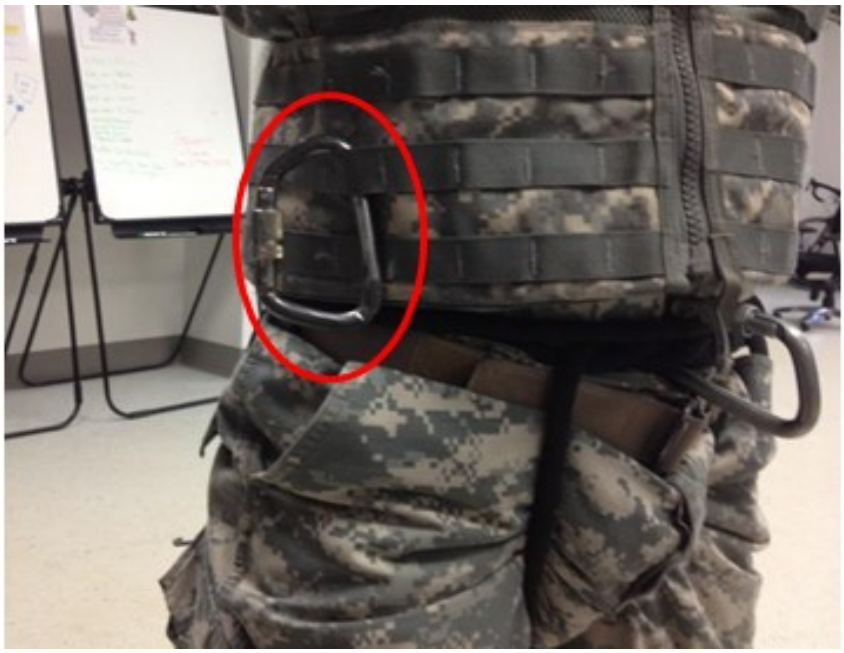
**FOLLOWING DEFIENCIENCIES ARE IN THE ORDER THEY WOULD BE FOUND DURING THE INSPECTION OF ONLY SEMI AND FULL COMBAT RAPPELLERS (THESE ARE IN ADDITION TO THE RMPI SEQUENCE FOR THE HOLLYWOOD RAPPELLER)**

**RUCKSACK CHEST STRAP NOT SECURED (MINOR)**

**FLC NOT ZIPPED (MINOR)**

**WEAPON IMPROPERLY SLUNG (MINOR)**

**EQUIPMENT ON BRAKE HAND SIDE OF FLC (MAJOR)**



**EQUIPMENT ON BRAKE HAND SIDE OF RUCK (MAJOR)**

**RUCKSACK POCKETS NOT SECURED (MINOR)**

**RUCKSACK STRAPS NOT TAPED/SECURED (MINOR)**

**ANY STRAP ON RUCK SACK TO INCLUDE KIDNEY PAD NOT SECURED WITH TAPE OR RETAINER BAND**

# CHAPTER 5

## HOOK-UP INSPECTION

Rappel Master will be graded on the proper inspection of a Hollywood and Aussie rappeller. The standards can be found in Appendix G and H of this Handbook.

HOLLYWOOD RAPPELLER:

1. Rappel Master will check the anchor point to make sure there is a secure connection.

2. The guide hand will be palm facing up and there will be a glove present

3. Sleeves will be rolled down

4. Kevlar/ACH will be worn with the chinstrap bisecting chin and fastened.

5. The square knot on the rappel seat must face the anchor point

6. The rappeller will have shirt tucked in and the snap link will have the gate opening down and away from the Rappel Master. Also, snap link will not be inverted or backwards.

7. Rappel Master will check for routing of the ropes (two closest to the RM go towards the anchor point and the ropes closest to the rappeller go to the ground). There will be 4 or 6 ropes in the snap link and never 3 or 5 and the barrel will be locked.

8. Slap the arm to reveal the brake hand so you may observe if sleeves are rolled down and glove is present on the brake hand.

9. Check the routing of the ropes to ensure the rappeller or another object is not tangled.

10. Finally replace the brake hand by tapping the arm.

AUSSIE RAPPELLER:

1. Rappel Master will check the anchor point to make sure there is a secure connection.

2. Snap link will have the gate opening down and away from the Rappel Master. Also, snap link will not be inverted or backwards.

3. Rappel Master will check for routing of the ropes (two closest to the RM go towards the anchor point and the ropes closest to the rappeller go to the ground). There will be 4 or 6 ropes in the snap link and never 3 or 5 and the barrel will be locked.

4. Rappel Master will (visually) make sure the guide hand has a glove present and the sleeves are rolled down. **(NO POINTING)**

5. Visually inspects the Kevlar/ACH is worn with the chin strap bisecting chin and fastened. **(NO POINTING)**

6. The square knot on the Aussie seat must be present in the front of the rappeller.

7. Slap the arm to reveal the brake hand so you may observe if sleeves are rolled down and glove is present on the brake hand.

8. Check the routing of the ropes to ensure the rappeller or another object is not tangled.

9. Finally replace the brake hand by tapping the arm.

**NOTE: There will be a 10 second time standard to inspect each rappeller in which you must correctly identify if the rappeller is a good hook-up and if not what is wrong.**

# CHAPTER 6

# RAPPELLING PROCEDURES

## BASIC RAPPELLING:

THREE BRAKES:

1. The Rappel Master states, “Next rappeller step forward, take a knee, and sound off with what brake hand you are”

2. After ensuring knot is towards the anchor point and Rappel Master is sure the Belay person is in place, Rappel Master tells the rappeller to hook up

3. Once rappeller has locked their barrel, put their guide-hand palm facing up, and brake hand in the small of their back the Rappel Master will check for a “good” hook-up

4. For “good” hook-up refer to Chapter Five of the Rappel Master Handbook

5. After Rappel Master has checked the hook-up they will state “you are lane ___” and give the command of “Get Ready”

6. The rappeller will tug on the rappel ropes three times and ensure the ropes are secured to the anchor point. Also, rappeller will look over the edge of the tower and ensure the belay is in place by stating, “Lane #, On Rappel”

7. Once rappeller is confident belay is paying attention then the Rappel Master will give the command of “Position”

8. Rappel Master will ensure the rappeller slowly approaches the edge of the tower and “milk” themselves out to a good “L” position

9. Once rappeller is set, Rappel Master will give a statement that gives their expectation for the upcoming rappel. (For example: “Three bounds, three brakes all the way to the ground. On each brake look back at me for a critique. Make sure you do your 4 point body check.”)

10. The Rappel Master will then give the command of "GO"

11. After each brake the Rappel Master will give the student a critique on their steps of performance and then give the command of "GO"

12. Once rappeller is above the Belay person's head the Rappel Master will tell the rappeller to get off the ropes.

13. Once the ropes are clear the Rappel Master will call the next rappeller forward.

LOCK-IN:

1. The Rappel Master states, "Next rappeller step forward, take a knee, and sound off with what brake hand you are"

2. After ensuring knot is towards the anchor point and Rappel Master is sure the Belay person is in place, Rappel Master tells the rappeller to hook up

3. Once rappeller has locked their barrel, put their guide-hand palm facing up, and brake hand in the small of their back the Rappel Master will check for a "good" hook-up

4. For "good" hook-up refer to Chapter Five of the Rappel Master Handbook

5. After Rappel Master has checked the hook-up they will state "you are lane ___" and give the command of "Get Ready"

6. The rappeller will tug on the rappel ropes three times and ensure the ropes are secured to the anchor point. Also, rappeller will look over the edge of the tower and ensure the belay is in place by stating, "Lane #, On Rappel"

7. Once rappeller is confident belay is paying attention then the Rappel Master will give the command of "Position"

8. Rappel Master will ensure the rappeller slowly approaches the edge of the tower and "milk" themselves out to a good "L" position

9. Once rappeller is set, Rappel Master will give a statement that gives their expectation for the upcoming rappel. (For example: “Give me one good bound half way down and then look back at me. Make sure you do your four point body check.”)

10. The Rappel Master will then give the command of “GO”

11. After the rappeller brakes the Rappel Master will give the student a critique on their steps of performance.

12. The Rappel Master will give the command of “Lock-In” and then ensure the rappeller conducts a proper lock-in

13. Once the rappeller is sure they conducted a proper lock-in they will begin to count and at that time the Rappel Master will tell the rappeller to separate ropes to “name tape” level

14. The Rappel Master will then give the command of “GO” ensuring when the rappeller brakes they do so to “name tape” level

15. Once rappeller is above the Belay person’s head the Rappel Master will tell the rappeller to get off the ropes.

16. Once the ropes are clear the Rappel Master will call the next rappeller forward.

STEPS OF PERFORMANCE:

- Rappeller hooks-up correctly (NO FATAL HOOK-UPS)
- Checks anchor point and belay person
- Doesn’t stand up until given the command of “Position”
- Gets into a good “L” position
- Does four point body check
- Fully extends their brake arm
- Clears the tower without incident
- Clears decent the entire bound until they brake

- Takes all commands from the Rappel Master
- Brakes to the small of their back with knuckle to spine contact ( Not to their hip)
- Continues to do four point body checks after each brake before the next bound
- Does four point body check
- Displays confidence throughout the rappel

**ADVANCED RAPPELLING:**

AUSTRALIAN RAPPEL:

1. Rappeller is called forward to conduct the rappel.

2. Rappellers snap link is placed on Aussie seat with the opening gate facing up. The gate should open down and away from rappeller and placed on the brake hand side.

