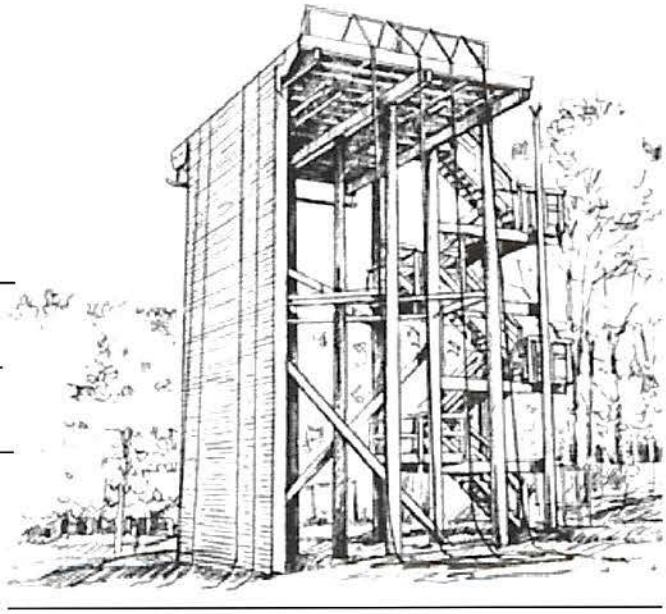
RAPPEL MASTER COURSE
STUDENT HANDOUT



Student Rank / Name:_____

Class Location:_____

Class Number:_____

Course Material
05 January 2017

DUTIES AND RESPONSIBILITIES

References:

TC 21-24 - Rappelling
TC 3-97.61 - Military Mountaineering
USSOCOM Manual 350-6 - Special Operations Infiltration / Exfiltration Operations (Chapter 5)

RAPPEL MASTER REQUIREMENTS / QUALIFICATIONS

Rank Requirement:

- E-4 thru E-9 or
- Warrant Officer or
- Commissioned Officer 2LT thru 1LT

Qualifications:

- Air Assault, Ranger, Sapper or Mountain Warfare qualified, AND
- Graduate of an accredited Rappel Master Course

RAPPEL MASTER CURRENCY

Must perform Rappel Master Duties in a tactical or training exercise at least once every 6 months

If Rappel Master fails to perform duties within 6 months, must attend refresher training taught by a current and qualified Rappel Master

Refresher Training must be conducted IAW TC 21-24 Chapter 1 Para 1-4

RAPPEL MASTER DUTIES AND RESPONSIBILITIES

Primary responsibility is SAFETY

Supervises the overall rappelling operation

Responsible for the following:

- Inspection of all equipment and proper documentation
- Inspection of Aircraft, Tower, and anchor point rigging
- Safety Briefs
- Training of all rappellers, Lane NCO's, belaymen, and belay safeties
- **Gives the Pilot-in-Command the Air Mission Brief (AMB)**
- Must have a knife/rope cutter on their person at all times
- Ensures internal communication between the pilot and Rappel Master, and external communication between the aircraft and the ground

SAFETY BRIEFS

Will cover the following as outlined in TC 21-24 Para 1-19, Para 3-16:

- Rappellers ensure that all loose clothing and equipment are secure
- Rappel seats are tied correctly and must be re-tied after each rappel
- Directions on approaching the A/C as well as what to do while on the tower
- Absolutely NO RUNNING on the tower or within 50 ft of A/C
- All personnel working within 3 ft from the edge must wear a safety line
- No one will lean or sit on the railing or banisters of the tower
- Steps on conducting a proper hook-up
- All personnel that weigh over 200lbs will conduct a standard rappel to determine if a friction hook-up is needed
- Combat equipment worn does not interfere with the rappeller's brake hand
- All personal equipment is worn and worn correctly
- All rappellers will take all commands from the Rappel Master or Lane NCO
- Belayer is present on the Rappel lane rope, has both hands on the rope and faces the rappeller at all times. No gloves, loose grip, 1 pace from the tower or directly below the rappeller on open rappels
- Any Soldiers that refuse to train or who display lack of confidence are removed from the training area

RAPPEL SAFETY OFFICER (RSO)

RSO serves as the OIC during all rappel operations

Requirements:

- SFC or above
- Trained on Rappel Master tasks
- Certified by the Commander to serve in the position
- Graduate of: Ranger, Air Assault, Sapper, or Mountain Warfare
- Responsible for the overall safety of all rappellers
- Ensures that all safety precautions are followed
- Briefs VIPs, visitors, and inspecting authorities on training, safety requirements, and layout of training areas

***Maintains communications at all times with the pilot and RM through FM radio**

RAPPEL LANE NCO

Safety is the rappel lane NCO's number one priority

Duties:

- Ensures proper safety procedures are followed
- Ensures proper hookup once directed to a rope station
- Issues commands and maintains eye contact with the rappeller at all times
- When assuming duties, inspects the rigging for damage, kinks, shifted equipment

Qualifications:

- Commander appointed
- Corporal or above

Rappel Lane NCO must be trained in the following:

- Responsibility and safety requirements
- Trained in proper execution of rappelling operations
- Inspection and maintenance of equipment
- Identification of satisfactory anchor points
- Identification of safe and unsafe hookups
- Establishment of a rappel point
- Inspection of a rappel seat
- Belay control procedures
- Coaching Techniques
- Rappelling procedures
- Emergency procedures

PILOT-IN-COMMAND (PIC)

Ensures that the aircrew and all non-aircrew personnel are briefed and understand their responsibilities during rappelling operations

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

Keeps the aircraft centered over the target with corrections from the rappel master as required

RAPPELLER

The unit commander ensures that personnel successfully complete these requirements before beginning aircraft rappel training. Individual rappellers must—

- Identify all rappelling equipment
- Demonstrate construction of rappel seat; donning of rappel harness; proper use and hook-up of the 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
- Exhibit satisfactory performance from a rappel tower of at least 34 feet in height (two rappels with equipment and weapon, two without equipment and weapon). Two rappels are conducted from the free side of the tower (no wall)
- Demonstrate the ability to lock-in

BELAY SAFETY

Qualifications:

Must be Ranger, Air Assault, Sapper, or Mountain qualified

Duties:

Ensures belay personnel are performing their duties properly

BELAY

Belay requirements are a subtask of basic rappel requirements

Duties:

- Assumes a position at the base of the lane about one pace away from the tower, with gloves off
- 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 rappeller
- Immediately stops the rappeller by pulling downward on the rappel ropes if "FALLING"
- Watches the rappeller at all times
- Maintains constant voice or visual contact
- Wears a helmet to prevent injuries from falling debris
- Removes the slack off the rope during aircraft ascent and descent
- Ensures the rope is not caught under the aircraft skids or tire prior to landing

TOWER & GROUND OPERATION PERSONNEL

Rappel Master – One per rappel site

RSO – One per rappel site

Rappel lane NCO – One per lane

Belay personnel – One per rappel lane

Belay Safeties – One for every two rappel lanes

Medic – At least one medic with medical kit & backboard and a medical evacuation vehicle with driver

***Units may conduct ground training and wall-side tower rappelling without a RM**
***Fully Qualified RSO must be on site to assume the duties and responsibilities of RM**

NON-TACTICAL AIRCRAFT OPERATION PERSONNEL

RSO – One per aircraft rappel site

Rappel Master - One per aircraft

Belay personnel - One per rappel lane

Belay Safeties – One for every two rappel lanes / one on each side of the aircraft

Medic -1 medic with medical kit & backboard and a medical evacuation vehicle with driver

***Rappel A/C may be used as a CASEVAC vehicle**

RAPPELLER'S INITIAL TRAINING

- Identify rappelling equipment and any unsafe equipment
- Demonstrate the construction of a rappel seat
- Understand and demonstrate rappel commands
- Demonstrate rappelling positions and belaying procedures
- Conduct five rappels from a tower no shorter than 34ft
- Demonstrate the ability to lock-in

RAPPELLER SUSTAINMENT TRAINING

Ground and Tower Rappelling:

Before conducting ground or tower rappel training, the unit or element conducts sustainment training. Training should include the following:

- Review the construction of a rappel seat, seats to be used, and hook-up procedures
- Conduct a minimum of one rappel on the 34-foot tower wall (20-foot tower is acceptable) under the same conditions as ground rappelling. If conducting ground rappelling with combat equipment, it is recommended that Soldiers conduct two tower rappels; one with equipment, one without equipment
- Demonstrate the ability to lock-in during one of the rappels from the free side of the tower

Aircraft:

Before conducting helicopter rappel training, the unit or element conducts sustainment training. Training includes:

- Review of the construction of a rappel seat, equipment to be used, and hook-up procedures
- Conduct of two rappels on the 34-foot or higher tower wall: one without equipment, one with equipment. Conduct two rappels from the open side of a 34-foot or higher rappel tower

- **NOTE: Service members will NOT wear a MILES harness during any rotary wing rappelling Operations**

AIRCRAFT RAPPELLING REFRESHER TRAINING

Refresher training is routinely conducted to maintain acquired skills. Soldiers who have not performed a helicopter rappel during the past six months will undergo refresher training consisting of three satisfactory rappels from a tower (one with weapon and equipment and one executing a lock-in) before executing a helicopter rappel

SAFETY REQUIREMENTS

- Safety must ALWAYS be first priority
- Proper rappelling uniform
- Safety line and/or safety harness
- Tower rappels: 10ft of rope on the ground
- Aircraft rappels: 20ft of rope on the ground
- FM communications are mandatory for all tactical and non-tactical aircraft rappelling operations
- Rappellers must inspect equipment, replace unserviceable equipment, tie and receive RMPI before any individual rappel
- Therefore, upon completing each rappel, rappellers must un-tie their seat in order to inspect their equipment for ANY damage caused during the rappel
- Rappellers burn through their seat rope and guide hand glove
- Combat equipment adjusts during the rappel and may be unsafe
- Weapon slings may become loose
- Reporting to a rappel point with deficient equipment is a Serious Safety Violation
- A scuff pad is used whenever possible to protect the ropes on the tower. Tape will be used on the aircraft to protect the ropes.

Requirements for a **night time rappelling** operation include the following as a minimum:

- Unit SOP's should be developed to further ensure the rappellers safety
- One chemical light attached to:
    1. The attachment point of the rope (anchor point)
    2. The end of the rope that is on the ground
    3. One will be attached to the rappeller where it can best be seen by the Rappel Master

***Night Vision Goggles will NOT be worn by rappellers during descent**
***Rappel Master may wear NVG's**

EMERGENCIES

- Hung Rappeller
- Falling Rappeller
- Opossum Rappeller (must check rappeller's carabiner)
- Inverted or open carabiner (must lower recovery line to rappeller)
- Ropes or rappellers become entangled
- Aircraft engine failure
- If the command "cut ropes" is issued, the Rappel Master is the only person authorized to cut the ropes when rappellers are on ropes. The command must be confirmed by the Rappel Lane NCO or the PIC.

ENVIRONMENTAL CONSIDERATIONS

Aircraft Rappelling Operations will NOT be conducted when the following conditions are present:

- Ambient temperature **30 degrees** Fahrenheit or below
- Winds exceeding **30 knots** (to include gusts)
- Lightning strikes within **one nautical mile**
- Wind chill factors which could cause cold weather injuries (rotor wash, wind during flight)
- 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 the rotor wash cause the aircrew or the rappel master to lose visual contact with the ground

Ground or Tower Rappelling will not be conducted during excessively high winds which would hinder safe belay and rappel procedures.

RAPPELLING GLOVES

Gloves:

- Made with thick/heavy weight leather
- Must have friction pad for rappelling operations or,
- In the absence of a friction bearing pad, glove inserts must be worn underneath

Unserviceable gloves:

- Stitch Rule: 3 or more consecutive broken stitches OR 5 in a stitch line
- Cuts, rips, burns or tears that show exposed skin except when cutting a slit or hole in the back to remedy a broken or missing cinch strap
- Army issue black leather gloves without friction bearing pad, must use glove liners

STEEL LOCKING CARABINER

Weakest part of carabiner is the gate

Locking pins should be checked to ensure that they are not loose, worn, or corroded

Will not have any dents, cracks, pits or rust that cannot be removed with a mild abrasive material

Carabiner should never be side-loaded

Opening gate will have little to no lateral movement and be spring loaded, open/closing freely with no effort

The locking barrel should spin open and closed freely

Rated capacity (strength) for a steel locking carabiner: 51-53 kN (11,464 lbs) with gate closed (1 kN = 224.8 pounds of force)

1 kN = 224.8 pounds of force

ROPE

Rope selection factors include proper rope for its intended task according to type, diameter, length and tensile strength. Consider the mission, enviornment, climate, resistance and weight when selecting ropes.

Ends must be whipped (at least one inch wrap with thin cord) and dipped (in enamel or lacquer) or burned to the rope's melting point to obtain a solid end. Burnt ends may also be dipped. 7/16 laid nylon rope must be taped when burned. Kernmantle does not have to be taped of burned.

STATIC ROPE

11mm Kernmantle Static rope allows for minimal stretch of the rope and is the preferred type of rope for rappelling operations. Static rope stretches about 2-8 percent under a working load and 5 to 15 percent at the point of failure. The minimum tensile strength for military use is 30 kN or 6750 lbs of force.

DYNAMIC ROPE

11mm Kernmantle Dynamic rope allows for stretch within the fibers of the rope. This can prove to be a disadvantage in rappelling, Prusik climbing, and other applications. Dynamic ropes are also more susceptible to abrasion and wear. They have about a 5 to 10 percent working stretch. The minimum tensile strength for military use is 9-10 kN or 2025 - 2250 lbs of force.

LAID ROPE / (7/16 inch nylon) - STATIC

Three strands of nylon rope on a right-hand-lay twisted braid. If any strand is cut, frayed or burnt more than half the diameter, it is unserviceable. Rated capacity: 4,500 lbs which is reduced when wet, knotted, or frozen, reduced by 15% when wet, and the stretch factor is 1/3 of its length to the point of failure.

ROPE LOG

Completed after using ropes on the tower or in Aircraft the form used is a **DA 5752-R**

ACCESSORY CORD

Constructed of 6-8mm kernmantle rope. Used for device extensions, auto belay knots (autoblock), rescue tethers or safety tether lines. Rope ends should be burned or whipped and dipped. Strenght is approximately 10-12 kN or 2250-2700 lbs of force.

1" TUBULAR NYLON WEBBING

Highly abrasion resistant. Used for device extensions, auto belay knots (autoblock) or rescue tethers. Strenght is approximately 18 kN or 4050 lbs of force.

RESCUE 8 DESCENDER

The Rescue 8 Descender is a type of descent device used for rappelling and descent maneuvers which offers a high amount of friction for heavy loads. The strengh dictated by the material and the manufacturer. Each device will state the kN it is rated for.

TOWER INSPECTION AND PREPARATION

Installations, MACOMs, and Unit Commanders may establish additional policies and safety procedures as needed to ensure safe and effective rappelling operations. The proponent for construction and inspection if the DPW (Directorate of Public Works) Engineering Div, Bldg 6, Fort Moore, Georgia 31905, COMM 706 545-1591. Inspections are typically every year with a load test every six months.

The Rappel Master is in charge of the tower and conducts an overall visual and physical inspection of the tower to identify potential hazards that may have occurred after the last inspection. The overall inspection includes the following:

- Structural lumber and timber (wall boards, decks)
- Ladder and handrails (anti-slip material, loose boards, protruding nails/screws)
- Platform floor, edge and scuff protection material
- All anchor points present and load tested

Tower rappelling requires:

- At least two lanes per side (one for rappelling and one for rescue operations)
- One safety recovery rope per side
- One RM or Lane NCO wearing a manufactured harness per side
- Two-strands of rope per lane with proper anchor knots and two locking carabiners opposite and opposed that are preferably taped together to reduce shifting
- The RM inspects all the rigging prior to commencing operations
- The medic, backboard and equipment with vehicle with a driver must be present

CONSTRUCTION OF RAPPELLING ROPES

Aircraft ropes will be constructed specific to the positions they will be hung inside the aircraft, the mission elevation, and airframe model. To obtain the correct length for UH-60 Series aircraft, add planned rappel elevation, 20 feet of rope on the ground and 15 feet for knots and ceiling-to-deck distance. The Primary and Secondary anchor points are:

- Separated 18 inches (Pos 1 & 4) and 24 inches (Pos 2 & 3) for the UH-1H
- Separated 18 inches (Pos 1 & 4) and 36 inches (Pos 2 & 3) for the UH-60L (base models)
- (UH-60L were designed for MEDEVAC operations, the additional distance was to center the hoist and other equipment on the door)
- Separated 22 inches(Pos 1 & 4) and 30 inches (Pos 2 & 3) for all other UH-60 (no mods)
  Distance between anchor knots, loop-to-loop, must be at least the distance as stated above. Once all ropes are set, take the shorter of the 1 & 4 ropes and, from the tail measure twenty feet. Then, mark every five feet back to the tail using TWO-INCH, BRIGHT ORANGE or WHITE tape. Only use one full wrap of tape to allow the c to pass freely. Mark both strands separately at the same distance mark to allow the strands to move independently.