3. The rappeller steps forward with hands on their helmet so that the rappel ropes are on the same side as their snap link. **(The RM will hook up rappeller to the ropes).**

4. The rappeller holds out their brake hand at a 45 degree angle to the front, palm facing the sky, and slightly lower than shoulder level.

5. The RM will hand the rappeller two ropes which will be going to the ground. The rappeller will then place their brake hand across their chest to the "nametape" keeping their hand closed. Their guide hand will be fully extended at shoulder level, palm facing forward, and will remain there until completion of rappel.

6. The rappeller will walk forward until their toes are over the edge of the tower. The rappeller will begin to milk themselves out until they're parallel to the ground. <u>They will need to keep their hips rotated forward, back slightly arched, and keep their head up and eyes on the horizon.</u>

7. The RM will tap the rappellers leg or simply say "GO".

8. The rappeller will fully extend their brake arm. This should put their brake arm 45degrees in front of them.

9. Once the rappeller leaves the tower they should assume a "starfish" like position keeping their guide hand fully extended at shoulder level, palm facing forward.

10. Brake two or three times during descent. To brake simply move the brake hand back to nametape.

11. Once on the ground double time away from the tower and assume belay.

RESCUE RAPPEL:

(A) Rappel Master with the “HUNG” rappeller
(B) Rappel Master on Top Belay
(C) Rappel Master responsible for Rescue

1. (A) states “HUNG RAPPELER” and will place all of their attention on the hung rappeller. (A) will instruct the hung rappeller to lock-in while reassuring them.

2. Immediately, **ALL** other Rappel Masters or Lane NCO’s will clear their rope by sending all rappellers to the ground. If the rappeller(s) are not in the “L” shape position then place them behind the safety line and have them take a knee.

3. The Belay Safety located at the bottom of the tower directs their attention to the lane of the hung rappeller and will assist the belay person if needed. They will assist in securing the rope that will be redirected from another rappel lane.

4. The lane next to the hung rappeller will redirect their rope to the lane of the hung rappeller. They will place the redirected rope into the redirect snap link that is on the secondary anchor point. That Rappel Master will become the rescue rappeller or (C).

5. Simultaneously, the first Rappel Master that is available (B) will secure the safety rope and hand it to (A). Once the safety rope is completely lowered to the hung rappeller, (A) instructs the hung rappeller to attach the snap link that is on the end of the safety rope around all three ropes of their rappel seat. (B) then ties a Munter hitch and places it into the redirect snap link that is located on the primary anchor point. All of the slack in the safety rope will be removed and (B) will control the hung rappellers brake and descent all the way to the ground.

6. (C) can utilize two different techniques for the rescue rappel.

> **(Option 1)** is utilizing a Munter hitch to form a mechanical belay; to use this technique (C) will make a loop in the rope and place the rope that comes from the bottom of the loop over the top of the loop. This will make a bight around the running end of the rope. The two ropes used to form the bight will be placed into the snap link and (C) will lock their barrel. (C) will be inspected by any available Rappel Master on the tower.
>
> **(Option 2)** is utilizing a rescue 8 friction device. (C) will form a bight in the rope and then route the bight through the large loop end of the device along the bridge and over the small looped end. (C) will then attach the rescue 8 to the snap link through the small looped end of the device, locking their own barrel, and then will be inspected by any available Rappel Master on the tower.

7. (C) will then begin their decent from the tower to the hung rappeller using only a single rope rappel. Once close to the rappellers head, (C) will conduct a lock-in. The lock-in procedures will be based on whichever technique (C) used.

8. (C) relays **ALL** information to (A) & (B). Why the rappeller got hung? What is in the rappellers snap link? The medical status of the rappeller. Also, any other information from their prospective. Lastly, they will relay to (A) & (B) how their going to free the hung rappeller. Cutting equipment, uniforms, gloves, and if needed the ropes.

9. All three Rappel Masters involved in the rescue **WILL** maintain constant communication throughout the entire process.

10. If (C) chooses to cut the ropes the following must take place prior to the ropes being cut:

(C) states “I NEED TO CUT THE ROPES”.
(A) states “DO YOU NEED TO CUT THE ROPES”.
(C) states “YES I NEED TO CUT THE ROPES”.
(A) states “ROGER YOU NEED TO CUT THE ROPES”.
(C) states “ROGER CUTTING ROPES”
(C) proceeds to cut only the rappellers ropes that they were using to rappel.

****NOTE: (C) WILL *NEVER* CUT THE SAFETY ROPE THAT WAS LOWERED TO THE HUNG RAPPELLER AND IS BEING CONTROLLED BY (B)****

11. (A) ensures that (B) is controlling the hung rappellers safety rope prior to confirming to (C) that they are okay to cut the ropes.

12. (B) slowly allows the hung rappeller to descend by moving the working end of the safety rope towards the center of the tower and away from the standing end of the rope.

13. Simultaneously, (C) prepares to finish their descent by pulling on the free running end of their rope freeing the locking mechanism.

14. Once the hung rappeller and (C) begin their descent (C) counts down the number of feet they are from the ground. For example; 30 ft, 20 ft, 10 ft all the way to the ground. The last 5 ft will be counted in increments of 1 foot.

15. (A) relays this information to (B) until both rappellers are safely on the ground.

A successful rescue rappel is measured in safety then in speed and accuracy. A well prepared and practiced team of Rappel Masters should be able to safely complete a rescue rappel, meaning both rappellers are safely on the ground within 2 minutes from the time the incident happened. Speed will never outweigh safety!

# CHAPTER 7

# AIRCRAFT PREPARATION AND RIGGING

## RAPPEL OPERATIONS FOR THE UH-1H HELICOPTER:

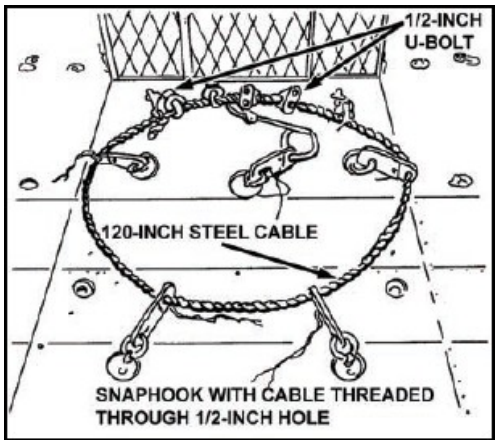
The UH-1H helicopter provides a safe, stable aerial platform from where rappelling operations can be conducted when landing is not feasible.

### CHARACTERISTICS:

- DUAL-ENGINE, MEDIUM-SPEED, AND SINGLE-MAIN ROTOR
- TRANSPORT EIGHT RAPPELLERS, ONE RM, AND A THREE-PERSON CREW
- LIFT CAPACITY OF 2,300LBS
- SEVEN FLOOR-MOUNTED TIE-DOWN FITTINGS USED DURING RAPPELLING OPERATIONS

### PREPARATION AND RIGGING:

**(1)** Remove all seats.
**(2)** Lock the doors in the open position. If no locks are present, remove doors. Also, remove small cargo doors.
**(3)** Pad and tape all sharp edges on the floor, door ledge, and all protrusions on the skids. Ensure each door ledge has a scuff pad to protect the rope from contacting the metal door ledge.
**(4)** Secure the donut ring to the center of the floor of the helicopter. The donut ring has six snap hooks numbered clockwise, with 12 o'clock being toward the front of the helicopter. The RM positions the clamps of the donut ring toward the aft end of the helicopter. The RM ensures the front two snap links and rear two snap links are facing outside of the donut ring and hooks them to the tie-down ring with the snap hook facing down. RM ensures the center two snap hooks face into the donut ring and are connected to the floor tie-down ring with the gate facing down. Attach the free-floating safety ring to the center floor tie-down ring using a seventh snap hook.




**(DONUT RING ATTACHED TO THE FLOOR OF THE UH-1H)**

**NOTE:** Using this technique has caused equipment failure in many aircraft. Therefore, the cable clamp nuts must be inspected and certified as airworthy by the pilot or maintenance crew before flying the mission.

## CONSTRUCTION OF ANCHOR POINTS:

In addition to the usual equipment requirements for rappelling operations, an anchor assembly is fabricated. This anchor assembly is commonly known as a "DONUT RING". The secondary anchor point is a "FLOATING SAFETY RING".