Tower rope construction will be loosely based on the aircraft rope construction method. All towers vary due to anchor placement, hitching post presence/diameter/height, distance from anchors to edge, etc. Always add all variables prior to cutting ropes. Distance between anchor knots must be specific to the rappel point to ensure that there is no slack between anchor knots when the rope is rigged and the rope is loaded.

Prior to cutting all the ropes for a tower, it is advisable to cut one set of ropes and set them up at the tower to verify the final length is correct. Make final adjustments if necessary and then cut the remaining sets of ropes with confidence.

UH-60 ANCHOR POINTS INSPECTION / RATED CAPACITY

Cabin ceiling tie down: 4,000 lbs

- Torque to 110-115lbs/ft within 24 hours prior to rappelling Operation
- Inspect to ensure stamped with a letter "H"
- Safety wire is installed through the bolt, twisted and secured to the airframe to prevent vibration slippage

Cargo restraint net rings: 3,500 lbs

KNOTS

ROPE MANAGEMENT AND KNOTS

PREPARATION, CARE AND MAINTENANCE, INSPECTION, TERMINOLOGY

The service life of a rope depends on the frequency of use, applications (rappelling, climbing, rope installations), speed of descent, surface abrasion, terrain, climate, and quality of maintenance. Any rope may fail under extreme conditions (shock load, sharp edges, misuse).

PREPARATION

The rappeller must select the proper rope for the task to be accomplished according to type, diameter, length, and tensile strength. It is important to prepare all ropes before departing on a mission. Avoid rope preparation in the field.

Packaging. New rope comes from the manufacturer in different configurations—boxed on a spool in various lengths, or coiled and bound in some manner. Precut ropes are usually packaged in a protective cover such as plastic or burlap. Do not remove the protective cover until the rope is ready for use.

Securing the Ends of the Rope: If still on a spool, the rope must be cut to the desired length. All ropes will fray at the ends unless they are bound or seared. Both static and dynamic rope ends are secured in the same manner. The ends must be heated to the melting point so as to attach the inner core strands to the outer sheath. By fusing the two together, the sheath cannot slide backward or forward. Ensure that this is only done to the ends of the rope. If the rope is exposed to extreme temperatures, the sheath could be weakened, along with the inner core, reducing overall tensile strength. The ends may also be dipped in enamel or lacquer for further protection.

CARE AND MAINTENANCE

The rope is a rappeller's lifeline. It must be cared for and used properly. These general guidelines should be used when handling ropes.

Do not step on or drag ropes on the ground unnecessarily. Small particles of dirt will be ground between the inner strands and will slowly cut them.

While in use, do not allow the rope to come into contact with sharp edges. Nylon rope is easily cut, particularly when under tension. If the rope must be used over a sharp edge, pad the edge for protection.

Always keep the rope as dry as possible. Should the rope become wet, hang it in large loops off the ground and allow it to dry. Never dry a rope with high heat or in direct sunlight.

Never leave a rope knotted or tightly stretched for longer than necessary. Over time it will reduce the strength and life of the rope.

Never allow one rope to continuously rub over or against another. Allowing rope-on-rope contact with nylon rope is extremely dangerous because the heat produced by the friction will cause the nylon to melt.

Inspect the rope before each use for frayed or cut spots, mildew or rot, or defects in construction (new rope).

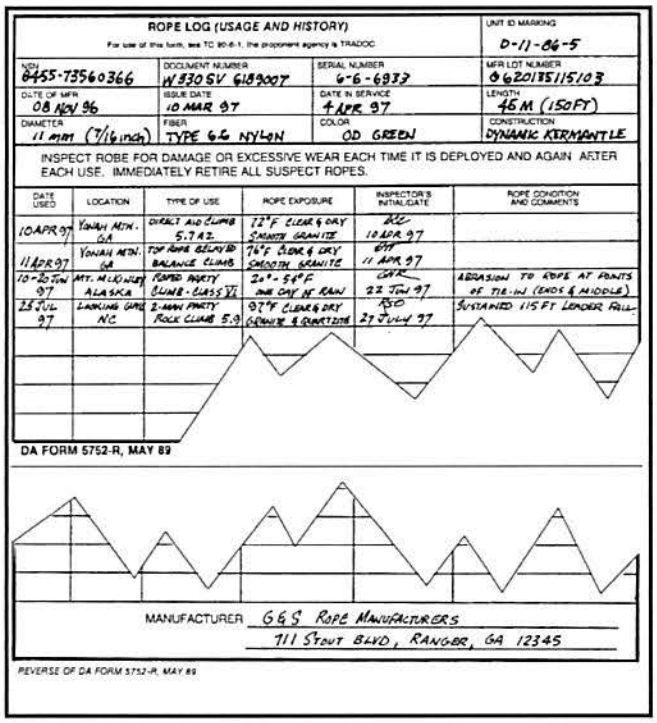
The ends of the rope should be whipped or melted to prevent unraveling.

Do not splice ropes for use in mountaineering.

Do not mark ropes with paints or allow them to come in contact with oils or petroleum products. Some of these will weaken or deteriorate nylon.

Never use a mountaineering rope for any purpose except mountaineering.

Each rope should have a corresponding rope log (DA Form 5752-R, Rope History and Usage), which is also a safety record. It should annotate use, terrain, weather, application, number of falls, dates, and so on, and should be annotated each time the rope is used (Figure 4-1). DA Form 5752-R is authorized for local reproduction on 8 1/2- by 11-inch paper.



ROPE LOG (USAGE AND HISTORY)

For use of this form, see TC 90-6-1; the proponent agency is TRADOC

UNIT ID MARKING: D-11-86-5

NSN	DOCUMENT NUMBER	SERIAL NUMBER	MFR LOT NUMBER
8455-73560366	W330SV 6189007	6-6-6937	06201851151013
DATE OF MFR	**ISSUE DATE**	**DATE IN SERVICE**	**LENGTH**
08 NOV 96	10 MAR 97	4 APR 97	46 M (150 FT)
DIAMETER	**FIBER**	**COLOR**	**CONSTRUCTION**
11 mm (7/16 inch)	TYPE 66 NYLON	OD GREEN	DYNAMIC KERMANTLE

INSPECT ROBE FOR DAMAGE OR EXCESSIVE WEAR EACH TIME IT IS DEPLOYED AND AGAIN AFTER EACH USE. IMMEDIATELY RETIRE ALL SUSPECT ROPES.

DATE USED	LOCATION	TYPE OF USE	ROPE EXPOSURE	INSPECTOR'S INITIAL/DATE	ROPE CONDITION AND COMMENTS
10 APR 97	YONAH MTN. GA	DIRECT AID CLIMB 5.7 A2.	72°F CLEAR & DRY SMOOTH GRANITE	RL 10 APR 97	
11 APR 97	YONAH MTN. GA	TOP ROPE BELAYED BALANCE CLIMB	76°F CLEAR & DRY SMOOTH GRANITE	CTT 11 APR 97	
10-20 JUN 97	MT. MCKINLEY ALASKA	RAPID PARTY CLIMB - CLASS VI	20°-50°F ONE DAY W RAIN	CWR 22 JUN 97	ABRASION TO ROPE AT POINTS OF TIE-IN (ENDS & MIDDLE)
25 JUL 97	LOOKING GLASS NC	2-MAN PARTY ROCK CLIMB 5.9	97°F CLEAR & DRY GRANITE & QUARTZITE	RSD 27 JULY 97	SUSTAINED 115 FT LEADER FALL

DA FORM 5752-R, MAY 89

MANUFACTURER G&S Rope Manufacturers
711 Stout Blvd, Ranger, GA 12345

REVERSE OF DA FORM 5752-R, MAY 89

Never subject the rope to high heat or flame. This will significantly weaken it.