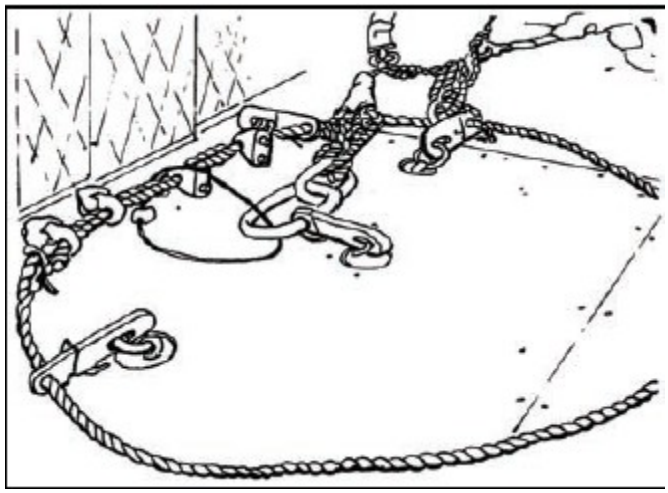
### DONUT RING

Primary (No. 1) anchor point for the rappelling ropes is constructed from a 1/2in steel cable with a steel wire core. The cable is 120in long, consists of 6 strands (18 wires per strand), and has a tensile strength of 21,000lbs. The completed donut ring has a tensile strength of 3,000lbs.

**(1)** Thread six parachute static line snap hooks onto the 120in steel cable so four snap hooks are facing out with the gates down, and the center two snap hooks are facing in with the gates down. Drill the end portion of each snap hook to make a 5/8in diameter hole, and thread the cable through the hole in the snap hooks.

**(2)** Overlap the ends of the 120in cable 20in to form a circle. Secure the ends with four 1/2in U-bolts placed at 2 to 3in intervals.

**(3)** Attach two U-bolts to each dead end of the cable so the bolts engage the dead end. Before torquing the U-bolts, position a 12in length of chain or 1/8in diameter cable on the center of the overlapped 120in steel cable so it remains in position between the two center U-bolts. Tighten each nut of the U-bolts with a torque wrench (if possible) to 40ft pounds (480in pounds). After the U-bolt clamps have been attached and tightened, fasten a steel plate (drill to fit) over the open end of the U-bolt studs and spot weld in place to prevent loosening.



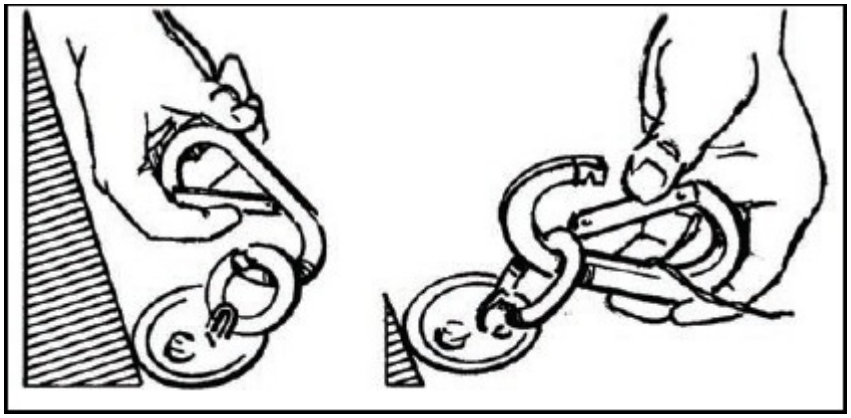
**(DONUT RING AND RAPPEL ROPE CONNECTION IN A UH-1H)**

## FLOATING SAFETY RING

Referred to as the secondary (No. 2) anchor point for the rappelling ropes. The snap link at the end of the rappelling rope is hooked to this connection. Either of the two types of floating safety rings may be used:

**(1)** First Method. Thread an elliptical rappelling ring through the free end of the keeper chain (cable). It is constructed of cold-rolled steel that is 1/4in in diameter, with inside dimensions of 2 1/4in (minor axis) and 4in (major axis). Thread a seventh parachute static line snap hook onto the ring before welding. Weld this ring together so it can withstand a force up to 3,000 lbs.

**(2)** Second Method. Attach two snap links to the aircraft tie-down ring in the center of the donut ring. Insert the first snap link through the free end of the keeper chain (cable) and the tie-down ring with the gate down. Insert the second snap link through the free end of the keeper chain (cable) and the tie-down ring with the gate up. Tape the snap link gates closed with masking tape. Then tape the snap links together to ensure that the snap link gates are on opposite sides of each other.



**(FLOATING SAFETY RING FORMED WITH TWO SNAP LINKS)**

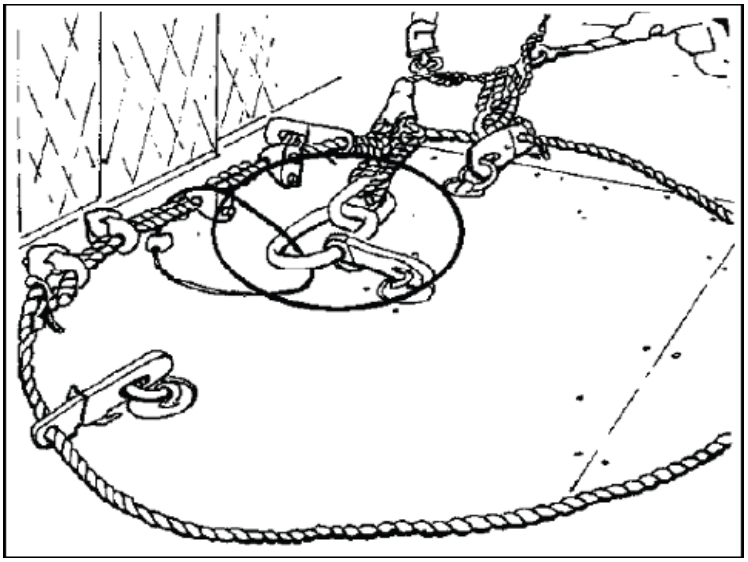
## RAPPEL ROPE ANCHOR POINTS

The rappelling rope is connected to the floating safety ring and donut ring as follows:

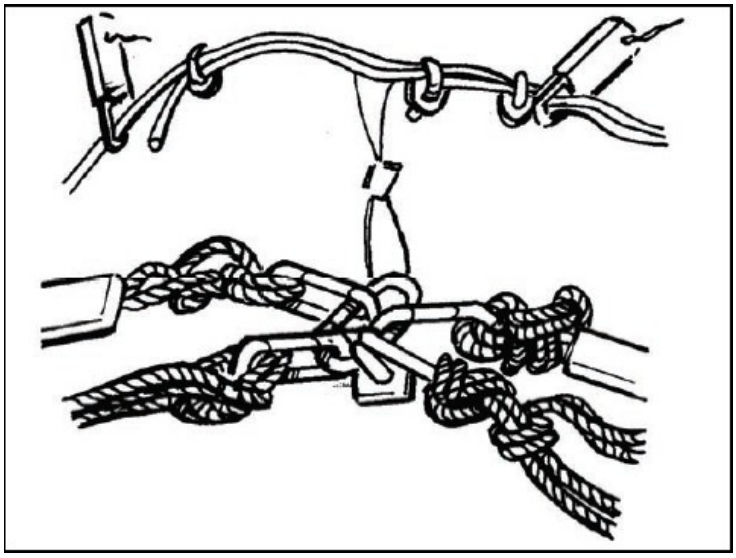
**(1)** No. 1 (Donut Ring) anchor point. Use a bight about 5ft from the end of the standing part of the rope, make one turn through the snap link forming a round turn. The bowline is the preferred method of attaching rappel ropes to snap links or anchor systems. The round turn with two half hitches is a reliable means of attaching ropes to anchor systems. Secure the round turn to the snap link with two half hitches. Make the connection to the donut ring by attaching the snap link gate upward. Ensure the gate faces upward with the opening away from the knot.

**(2)** No. 2 (Floating Ring) anchor point. Attach the snap link the same as the first with some exceptions. Using a bight about 2ft from the end of the standing part of the rope, connect the snap link to the rope the same as the first connection.

Tape the end of the standing part of the rope and the knots with 2” Adhesive Tape to secure them in place. Make the connection to the floating safety ring the same as the connection to the donut ring. Four ropes can be connected to the floating safety ring using two snap links.



**(TWO SNAP LINKS FOR THE FLOATING SAFETY RING)**



**(FOUR RAPPEL ROPES CONNECTED TO FLOATING SAFETY RING)**

## RAPPEL OPERATIONS FOR THE UH-60 HELICOPTER:

The techniques used by the rappeller when rappelling from different A/C are similar. However, positioning, seating, and the tie-down anchor point are different. Each rappeller is well trained on each A/C before conducting a rappel.

### CHARACTERISTICS:

- TWIN ENGINE, MEDIUM-SPEED, AND SINGLE-MAIN ROTOR
- TRANSPORT TEN RAPPELLERS, ONE RM, AND A FOUR-PERSON CREW
- LIFT CAPACITY OF 8,000LBS
- FOUR CEILING-MOUNTED TIE-DOWN FITTINGS USED DURING RAPPELLING OPERATIONS

### PREPARATION AND RIGGING:

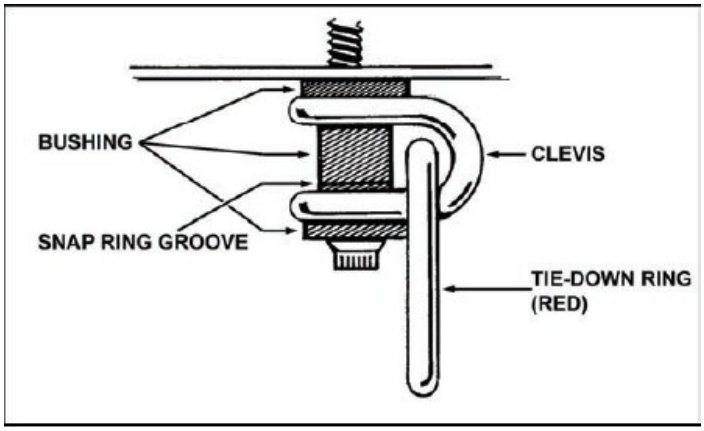
**(1)** Lock both cargo doors in the open position.
**(2)** Removes the center row of troop seats.
**(3)** Tapes any sharp edges or protrusions on the cargo floor and door ledges that may come in contact with the rappeller or the rappelling rope.
**(4)** Stow loose equipment forward in the cargo compartment.
**(5)** Extend the RM's intercom cord to the rear over the aft utility drain line and tape the cord to the overhead troop seat support tube.
**(6)** Install the floor restraint provisions for rappellers No.1 through 6.
**(7)** Rig and connect rappelling ropes to the A/C primary and secondary anchoring points.