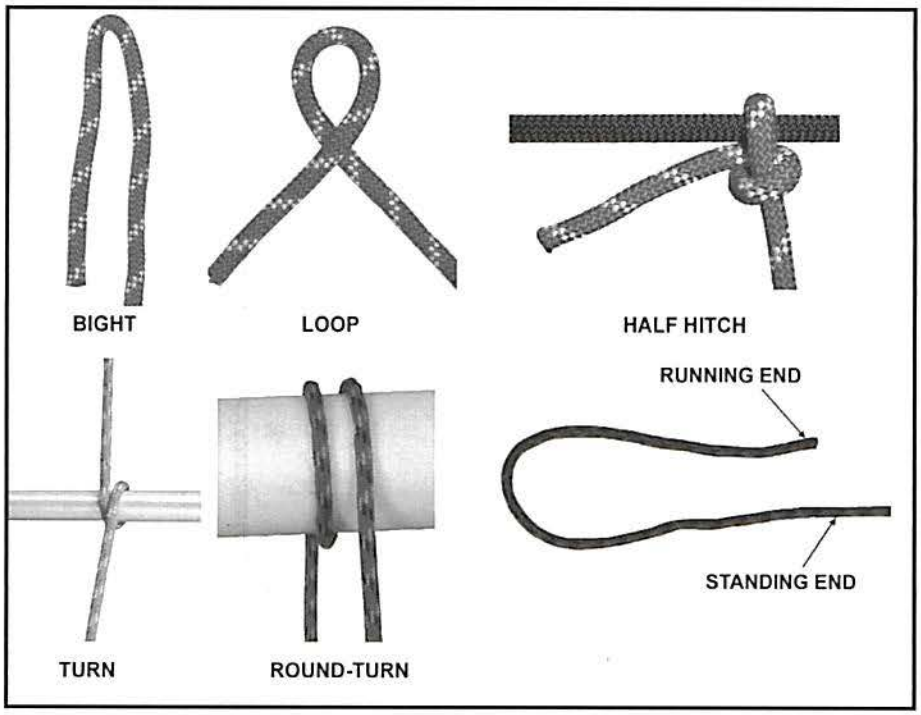
All ropes should be washed periodically to remove dirt and grit, and rinsed thoroughly. Commercial rope washers are made from short pieces of modified pipe that connect to any faucet. Pinholes within the pipe force water to circulate around and scrub the rope as you slowly feed it through the washer. Another method is to machine wash,

Standing Part. The standing part is the static, stationary, or nonworking end of the rope

Lay. The lay is the direction of twist used in construction of the rope

Pigtail. The pigtail (tail) is the portion of the running end of the rope between the safety knot and the end of the rope

Dress. Dress is the proper arrangement of all the knot parts, removing unnecessary kinks, twists, and slack so that all rope parts of the knot make contact.



SQUARE KNOT

The square knot is used to tie the ends of two ropes of equal diameter. It is a joining knot.

Tying the 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 it 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 overhand knot on each side of the square knot.

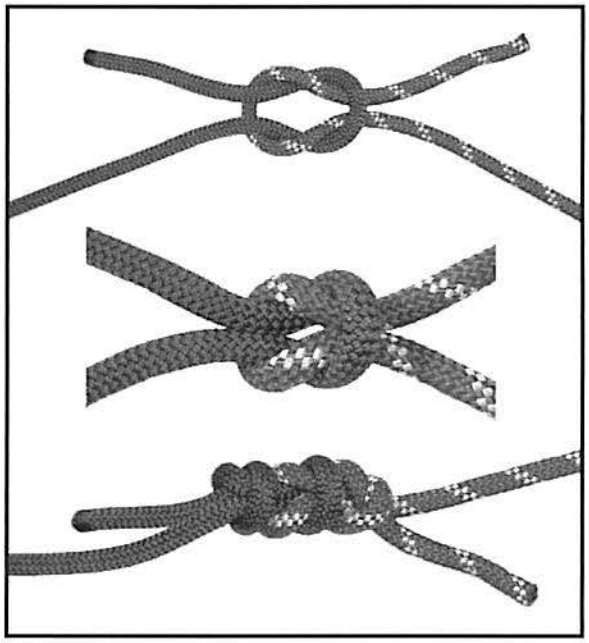


FIGURE-EIGHT LOOP (FIGURE-EIGHT-ON-A-BIGHT)

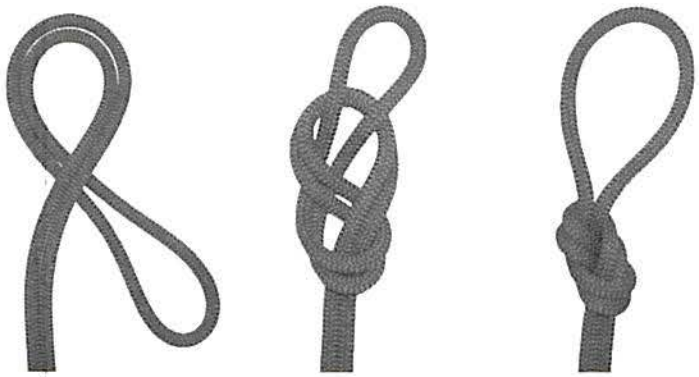
The figure-eight loop, also called the figure-eight-on-a-bight, is used to form a fixed loop in a rope (Figure 4-19). It is a middle of the rope knot.

a. **Tying the 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 part).

STEP 3. Wrap the working end around the standing part 360 degrees and feed the working end through the loop. Dress the knot tightly.



THREE-LOOP BOWLINE

The three-loop bowline is used to form three fixed loops in the middle of a rope. It is self-equalizing anchor system. It a specialty knot.

a. **Tying the Knot.**

STEP 1. Form an approximate 24-inch 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 part 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 parts.

STEP 5. Safety it off with a doubled overhand knot.

MUNTER HITCH

The munter hitch, when used in conjunction with a pear-shaped locking carabiner, is used to form a mechanical belay.

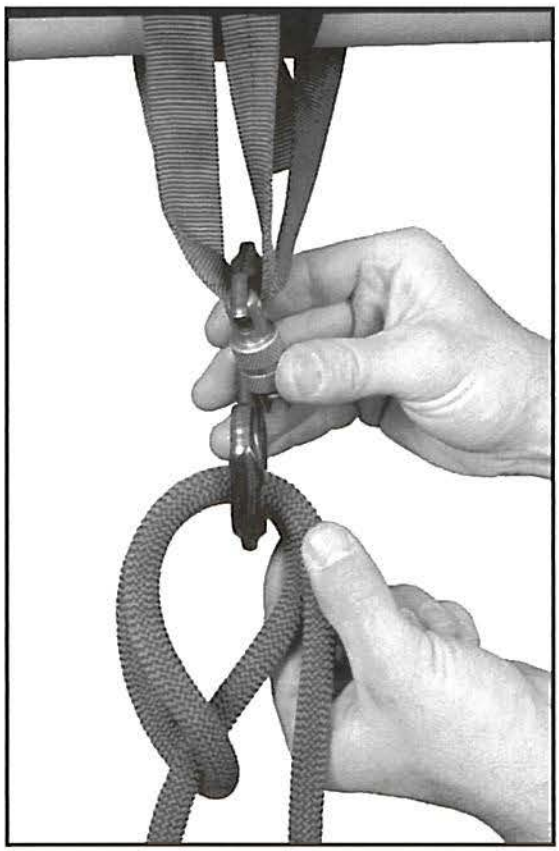
a. **Tying the Knot.**

STEP 1. Hold the rope in both hands, palms down about 12 inches 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 carabiner. Lock the locking mechanism.

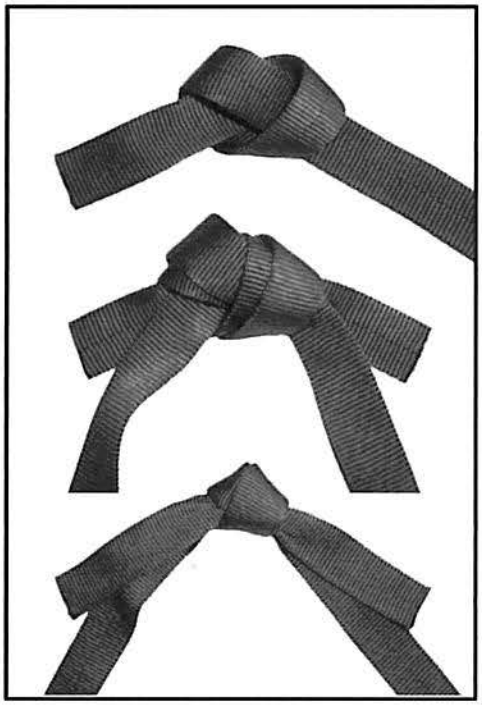


WATER KNOT

The water knot is used to attach two webbing ends (Figure 4-10). It is also called a ring bend, overhand retrace, or tape knot. It is used in runners and harnesses and is a joining knot.

TYING THE KNOT

STEP 1. Tie an overhand 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 4 inches beyond the knot in both directions.



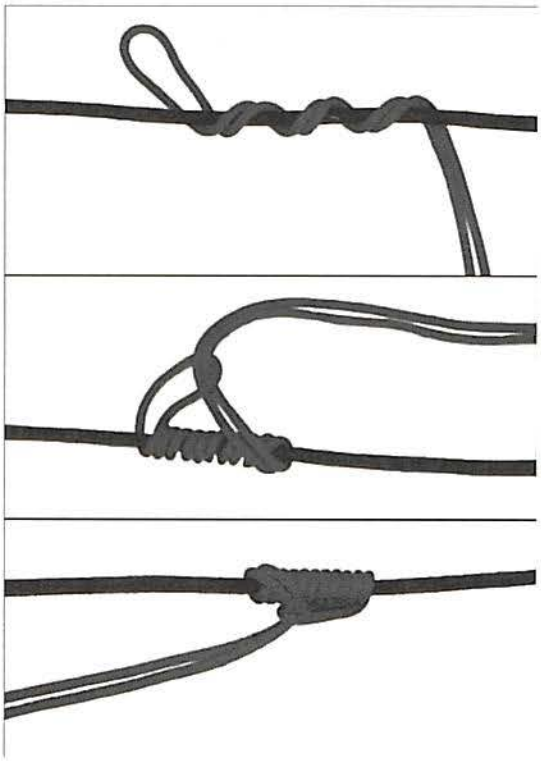
KLEIMHIEST KNOT

The Kleimhiest knot provides a moveable, easily adjustable, high-tension knot capable of holding extremely heavy loads while being pulled tight (Figure 4-27). It is a special-purpose knot.

TYING THE KNOT

STEP 1. Using a utility rope or webbing offset the ends by 12 inches. 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 that all wraps are touching.

Note: Polyethylene rope should not be used for the Kleimhiest knot. It has a low melting point and tends to slip.



RAPPEL SEAT

The rappel seat is an improvised seat rappel harness made of rope (Figure 4-31, page 4-32). It usually requires a sling rope 14 feet or longer.

a. **Tying the Knot.**

STEP 1. Find the middle of the sling rope and make a bight.

STEP 2. Decide which hand will be used as the brake hand and place the bight on the opposite hip.

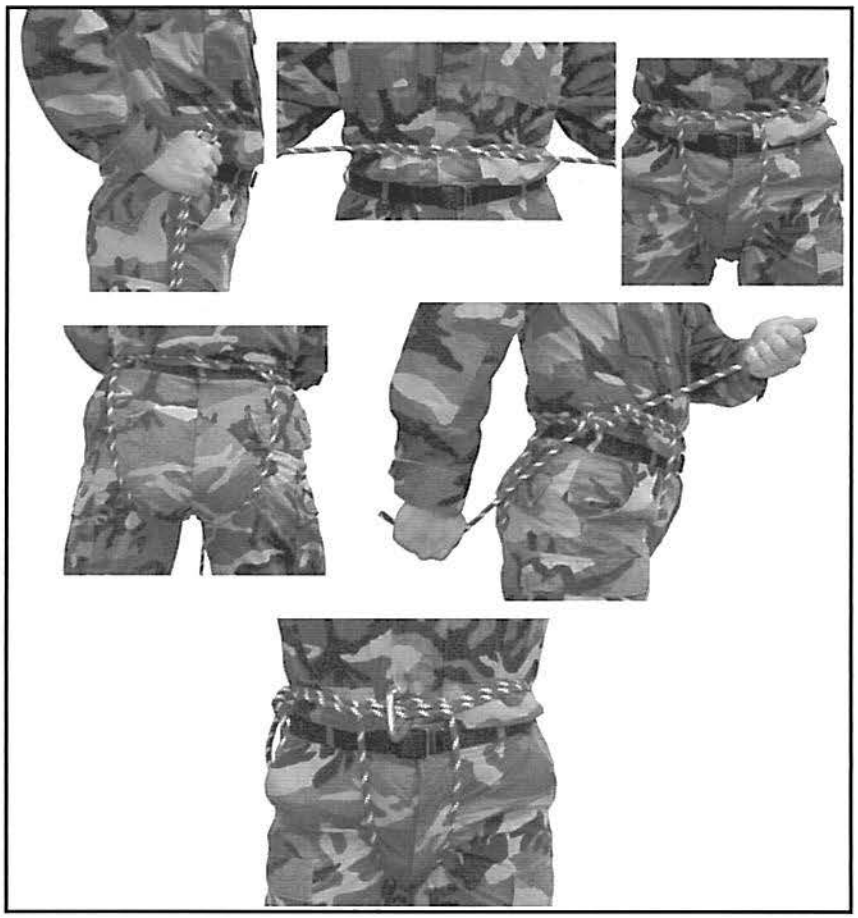
STEP 3. Reach around behind and grab a single strand of rope. Bring it around the waist to the front and tie two overhands on the other strand of rope, thus creating a loop around the waist.

STEP 4. Pass the two ends between the legs, ensuring they do not cross.

STEP 5. Pass the two ends up under the loop around the waist, bisecting the pocket flaps on the trousers. Pull up on the ropes, tightening the seat.

STEP 6. From rear to front, pass the two ends through the leg loops creating a half hitch on both hips.

STEP 7. Bring the longer of the two ends across the front to the nonbrake hand hip and secure the two ends with a square knot safetied with overhand knots. Tuck any excess rope in the pocket below the square knot.



RAPPEL MASTER PERSONNEL INSPECTION (RMPI)

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 rappel seat or harness and equipment are inspected for deficiencies that could potentially cause serious injury or death to a rappeller.

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

To assist you in training, this handout lists the *most common* deficiencies found while inspecting a rappeller utilizing a Hip Rappel Seat. There are two types of deficiencies you will see during RMPI training: deliberate and student-rigged. As a student you must seek clarification on how the deficiencies should be rigged during training. Be sure to only rig the deficiencies that appear in the RMPI Card (deliberate). Any additional deficiencies will slow down the training process. Your instructors will inspect every rappeller for proper rigging.

Be forewarned that there are more deficiencies than the ones listed but are less common and least dangerous. The pictures depict one of several ways the deficiency may occur.

Deficiency List - Majors and Minors

As of 05 February 2016

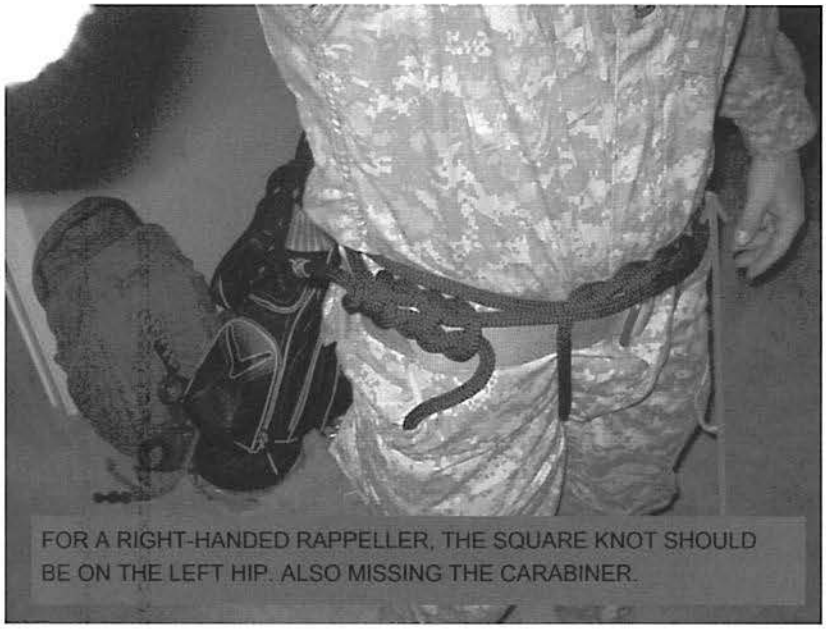
Nomenclature must be verbatim. Memorize these deficiencies.