### CONSTRUCTION OF ANCHOR POINTS

#### PRIMARY ANCHOR POINT:

**(1)** RM ties a bowline with a half hitch about 4ft from the standing end of the rope.

**(2)** Attach the two primary snap links to the respective cabin tie-down fitting ring with gates facing in the opposite and opposing directions.

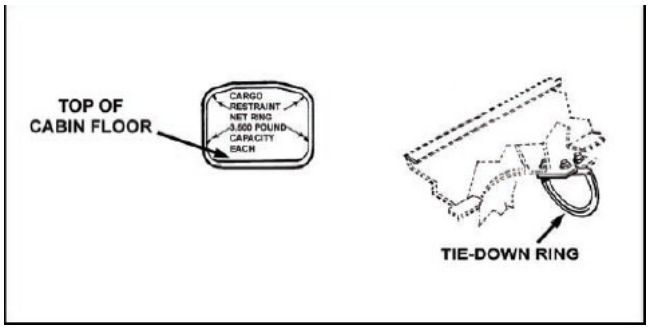



**(PRIMARY SNAP LINK ATTACHING POINT)**

## SECONDARY ANCHOR POINT:

**(1)** RM ties a bowline with a half hitch about 1 1/2ft from the standing end of the rope.

**(2)** Attach the secondary snap link to the adjacent overhead cargo restraint net ring.

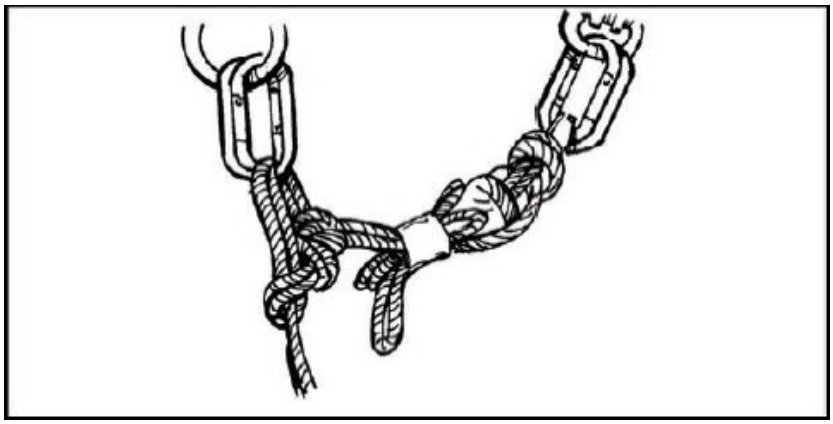



**(SECONDARY SNAP LINK ATTACHING POINT)**

**(3)** Remove and secure the cargo hook access door and deploy the cargo hook in the DOWN position.

**(4)** Install the recovery rope for endangered rappellers.

**(5)** Tapes the unused floor rings.



**(PRIMARY AND SECONDARY SNAP LINK ATTACHING POINTS)**

**NOTE: THERE MUST BE A MINIMUM OF 22IN AND A MAXIMUM OF 30IN BETWEEN THE ANCHOR KNOTS.**

## RAPPEL OPERATIONS FOR THE MH-53 HELICOPTER:

The MH-53 helicopter is a highly versatile A/C. It is used for a variety of missions, usually in conjunction with special operations.

### CHARACTERISTICS:

- TWO-ENGINE, HEAVY LIFT, AND SEVEN BLADE MAIN ROTOR
- TRANSPORT 23 RAPPELLERS, 1 RM, AND A FIVE -PERSON CREW
- SIX TIE-DOWN RINGS USED DURING RAPPELLING OPERATIONS

CHAPTER 8

# AIRCRAFT COMMAND AND CONTROL

**PERFORMANCE STEPS:**

1. ENTER HELICOPTER AND HOOK UP SAFETY LINE.

2. PERFORM COMMUNICATION CHECK WITH PILOT.
   **(ENSURES COMMUNICATION BETWEEN GTA AND PILOT)**

3. WAVE ON RAPPELLERS USING THE PROPER HAND & ARM SIGNAL.

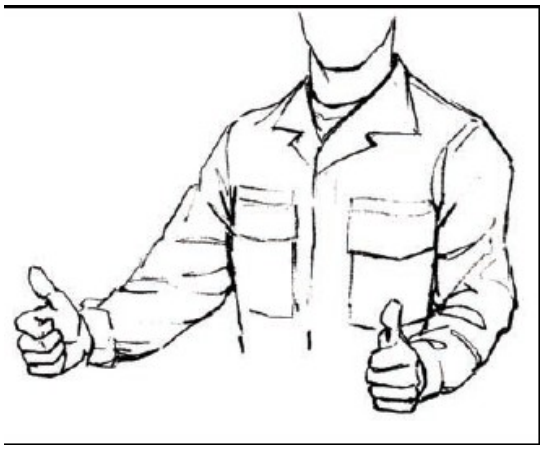
4. PHYSICALLY TOUCH EACH RAPPELLER'S KNOT (IN THE CORRECT ORDER) TO ENSURE FACING TOWARDS INSIDE OF THE A/C.

5. INSPECT EACH RAPPELLER (BEGIN AT THE FRONT, LEFT OF THE A/C).

   CHECK ANCHOR POINT
   GUIDE HAND GLOVE
   SLEEVE
   HELMET, CHINSTRAP FASTENED
   SHIRT IS TUCKED IN.
   CORRECT HOOK-UP
   (SNAP LINK LOCKED – ROUTED ROPES)
   EXTEND BRAKE HAND
   SLEEVE
   GLOVE
   ROUTING OF ROPES
   REPLACE BRAKE HAND.
   SWEEP: BODY PARTS IN A/C
   (3 CONSECUTIVE TIMES)
   "FREEZE, HEAD AND EYES ON ME"
   (CORRECT HAND & ARM SIGNAL)

6. CHECK WITH BELAY MASTER (THUMBS UP).

7. ISSUE CORRECT FIRST COMMAND WITH HAND & ARM SIGNAL
(GET READY).

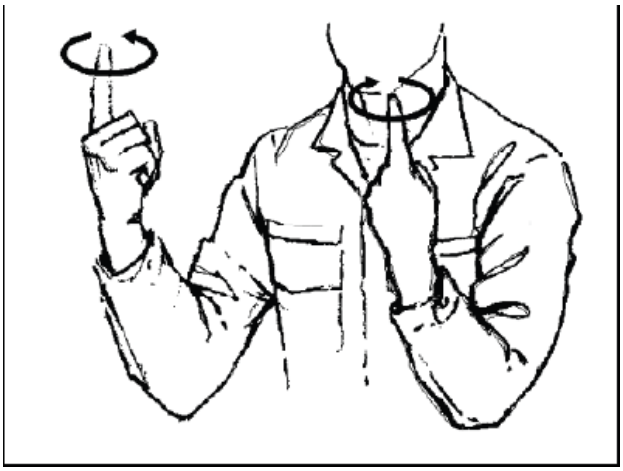


8. CHECK ALL SNAP LINKS IN CORRECT SEQUENCE
(PHYSICALLY CHECKED GATES).

9. INSTRUCT PILOT TO ASCEND, OBSERVED ASCENT FROM #4 ROPE.

10. ENSURE "RED TAPE ON THE GROUND"
(VERBALLY STATED 3 TIMES).

11. ISSUED CORRECT COMMAND WITH HAND & ARM SIGNAL
(POSITION).

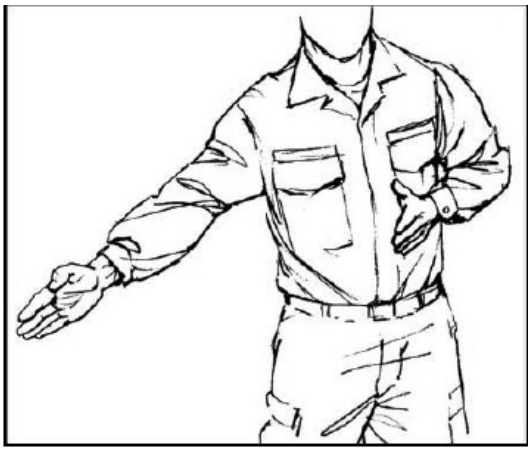


12. CHECK ALL SNAP LINKS IN CORRECT SEQUENCE (VISUAL CHECK ONLY-DON'T POINT).

13. CHECK ROPES FROM #4 ROPE (ADJUST HEIGHT IF NECESSARY).

14. ENSURE "RED TAPE ON THE GROUND" (VERBALLY STATED 3 TIMES).

15. ISSUE CORRECT COMMAND WITH HAND & ARM SIGNAL (GO).



16. GO TO THE DECK OF A/C AT THE #4 ROPE AND OBSERVE DESCENT OF RAPPELLER.

17. ACKNOWLEDGE WHEN ALL RAPPELLERS ARE ON ROPES, ON THE GROUND, AND OFF ROPES (VERBALLY).

18. REPORT STATUS TO PILOT (CLEAR AND TANGLED).

19. RECOVER FROM DECK ONLY AFTER A/C IS FIRMLY GROUNDED.

20. DISPLAY CONFIDENCE, REMAIN IN CHARGE THROUGHOUT.

**EMERGENCY STEPS:**

OPPOSUM:

1. GIVE "FREEZE" COMMAND TO ALL RAPPELLERS.

2. VISUALLY CHECK RAPPELLER'S SNAP LINK (REMOVE/REPLACE GUIDE HAND BY PROPER HAND & ARM SIGNAL).

3. IF SNAP LINK IS NOT INVERTED, SEND RAPPELLER WITH PROPER HAND & ARM SIGNAL (GO).

4. IF SNAP LINK IS INVERTED, GIVE RAPPELLER LOCK-IN HAND & ARM SIGNAL.

5. SECURE RAPPELLER WITH RECOVERY LINE.

6. RE-INSPECT ALL RAPPELLER'S SNAP LINKS (VISUAL CHECK - DON'T POINT).

7. CHECK THE #4 ROPE FOR "RED TAPE ON THE GROUND" PRIOR TO CONTINUING. (VERBALLY STATE 3 TIMES).

8. CONTINUE WITH OTHER RAPPELLERS WITH PROPER HAND & ARM SIGNAL (GO).

9. ONCE RAPPELERS ARE ON GROUND, SAFELY "TALK" THE PILOT TO THE GROUND WITH OPOSSUM RAPPELLER.

**EMERGENCY STEPS:**

TANGLED RAPPEL ROPES:

1. ALLOW RAPPELLERS ON UNTANGLED ROPES TO CLEAR ROPES.

2. INSTRUCT PILOT TO DESCEND, HOVER AS TANGLED RAPPELLERS TOUCH GROUND.

3. WHEN CLEARED BY BELAY MASTER, INSTRUCT PILOT TO LOWER HELICOPTER.

4. REMAIN ON DECK OF A/C UNTIL A/C HAS FIRMLY LANDED.

# APPENDIX A

| RAPPEL TOWER INSPECTION | | | |
|---|---|---|---|
| Item Inspected | Yes | No | Remarks |
| | | | |
| 1. Has the tower been inspected for structural soundness and cleared for use by DEFL in the past year? If so, when? | | | |
| 2. Are all open areas (above 4') guarded with guard rails? Ref: 29 CFR 1910.23(c)(1) | | | |
| 3. Are all guard rails a minimum of 42" high and capable of with-standing a side force of 200 lbs? Ref: 29 CFR 1910.23.(e)(1)(iv) | | | |
| 4. Are toe boards in all areas where personnel could pass underneath? Ref: 29 CFR 1910.23(c)(1) | | | |
| 5. Do all stairs / fixed ladders comply with OSHA standards? Ref: 29 CFR 1910.24 and .27 and 1910.23(d) | | | |
| 6. Do all tower rope stations have two anchor points each? Ref: TC 21-24, 1-9 | | | |
| 7. Have all anchor points been load tested and cleared for use by DEFL in the past year? If so, when? Ref: 29 CFR 1910.66 Appendix C. (1)(c)(10) | | | |
| 8. Are anchor points in good condition and free of corrosion, sharp edges, burrs, etc? Ref: TC 21-24, 1-9 | | | |
| 9. Are all ropes and cables serviceable? | | | |
| 10. Is the tower deck free of trip / slip hazards (water, protruding nails/bolts, splinters, etc.)? Ref: 29 CFR 1910.14(a)(3)(ii) | | | |
| 11. Is the rappel wall face and the fast rope area free of protrusions (nails, screws, etc.), broken or loose boards? | | | |
| 12. Does the tower deck and the stairway treads have a non-skid surface? Ref 29 CFR 1910.24(f) | | | |
| 13. Is there padding on all edges that ropes and / or personnel cross? | | | |
| 14. Is the edge padding in good condition and securely fastened? | | | |
| 15. Are there any signs of insect infestation? Ref: 29 CFR 1910.14.(a)(5) and 29 CFR 1910.269 I, II.A-H, III A-B | | | |
| 16. Are there any signs of rust or oxidation on metal / steel surfaces? | | | |
| 17. Any signs or visible presence broken boards or cross members, guy wires not secured to platform, guy wires not at correct angle in relation to tower or not at the correct tensil strength (sagging), etc.? | | | |

| | | | |
|---|---|---|---|
| 18. Is the landing area free of obstructions and hazards? | | | |
| 19. Do the landing areas consist of a cushioning material (recommend 4-12" of non-compressed depth of wood chips or mulch)? Ref: FM 21-20, Ch. 8 | | | |
| 20. Has the landing area been loosened up prior to use and, if large numbers of students are rappelling, loosened up again during training? Ref: FM 21-20, Ch. 8 | | | |
| 21. Are all structural areas of the tower, that a rappeller might contact during rappel / fast rope operations, properly padded? | | | |
| 22. Is all structural padding in good condition and securely fastened? | | | |
| 23. Are all areas, that pose a trip hazard or head hazard, marked in yellow? Ref: 29 CFR 1910.144(a)(3) | | | |
| 24. Is the tower platform and all rappel rope stations accessible without having to climb over any obstacles (i.e., guard rails, support cables, etc.)? | | | |
| 25. Are there helicopter skids on the rappel tower? If so, are they free of debris, rust, corrosion, burrs, etc.? | | | |
| 26. Are all obstacles and training areas clear of all debris? | | | |
| 27. Does rappel tower have a lightning protection system present? When was the last test conducted? | | | |
| 28. Can the rappel tower be locked to deny access? | | | |
| 29. Is the rappel tower clearly marked with "Off Limits" signs? | | | |
| | | | |
| Comments: | | | |
| Recommend IBSO representative conduct structural inspection. | | | |
| Recommend DEFL representative conduct structural inspection. | | | |
| Recommend DEFL representative conduct load test of all anchor points. | | | |
| | | | |
| Inspected By: | | | Unit Representative: |

| | | | |
|---|---|---|---|
| Date: | | | Date: |
| Location of Tower Inspected: | | | Date of Last Inspection: |
| | | | |
| References: | | | |
| 1. 29 CFR, Part 1910, OSHA Standards For General Industry | | | |
| 2. MCRP 3-11.4A, Helicopter Insertion/Extraction, Rappel Tower Inspection | | | |
| 3. TC 21-24, Rappelling | | | |

# APPENDIX B

## KNOTS EXAMINATION

STUDENT NAME: _____

INSTRUCTOR NAME: _____

YOU WILL HAVE A HANDS-ON EXAMINATION ON THE FOUR BASIC KNOTS THAT YOU LEARNED TO TIE IN YOUR BLOCK OF INSTRUCTION. YOU WILL HAVE THIRTY SECONDS TO SUCCESSFULLY TIE EACH KNOT; SQUARE KNOT, END-OF-THE-LINE BOWLINE KNOT, ANCHOR-LINE BOWLINE KNOT, AND PRUSIK KNOT. YOU MUST CORRECTLY TIE EACH KNOT TO PASS THIS EXAM. ONLY ONE RE-TEST IS ALLOWED PER KNOT.

| **INITIAL** | CIRCLE ONE: |
|---|---|
| DEMONSTRATED A SQUARE KNOT | GO / NO-GO |
| DEMONSTRATED END-OF-THE-LINE BOWLINE | GO / NO-GO |
| DEMONSTRATED ANCHOR-LINE BOWLINE | GO / NO-GO |
| DEMONSTRATED A PRUSIK KNOT | GO / NO-GO |
| **OVERALL** | **GO / NO-GO** |

**GRADER SIGNATURE:** _____

**STUDENT SIGNATURE:** _____

**DATE:** _____

# APPENDIX C

## KNOTS EXAMINATION

STUDENT NAME: _____

INSTRUCTOR NAME: _____

YOU WILL HAVE A HANDS-ON EXAMINATION ON THE FOUR BASIC KNOTS THAT YOU LEARNED TO TIE IN YOUR BLOCK OF INSTRUCTION. YOU WILL HAVE THIRTY SECONDS TO SUCCESSFULLY TIE EACH KNOT; SQUARE KNOT, END-OF-THE-LINE BOWLINE KNOT, ANCHOR-LINE BOWLINE KNOT, AND PRUSIK KNOT. YOU MUST CORRECTLY TIE EACH KNOT TO PASS THIS EXAM. THIS IS YOUR RE-TEST.