MAJOR Deficiencies	***MINOR Deficiencies***
Knot On Wrong Side	Glove Unserviceable
Gloves Not Worn	Sleeve(s) Not Down
ACH Not Worn	Chinstrap Not Bisecting Chin/Too Loose
Chinstrap Not Fastened	Overhand Tied Behind Half-Hitch
Improper Square Knot	Half-Hitch(es) Instead of Overhand(s)
Missing Over-Hand(s)	Overhand(s)Tied To Wrong Rope
Rucksack Cheststrap Not Secured	Overhand Tied To Both Ropes
Carabiner Missing	Rope Ends Not In Pocket
Carabiner Inverted	FLC Not Zipped
Carabiner Through Overhand Lay	Shirt Not Tucked In
Overhand-Lay Not In Carabiner	Seat Below Belt
Carabiner Touches Square Knot	Carabiner Backward
Equipment on Brake-Hand Side	Waist Rope Not In Carabiner
Missing Half-Hitch(es)	Improper Overhand Lay
	Ropes Crossed Between Legs
	Rope Routed Through Belt
	Weapon Improperly Slung
	Leg Ropes Too Close
	Seat Too Loose
	Rucksack Not Secured

RMPI DEFICIENCIES DEFINED

Deficiency List	Definition
Knot On Wrong Side	When the square knot is tied on the brake-hand side hip instead of the guide-hand side
Gloves Not Worn	Heavy duty leather gloves are not worn
Glove Unserviceable	The glove presents exposed skin or fails the stitch-rule
Sleeve(s) Not Down	Sleeves must be unrolled and cuffed at the wrist
ACH Not Worn	ACH (or other appropriate head protection) must be worn
Chinstrap Not Fastened	Helmet chinstrap is unbuckled
Chinstrap Not Bisecting Chin/ Too Loose	Helmet chinstrap is not worn or adjusted properly
Improper Square Knot	The knot does not form two interlocking bights
Missing Overhand(s)	One or both overhand safties on the square knot does not exist
Overhand Tied Behind Half-Hitch	The rear overhand safety tied past the rear half-hitch
Half-Hitch(es) Instead Over Hand(s)	One or both safety knots on the square knot are half-hitch knots
Overhand(s) Tied To Wrong Rope	Overhand(s) must be tied on the waist rope flush with the square knot
Overhand Tied To Both Ropes	Safety overhands must be tied to the waist rope only
Rope Ends Not In Pocket	The excess tails are not inside the pocket unless they are too short
Rucksack Cheststrap Not Secured	The shoulder straps are not tied together at the chest
FLC Not Zipped	The FLC must be zipped to reduce entanglement
Shirt Not Tucked In	The Uniform Top is not tucked inside the pants all around
Seat Below Belt	The seat is tied below the trouser belt and the hip bones
Carabiner Missing	The carabiner is not present
Carabiner Inverted	The carabiner is routed properly but the gate is on the bottom
Carabiner Backward	The gate of the carabiner must open down and away from the rappeller
Waist Rope Not In Carabiner	The rope that creates the square knot must be in the carabiner
Carabiner Through Overhand Lay	The carabiner is routed through the wraps of the overhand lay
Overhand-Lay Not Carabiner	The carabiner is only routed onto the waist rope
Improper Overhand Lay	The overhand lay is wrapped either once or three times
Carabiner Touches Square Knot	The square knot was tied too close to the overhand lay
Ropes Crossed Between Legs	The ropes were brought crossed under and between the legs
Equipment on Brake-Hand Side	Any item on the Brake Hand side that does not belong
Rope Routed Through Belt	The rope is routed between the trouser belt and the rappeller
Missing Half-Hitch(es)	One or both of the half-hitch created by the leg ropes behind the rappeller is missing
Weapon Improperly Slung	The muzzle is pointing up and/or towards the brake hand
Leg Ropes Too Close	The leg ropes must be greater than 4" apart
Seat Too Loose	The seat is not tight around the rappeller
Rucksack Not Secured	All buckles, excess straps, pouches, etc must be secured

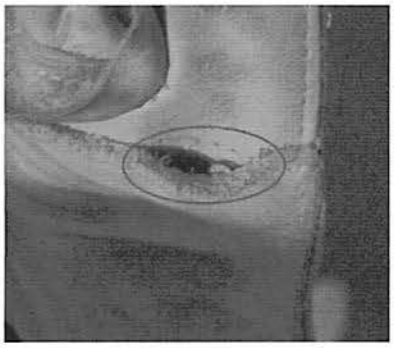
KNOT ON WRONG SIDE (MAJOR)

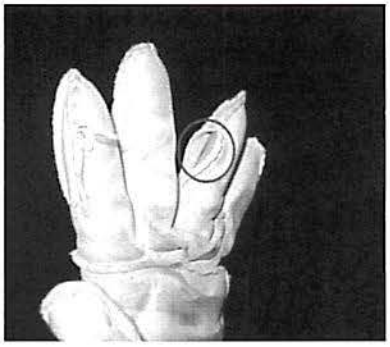


FOR A RIGHT-HANDED RAPPELLER, THE SQUARE KNOT SHOULD BE ON THE LEFT HIP. ALSO MISSING THE CARABINER.

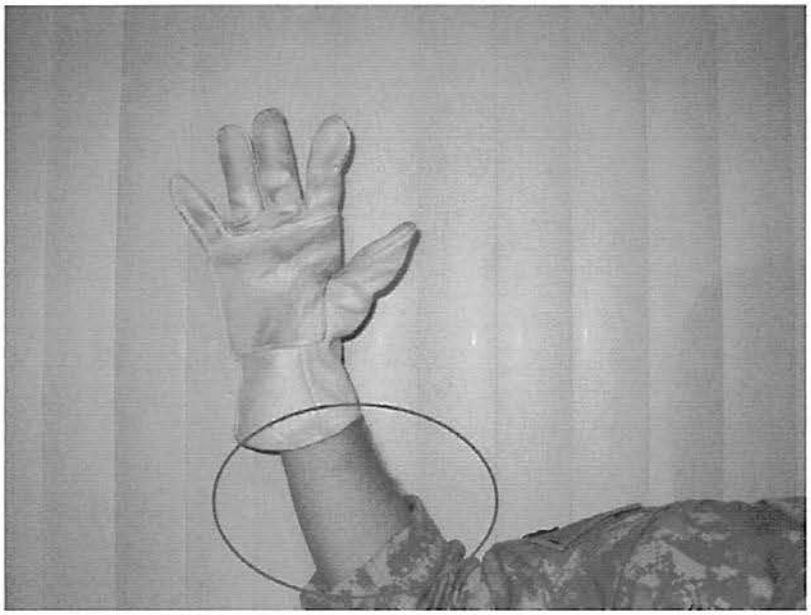
GLOVE(S) NOT WORN (MAJOR)

UNSERVICEABLE GLOVE (MINOR)

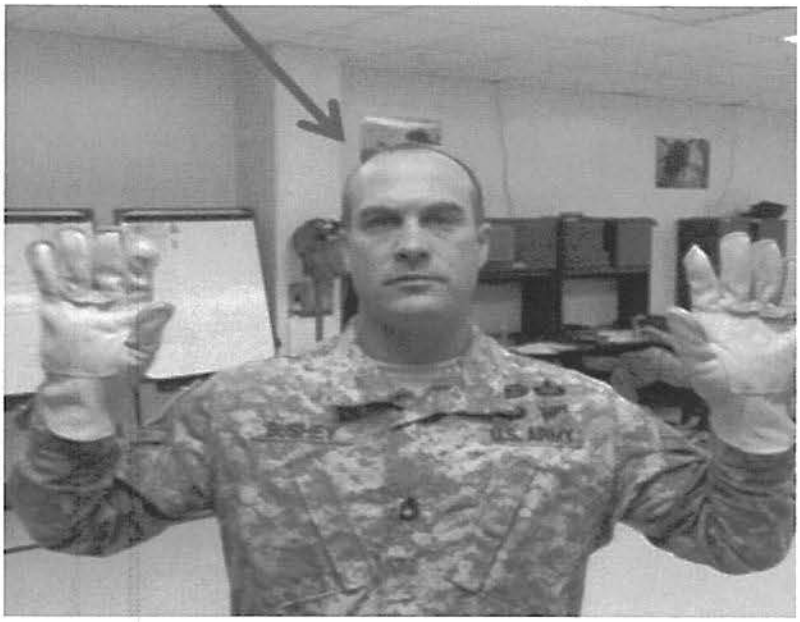




SLEEVE(S) NOT DOWN (MINOR)



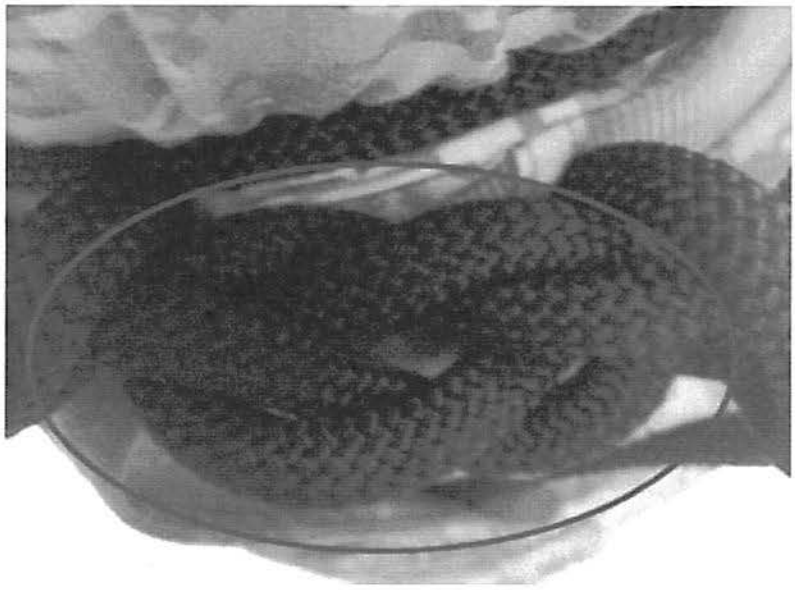
ACH NOT WORN (MAJOR)



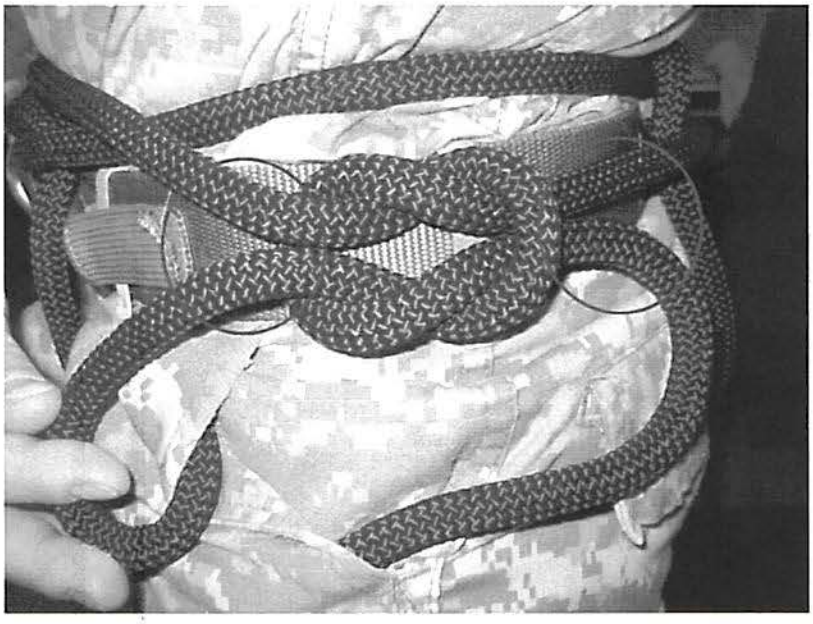
CHINSTRAP NOT FASTENED (MAJOR)

CHINSTRAP NOT BISECTING CHIN/TOO LOOSE
(MINOR)

IMPROPER SQUARE KNOT (MAJOR)

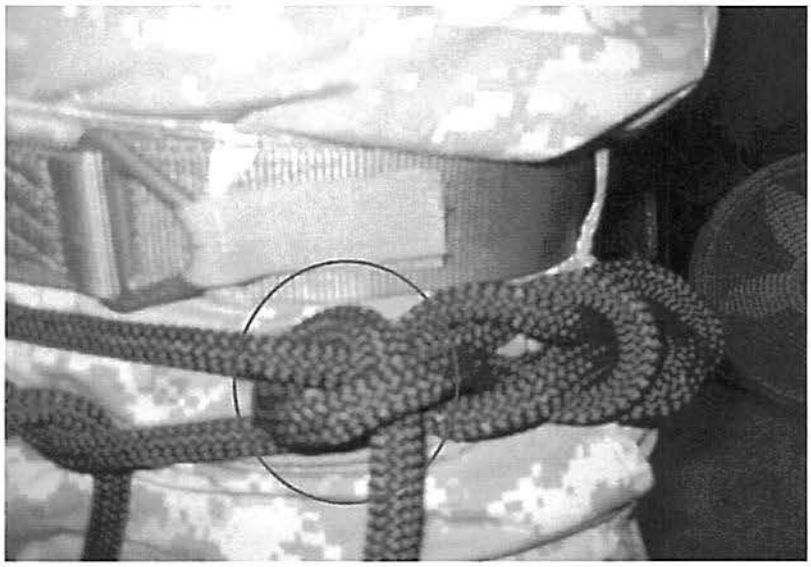


MISSING OVERHAND(S) (MAJOR)

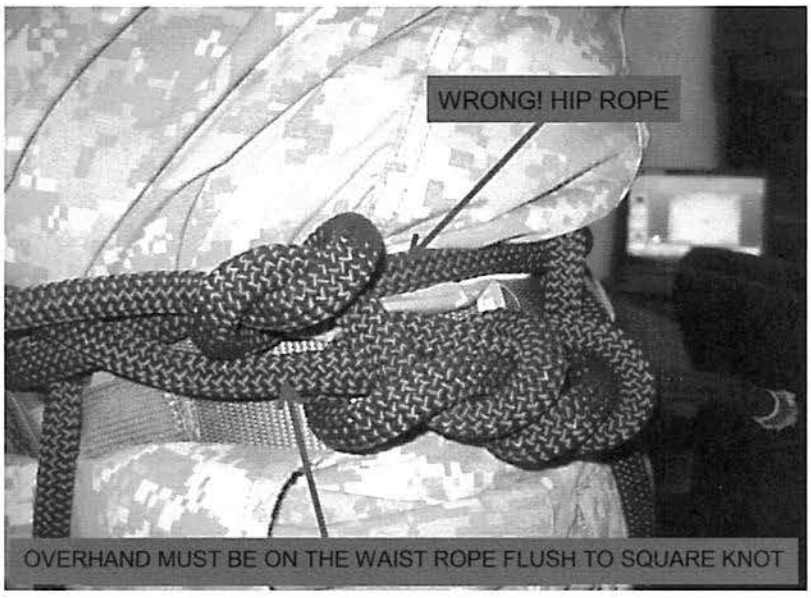


OVERHAND TIED BEHIND 1/2 HITCH (MINOR)

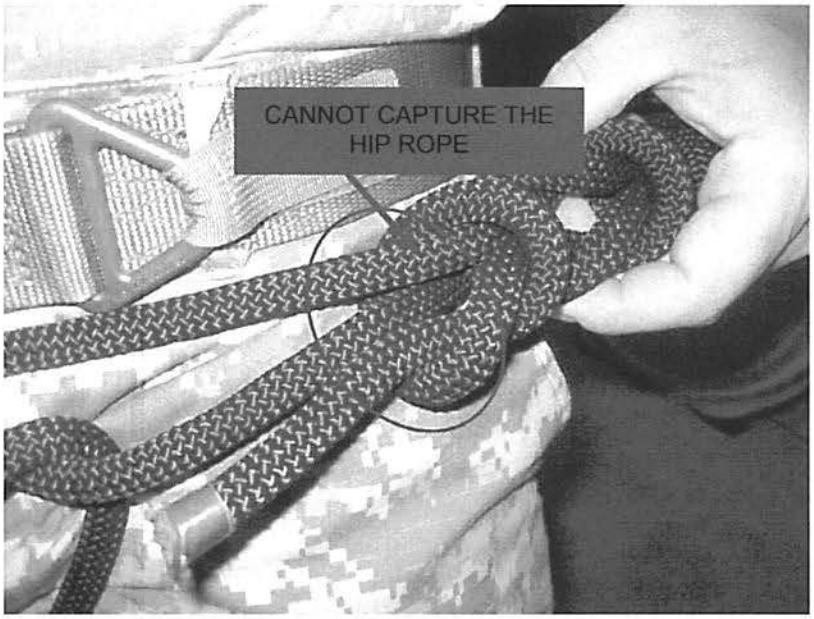
HALF-HITCH(ES) INSTEAD OF OVERHAND KNOT(S)
(MINOR)