**RE-TEST**

| | CIRCLE ONE: |
|---|---|
| DEMONSTRATED A SQUARE KNOT | GO / NO-GO |
| DEMONSTRATED END-OF-THE-LINE BOWLINE | GO / NO-GO |
| DEMONSTRATED ANCHOR-LINE BOWLINE | GO / NO-GO |
| DEMONSTRATED A PRUSIK KNOT | GO / NO-GO |
| **OVERALL** | **GO / NO-GO** |

**GRADER SIGNATURE:** _____

**STUDENT SIGNATURE:** _____

**DATE:** _____

# APPENDIX D

## EQUIPMENT INSPECTION EXAMINATION

STUDENT NAME: _____

INSTRUCTOR NAME: _____

YOU WILL HAVE A HANDS-ON EXAMINATION ON THE FOUR PIECES OF EQUIPMENT THAT YOU LEARNED TO INSPECT IN YOUR BLOCK OF INSTRUCTION. YOU WILL HAVE TWO MINUTES TO SUCCESSFULLY INSPECT THE EQUIPMENT AND LET THE CADRE KNOW WHETHER EACH PIECE IS SERVICEABLE OR UNSERVICEABLE. IF UNSERVICEABLE, YOU MUST BE ABLE TO EXPLAIN WHY THE PIECE OF EQUIPMENT IS UNSERVICEABLE. YOU MUST RECEIVE A 100% "GO" TO PASS THIS EXAM. ONLY ONE RE-TEST IS ALLOWED.

**INITIAL**

| | | CIRCLE ONE: |
|---|---|---|
| 1. | SNAPLINK | **SERVICEABLE / UNSERVICEABLE** |
| 2. | GLOVES | **SERVICEABLE / UNSERVICEABLE** |
| 3. | KERNMANTLE | **SERVICEABLE / UNSERVICEABLE** |
| **4.** | 7/16" NYLON ROPE | **SERVICEABLE / UNSERVICEABLE** |

**OVERALL** **GO / NO-GO**

**GRADER SIGNATURE:** _____

**STUDENT SIGNATURE:** _____

**DATE:** _____

# APPENDIX E

## EQUIPMENT INSPECTION EXAMINATION

STUDENT NAME: _____

INSTRUCTOR NAME: _____

YOU WILL HAVE A HANDS-ON EXAMINATION ON THE FOUR PIECES OF EQUIPMENT THAT YOU LEARNED TO INSPECT IN YOUR BLOCK OF INSTRUCTION. YOU WILL HAVE TWO MINUTES TO SUCCESSFULLY INSPECT THE EQUIPMENT AND LET THE CADRE KNOW WHETHER EACH PIECE IS SERVICEABLE OR UNSERVICEABLE. IF UNSERVICEABLE, YOU MUST BE ABLE TO EXPLAIN WHY THE PIECE OF EQUIPMENT IS UNSERVICEABLE. YOU MUST RECEIVE A 100% "GO" TO PASS THIS EXAM. THIS IS YOUR RE-TEST.

**RE-TEST**

| | | CIRCLE ONE: |
|---|---|---|
| 1. | SNAPLINK | **SERVICEABLE / UNSERVICEABLE** |
| 2. | GLOVES | **SERVICEABLE / UNSERVICEABLE** |
| 3. | KERNMANTLE | **SERVICEABLE / UNSERVICEABLE** |
| **4.** | 7/16" NYLON ROPE | **SERVICEABLE / UNSERVICEABLE** |

**OVERALL** **GO / NO-GO**

**GRADER SIGNATURE:** _____

**STUDENT SIGNATURE:** _____

**DATE:** _____

# APPENDIX F

| ROPE LOG (USAGE AND HISTORY) | | | UNIT ID MARKING |
|---|---|---|---|
| NSN | DOCUMENT NUMBER | SERIAL NUMBER | MFR LOT NUMBER |
| DATE OF MFR | ISSUE DATE | DATE OF SERVICE | LENGTH |
| DIAMETER | FIBER | COLOR | CONSTRUCTION |

**INSPECT ROPE FOR DAMAGE OR EXCESSIVE WEAR EACH TIME IT IS DEPLOYED AND AGAIN**

| DATE USED | LOCATION | TYPE OF USE | ROPE EXPO-SURE | INSPECTOR'S SIG-NATURE | ROPE CONDITION AND COMMENTS |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

# APPENDIX G

## HOOK-UP EXAMINATION

STUDENT NAME: _____

INSTRUCTOR NAME: _____

YOU WILL HAVE A HANDS-ON EXAMINATION ON THE TWO TYPES OF HOOK-UPS YOU LEARNED IN YOUR BLOCK OF INSTRUCTION. YOU WILL HAVE 10 SECONDS TO DETERMINE IF EACH HOOK-UP, HOLLYWOOD AND AUSTRALIAN, ARE A "GO" OR "NO-GO". UPON INSPECTION OF A "NO-GO" YOU MUST BE ABLE TO IDENTIFY AND EXPLAIN THE DEFIENCY. YOU MUST RECEIVE A 100% "GO" FOR EACH HOOK-UP TO PASS THIS EXAM. ONLY ONE RE-TEST IS ALLOWED AND ONLY THE HOOK-UP(S) THAT ARE FAILED ON THE TEST.

**INITIAL**

CIRCLE ONE:

**1.** HOLLYWOOD **GO / NO-GO**

NOTES: _____

**2.** AUSTRALIAN **GO / NO-GO**

NOTES: _____

**OVERALL** **GO / NO-GO**

**GRADER SIGNATURE:** _____

**STUDENT SIGNATURE:** _____

**DATE:** _____

# APPENDIX H

## HOOK-UP EXAMINATION

STUDENT NAME: _____

INSTRUCTOR NAME: _____

YOU WILL HAVE A HANDS-ON EXAMINATION ON THE TWO TYPES OF HOOK-UPS YOU LEARNED IN YOUR BLOCK OF INSTRUCTION. YOU WILL HAVE 10 SECONDS TO DETERMINE IF EACH HOOK-UP, HOLLYWOOD AND AUSTRALIAN, ARE A "GO" OR "NO-GO". UPON INSPECTION OF A "NO-GO" YOU MUST BE ABLE TO IDENTIFY AND EXPLAIN THE DEFIENCY. YOU MUST RECEIVE A 100% "GO" FOR EACH HOOK-UP TO PASS THIS EXAM. THIS IS YOUR RE-TEST.

**RE-TEST**

CIRCLE ONE:

**1.** HOLLYWOOD **GO / NO-GO**

NOTES: _____

**2.** AUSTRALIAN **GO / NO-GO**

NOTES: _____

**OVERALL** **GO / NO-GO**

**GRADER SIGNATURE:** _____

**STUDENT SIGNATURE:** _____

**DATE:** _____

# APPENDIX I

**A/C PREPARATION AND RIGGING EXAMINATION**
**(UH-1H)**

STUDENT NAME: _____

INSTRUCTOR NAME: _____

THE RAPPEL MASTER STUDENT MUST SCORE A 100% "GO" TO PASS THIS EXAM. ONLY ONE RE-TEST IS ALLOWED.

**INTIAL**

**CIRCLE ONE**:

1. TAPE EDGES OR PROTRUSSIONS ON THE CARGO FLOOR, DOOR EDGES, AND SKIDS. (4 LAYERS) **GO / NO-GO**

2. ATTACH DONUT RING AND FLOATING RING **GO / NO-GO**

   A. 4 SNAP HOOKS FACING OUT AND GATES DOWN (11, 1, 5, 7)
   B. 4 SNAPP HOOKS FACING IN AND GATES DOWN (CENTER, 3, 9)
   C. 2 SNAP LINKS OPPOSITE AND OPPOSING THROUGH A/C TIE DOWN RING.
   D. FLOATING RING ATTACHED TO DONUT WITH KEEPER CABLE

3. ATTACH TWO SNAP LINK TO PRIMARY AND SECONDARY ON A/C ROPE. (OPPOSITE AND OPPOSING) **GO / NO-GO**

4. ATTACH A/C ROPES TO ANCHOR POINT: **GO / NO-GO**

   A. ATTACH PRIMARY SNAPLINKS TO DONUT RING
   B. ATTACH SECONDARY SNAPLINKS TO FLOATING RING
   C. A/C ROPES ARE ATTACHED IN CORRECT POSITION
   D. ALL SNAP LINKS ARE OPPOSITE AND OPPOSING
   E. ALL BARRELS ARE LOCKED ON SNAPLINKS
   F. ALL SNAP LINKS ARE TAPED
   G. NUMBER 4 A/C ROPE IS IN THE CORRECT POSITION
   H. FREE OF TWIST BETWEEN ANCHOR POINTS

5. ATTACH RECOVERY POINTS: **GO / NO-GO**

   A. CORRECT PLACEMENT
   B. SNAP LINK BARREL IS UNLOCKED

**6.** ATTACH RAPPEL MASTER HARNESS CORRECTLY **GO / NO-GO**

**OVERALL** **GO / NO-GO**

**GRADER SIGNATURE: _____**

**STUDENT SIGNATURE: _____**

**DATE: _____**

# APPENDIX J

**A/C PREPARATION AND RIGGING EXAMINATION**
**(UH-1H)**

STUDENT NAME: _____

INSTRUCTOR NAME: _____

THE RAPPEL MASTER STUDENT MUST SCORE A 100% "GO" TO PASS THIS EXAM. THIS IS YOUR RE-TEST.

**RE-TEST**

**CIRCLE ONE**:

1. TAPE EDGES OR PROTRUSSIONS ON THE CARGO FLOOR, DOOR EDGES, AND SKIDS. (4 LAYERS) **GO / NO-GO**

2. ATTACH DONUT RING AND FLOATING RING **GO / NO-GO**

   A. 4 SNAP HOOKS FACING OUT AND GATES DOWN (11, 1, 5, 7)
   B. 4 SNAPP HOOKS FACING IN AND GATES DOWN (CENTER, 3, 9)
   C. 2 SNAP LINKS OPPOSITE AND OPPOSING THROUGH A/C TIE DOWN RING.
   D. FLOATING RING ATTACHED TO DONUT WITH KEEPER CABLE

3. ATTACH TWO SNAP LINK TO PRIMARY AND SECONDARY ON A/C ROPE. (OPPOSITE AND OPPOSING) **GO / NO-GO**

4. ATTACH A/C ROPES TO ANCHOR POINT: **GO / NO-GO**

   A. ATTACH PRIMARY SNAPLINKS TO DONUT RING
   B. ATTACH SECONDARY SNAPLINKS TO FLOATING RING
   C. A/C ROPES ARE ATTACHED IN CORRECT POSITION
   D. ALL SNAP LINKS ARE OPPOSITE AND OPPOSING
   E. ALL BARRELS ARE LOCKED ON SNAPLINKS
   F. ALL SNAP LINKS ARE TAPED
   G. NUMBER 4 A/C ROPE IS IN THE CORRECT POSITION
   H. FREE OF TWIST BETWEEN ANCHOR POINTS

5. ATTACH RECOVERY POINTS: **GO / NO-GO**

   A. CORRECT PLACEMENT
   B. SNAP LINK BARREL IS UNLOCKED

**6.** ATTACH RAPPEL MASTER HARNESS CORRECTLY **GO / NO-GO**

**OVERALL** **GO / NO-GO**

**GRADER SIGNATURE: _____**

**STUDENT SIGNATURE: _____**

**DATE: _____**

# APPENDIX K

**A/C PREPARATION AND RIGGING EXAMINATION**
**(UH-60)**

STUDENT NAME: _____

INSTRUCTOR NAME: _____

THE RAPPEL MASTER STUDENT MUST SCORE A 100% "GO" TO PASS THIS EXAM. ONLY ONE RE-TEST IS ALLOWED.

**INTIAL**

**CIRCLE ONE**:

1. TAPE EDGES OR PROTRUSIONS ON THE CARGO FLOOR AND DOOR EDGES. (4 LAYERS) **GO / NO-GO**

2. ATTACH TWO SNAP LINK TO PRIMARY AND SECONDARY ON A/C ROPE. (OPPOSITE AND OPPOSING) **GO / NO-GO**

3. ATTACH A/C ROPES TO ANCHOR POINT: **GO / NO-GO**

   A. ATTACH PRIMARY SNAPLINKS TO CABIN CEILING TIE-DOWN
   B. ATTACH SECONDARY SNAPLINKS TO CARGO RESTRAINT NET RING
   C. ALL SNAP LINKS ARE OPPOSITE AND OPPOSING
   D. ALL BARRELS ARE LOCKED ON SNAPLINKS
   E. ALL SNAP LINKS ARE TAPED
   F. NUMBER 4 A/C ROPE IS IN THE CORRECT POSITION
   G. FREE OF TWIST BETWEEN ANCHOR POINTS

4. ATTACH RECOVERY POINTS: **GO / NO-GO**

   A. CORRECT PLACEMENT
   B. SNAP LINK BARREL IS UNLOCKED

**5.** ATTACH RAPPEL MASTER HARNESS CORRECTLY **GO / NO-GO**

**OVERALL** **GO / NO-GO**

**GRADER SIGNATURE: _____**

**STUDENT SIGNATURE: _____**

**DATE: _____**

# APPENDIX L

**A/C PREPARATION AND RIGGING EXAMINATION**
**(UH-60)**

STUDENT NAME: _____

INSTRUCTOR NAME: _____

THE RAPPEL MASTER STUDENT MUST SCORE A 100% "GO" TO PASS THIS EXAM. THIS IS YOUR RETEST.

**RE-TEST**

**CIRCLE ONE**:

1. TAPE EDGES OR PROTRUSIONS ON THE CARGO FLOOR AND DOOR EDGES. (4 LAYERS) **GO / NO-GO**

2. ATTACH TWO SNAP LINK TO PRIMARY AND SECONDARY ON A/C ROPE. (OPPOSITE AND OPPOSING) **GO / NO-GO**

3. ATTACH A/C ROPES TO ANCHOR POINT: **GO / NO-GO**

   A. ATTACH PRIMARY SNAPLINKS TO CABIN CEILING TIE-DOWN
   B. ATTACH SECONDARY SNAPLINKS TO CARGO RESTRAINT NET RING
   C. ALL SNAP LINKS ARE OPPOSITE AND OPPOSING
   D. ALL BARRELS ARE LOCKED ON SNAPLINKS
   E. ALL SNAP LINKS ARE TAPED
   F. NUMBER 4 A/C ROPE IS IN THE CORRECT POSITION
   G. FREE OF TWIST BETWEEN ANCHOR POINTS

4. ATTACH RECOVERY POINTS: **GO / NO-GO**

   A. CORRECT PLACEMENT
   B. SNAP LINK BARREL IS UNLOCKED

**5.** ATTACH RAPPEL MASTER HARNESS CORRECTLY **GO / NO-GO**

**OVERALL** **GO / NO-GO**

**GRADER SIGNATURE: _____**

**STUDENT SIGNATURE: _____**

**DATE: _____**

# APPENDIX M

## AIR MISSION BRIEF

1. Mission Name: **(Mission type such as: Rappel Master A/C Command and Control Test; Rappelling Operations)**
2. Number of Personnel to be trained: **(##)**
3. Lifts needed to complete mission: **(##)**
4. Scheme of maneuvers by troops on ground:
5. A/C equipment needed: **(Cabin Ceiling Tie-Downs, Cargo Restraint net hooks, safety wire to secure cabin ceiling tie-downs, cabin ceiling tie-down bolts with "H" stamped on them, 2 ICS headsets)**
6. Load: (Internal) (## of Pax; Rappel Master, Rappel Master student, and rappellers)
7. Expected density of air traffic:
8. Tactical Situation:
9. Number and Type of visual and electronic aids used:
10. Commanders Concept/Ground Tactical Plan:
11. Pathfinder insertion method:
12. Pathfinder extraction method:
13. Location of medical support: (Next to GTA)
14. Verify pilot is current and rated for task:
15. Pick-Up zone data:
    - A. Location: (8 digit grid coordinate)
    - B. Name of primary and alternate HLS:
    - C. Flight route to PZ: (Aircrew Brief)
    - D. Location of CCP/RP: (Discussion on Map)
    - E. Description: (Map Recon)
    - F. Field Elevation: (Feet; Mean Sea Level)
    - G. Overall Size: (Meters wide x Meters long)
    - H. Usable Size: (Meters wide x Meters long)
    - I. Markings: (Obstacles in RED)
    - J. Hazards: (Light Poles, etc)
    - K. Aircraft Formation:
    - L. Approach and Departure routes:
    - M. Identification signal:
    - N. Use of Visual Approach-Path Indicator (VAPI):

O. Land/Drop heading (000 degrees) (000 degrees)
P. Location of sun and shade:
Q. Communication:
R. Troop staging area:
S. Troop landing plan:
T. Environmental conditions:

16. Landing Zone data:
    A. Location: (8 digit grid coordinate)
    B. Name of primary and alternate HLS:
    C. Flight route to PZ: (Aircrew Brief)
    D. Location of CCP/RP: (Discussion on Map)
    E. Description: (Map Recon)
    F. Field Elevation: (Feet; Mean Sea Level)
    G. Overall Size: (Meters wide x Meters long)
    H. Usable Size: (Meters wide x Meters long)
    I. Markings: (Obstacles in RED)
    J. Hazards: (Light Poles, etc)
    K. Aircraft Formation:
    L. Approach and Departure routes:
    M. Identification signal:
    N. Use of Visual Approach-Path Indicator (VAPI):
    O. Land/Drop heading (000 degrees) (000 degrees)
    P. Location of sun and shade:
    Q. Communication:
    R. Troop staging area:
    S. Troop landing plan:
    T. Environmental conditions:

17. Time Flow:
    A. Time zone used:
    B. Next AMB time to confirm and conduct rehearsals:
    C. Time Pathfinder is on site:
    D. Time Pathfinder can accept A/C:
    E. Time Pathfinder will close LZ/PZ:
    F. Time at A/C:

# APPENDIX M

G. Load time:
H. Take-off time:
I. Time on Target/Station:
J. No earlier than/no later than time:
K. Time of expected Re-fuel:
L. Weather decision time:

18. Communication: **(Aircraft/Pathfinder/Air Operations/Range Control/Rappel Master)**

A. Primary Frequency:
B. Alternate Frequency:
C. Supported Unit PRI/ALT:
D. Other friendly units PRI/ALT:
E. Visual Signals:
F. Call Signs:
G. Signalman:
H. Hand and Arm Signals:
I. Markings for obstacles:
J. Communications check/time:
L. Location of GTA:
M. FM Homing beacons in A/C:
N Code words for PZ secure:
O. No communications plan:

19. Weather Forecast: (NLT 48 hrs out)

A. Ceiling:
B. Visibility:
C. Temperatures:
D. Winds:
E. Pressure:
F. Density Altitude:
G. Percent of moon illumination:
H. Moonrise and Moonset:
I. Sunrise and Sunset:
J. Precipitation:
K. Night Vision Capabilities of A/C:

# APPENDIX M

20. Route Briefing:
    A. Distance and Time to checkpoints:
    B. Flight formations and airspeed:
    C. Location of CCP:
    D. Location of RP/SP:
    E. Location of friendly forces:
    F. Mission Decision Line:
    G. Location of Forward Arming and Refueling Point:

21. Contingencies:
    A. Maintenance abort:
    B. Sling load abort:
    C. Rappel emergency procedures:
    D. Inclement weather:
    E. Refueling Plan:
    F. Pathfinder considerations:
    G. Emergency Ditch:
    H. Location of back-up aircraft:

22. Orientation Flight:
    A. Planned load/unload time:
    B. Number of troops per lift:
    C. Equipment being worn:
    D. False insertion/extraction location:

23. Rappelling Operations:
    A. Rappel Master actions:
    B. Opossum rappeller:
    C. Entangled rappeller:
    D. Altitude for rappelling
    E. Belay safety duties:
    F. Cutting Ropes:

# APPENDIX N

**AIRCRAFT COMMAND AND CONTROL EXAMINATION**

THE RAPPEL MASTER STUDENT MUST SCORE 100% "GO" TO PASS THIS EXAM. ONLY ONE RE-TEST IS ALLOWED.

**INITIAL**

**CIRCLE ONE:**

1. ENTER HELICOPTER AND HOOK UP SAFETY LINE. **GO / NO-GO**
2. PERFORM COMMUNICATION CHECK WITH PILOT AND GTA. **GO / NO-GO**
3. WAVE ON RAPPELLERS USING THE PROPER HAND & ARM SIGNAL. **GO / NO-GO**
4. PHYSICALLY TOUCH EACH RAPPELLER'S KNOT (IN THE CORRECT ORDER) TO ENSURE FACING TOWARDS INSIDE OF THE A/C. **GO / NO-GO**
5. INSPECT EACH RAPPELLER (BEGIN AT THE FRONT, LEFT OF THE A/C). **GO / NO-GO**
   - A. CHECK ANCHOR POINT
   - B. GUIDE HAND GLOVE
   - C. SLEEVE
   - D. HELMET, CHINSTRAP FASTENED
   - E. SWEEP FRONT OF RAPPELLER TO ENSURE SHIRT IS TUCKED IN.
   - f. CORRECT HOOK-UP (SNAP LINK LOCKED/ROUTED ROPES)
   - G. EXTEND BRAKE HAND, SLEEVE, GLOVE, ROUTING OF ROPES, AND REPLACE BRAKE HAND.
   - h. SWEEP: BODY PARTS IN A/C (3 CONSECUTIVE TIMES)
   - i. "FREEZE, HEAD AND EYES ON ME" (CORRECT HAND & ARM SIGNAL)
6. CHECK WITH BELAY MASTER (THUMBS UP). **GO / NO-GO**
7. ISSUE CORRECT FIRST COMMAND WITH HAND & ARM SIGNAL (GET READY). **GO / NO-GO**
8. CHECK ALL SNAP LINKS IN CORRECT SEQUENCE (PHYSICALLY CHECKED GATES). **GO / NO-GO**
9. INSTRUCT PILOT TO ASCEND, OBSERVED ASCENT FROM #4 ROPE. **GO / NO-GO**
10. ENSURE "RED TAPE ON THE GROUND" (VERBALLY STATED 3 TIMES). **GO / NO-GO**
11. ISSUED CORRECT COMMAND WITH HAND & ARM SIGNAL (POSITION). **GO / NO-GO**
12. CHECK ALL SNAP LINKS IN CORRECT SEQUENCE (VISUAL CHECK ONLY-DON'T POINT). **GO / NO-GO**
13. CHECK ROPES FROM #4 ROPE (ADJUST HEIGHT IF NECESSARY). **GO / NO-GO**
14. ENSURE "RED TAPE ON THE GROUND" (VERBALLY STATED 3 TIMES). **GO / NO-GO**
15. ISSUE CORRECT COMMAND WITH HAND & ARM SIGNAL (GO). **GO / NO-GO**
16. GO TO THE DECK OF A/C AT THE #4 ROPE AND OBSERVE DESCENT OF RAPPELLER. **GO / NO-GO**
17. ACKNOWLEDGE WHEN ALL RAPPELLERS ARE ON ROPES, ON THE GROUND, AND OFF ROPES (VERBALLY). **GO / NO-GO**
18. REPORT STATUS TO PILOT (CLEAR AND TANGLED). **GO / NO-GO**
19. RECOVER FROM DECK ONLY AFTER A/C IS FIRMLY GROUNDED. **GO / NO-GO**
20. DISPLAY CONFIDENCE, REMAIN IN CHARGE THROUGHOUT. **GO / NO-GO**

**OVERALL** **GO / NO-GO**

# APPENDIX O

**AIRCRAFT COMMAND AND CONTROL EXAMINATION**

THE RAPPEL MASTER STUDENT MUST SCORE 100% "GO" TO PASS THIS EXAM. THIS IS YOUR RE-TEST.

**RE-TEST**

**CIRCLE ONE:**

1. ENTER HELICOPTER AND HOOK UP SAFETY LINE. **GO / NO-GO**
2. PERFORM COMMUNICATION CHECK WITH PILOT AND GTA. **GO / NO-GO**
3. WAVE ON RAPPELLERS USING THE PROPER HAND & ARM SIGNAL. **GO / NO-GO**
4. PHYSICALLY TOUCH EACH RAPPELLER'S KNOT (IN THE CORRECT ORDER) TO ENSURE FACING TOWARDS INSIDE OF THE A/C. **GO / NO-GO**
5. INSPECT EACH RAPPELLER (BEGIN AT THE FRONT, LEFT OF THE A/C). **GO / NO-GO**
   - A. CHECK ANCHOR POINT
   - B. GUIDE HAND GLOVE
   - C. SLEEVE
   - D. HELMET, CHINSTRAP FASTENED
   - E. SWEEP FRONT OF RAPPELLER TO ENSURE SHIRT IS TUCKED IN.
   - f. CORRECT HOOK-UP (SNAP LINK LOCKED/ROUTED ROPES)
   - G. EXTEND BRAKE HAND, SLEEVE, GLOVE, ROUTING OF ROPES, AND REPLACE BRAKE HAND.
   - h. SWEEP: BODY PARTS IN A/C (3 CONSECUTIVE TIMES)
   - i. "FREEZE, HEAD AND EYES ON ME" (CORRECT HAND & ARM SIGNAL)
6. CHECK WITH BELAY MASTER (THUMBS UP). **GO / NO-GO**
7. ISSUE CORRECT FIRST COMMAND WITH HAND & ARM SIGNAL (GET READY). **GO / NO-GO**
8. CHECK ALL SNAP LINKS IN CORRECT SEQUENCE (PHYSICALLY CHECKED GATES). **GO / NO-GO**
9. INSTRUCT PILOT TO ASCEND, OBSERVED ASCENT FROM #4 ROPE. **GO / NO-GO**
10. ENSURE "RED TAPE ON THE GROUND" (VERBALLY STATED 3 TIMES). **GO / NO-GO**
11. ISSUED CORRECT COMMAND WITH HAND & ARM SIGNAL (POSITION). **GO / NO-GO**
12. CHECK ALL SNAP LINKS IN CORRECT SEQUENCE (VISUAL CHECK ONLY-DON'T POINT). **GO / NO-GO**
13. CHECK ROPES FROM #4 ROPE (ADJUST HEIGHT IF NECESSARY). **GO / NO-GO**
14. ENSURE "RED TAPE ON THE GROUND" (VERBALLY STATED 3 TIMES). **GO / NO-GO**
15. ISSUE CORRECT COMMAND WITH HAND & ARM SIGNAL (GO). **GO / NO-GO**
16. GO TO THE DECK OF A/C AT THE #4 ROPE AND OBSERVE DESCENT OF RAPPELLER. **GO / NO-GO**
17. ACKNOWLEDGE WHEN ALL RAPPELLERS ARE ON ROPES, ON THE GROUND, AND OFF ROPES (VERBALLY). **GO / NO-GO**
18. REPORT STATUS TO PILOT (CLEAR AND TANGLED). **GO / NO-GO**
19. RECOVER FROM DECK ONLY AFTER A/C IS FIRMLY GROUNDED. **GO / NO-GO**
20. DISPLAY CONFIDENCE, REMAIN IN CHARGE THROUGHOUT. **GO / NO-GO**

**OVERALL** **GO / NO-GO**