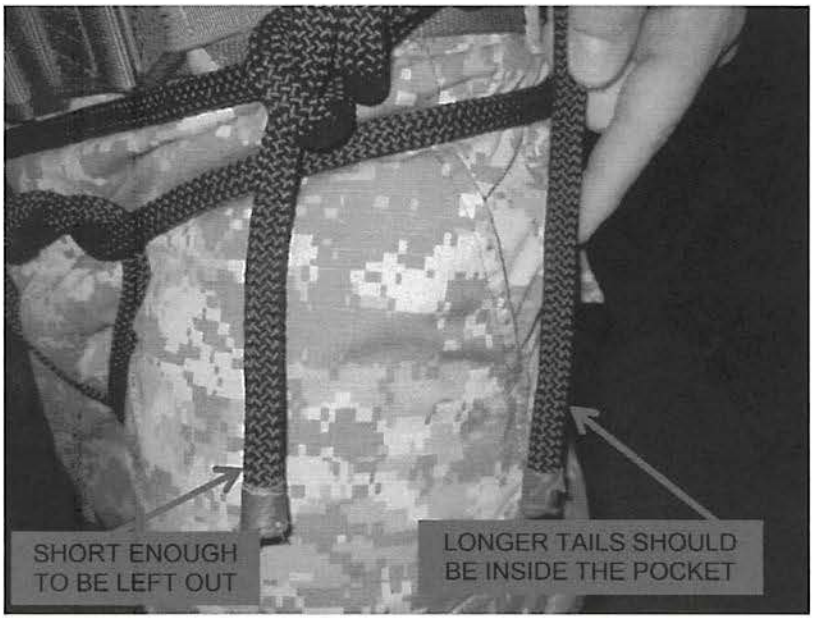
OVERHAND(S) TIED TO WRONG ROPE
(MINOR)



OVERHAND(S) TIED TO BOTH ROPES (MINOR)



ROPE END(S) NOT IN POCKET (MINOR)

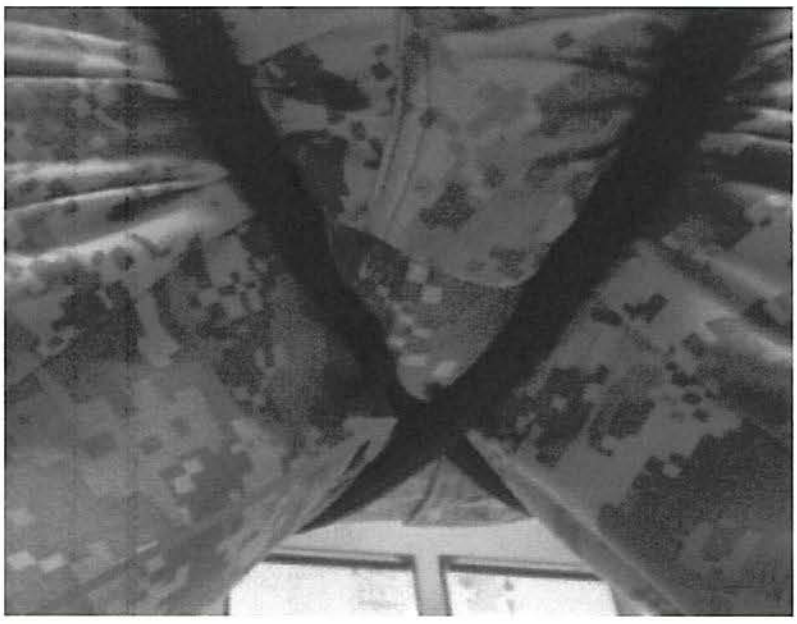


CARABINER MISSING (MAJOR)

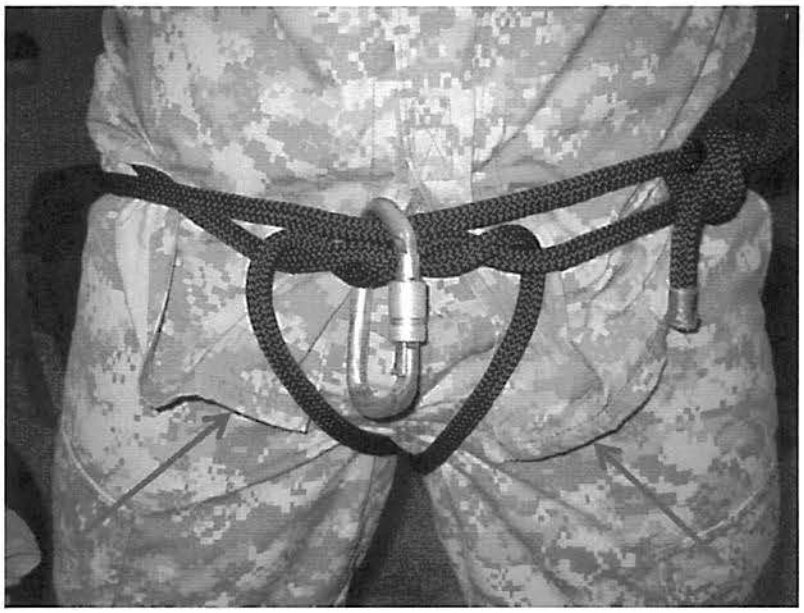
WAIST ROPE NOT IN CARABINER (MINOR)

OVERHAND LAY NOT IN CARABINER (MAJOR)

ROPES CROSSED BETWEEN LEGS (MINOR)

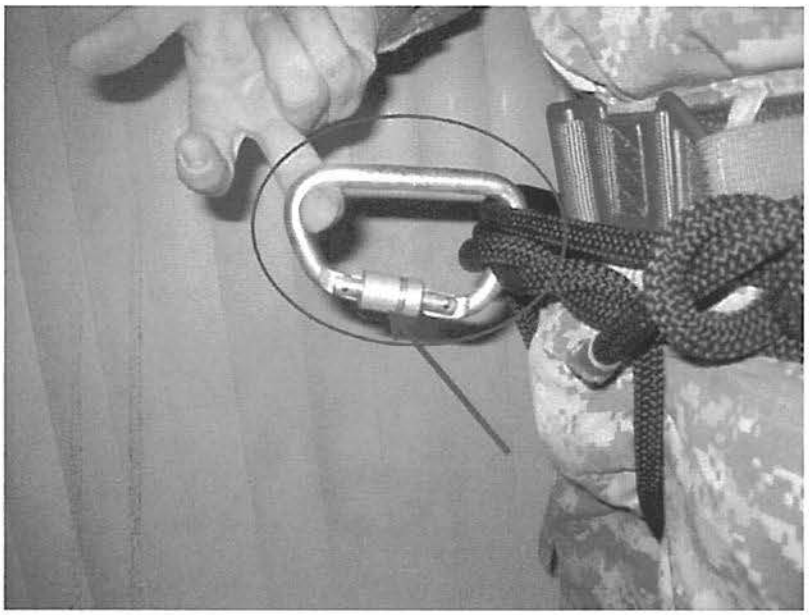


SHIRT NOT TUCKED IN (MINOR)

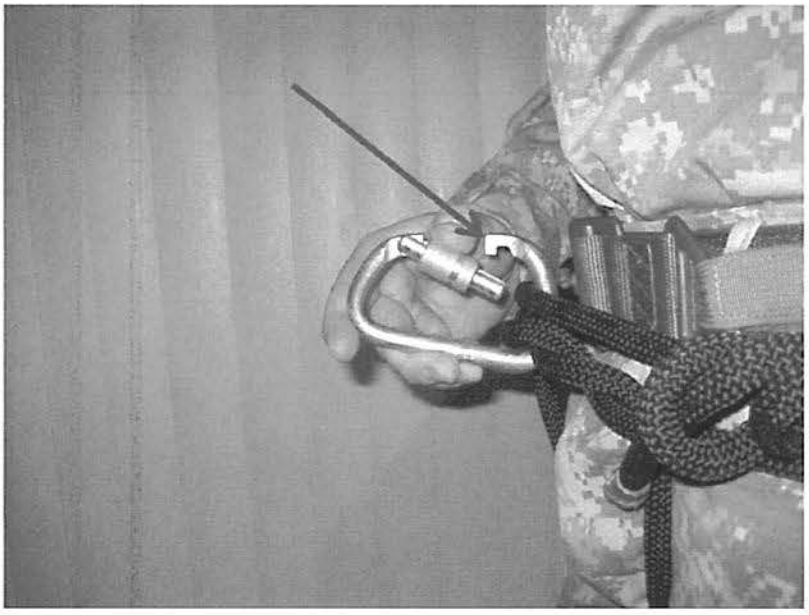


SEAT BELOW BELT (MINOR)

CARABINER INVERTED (MAJOR)



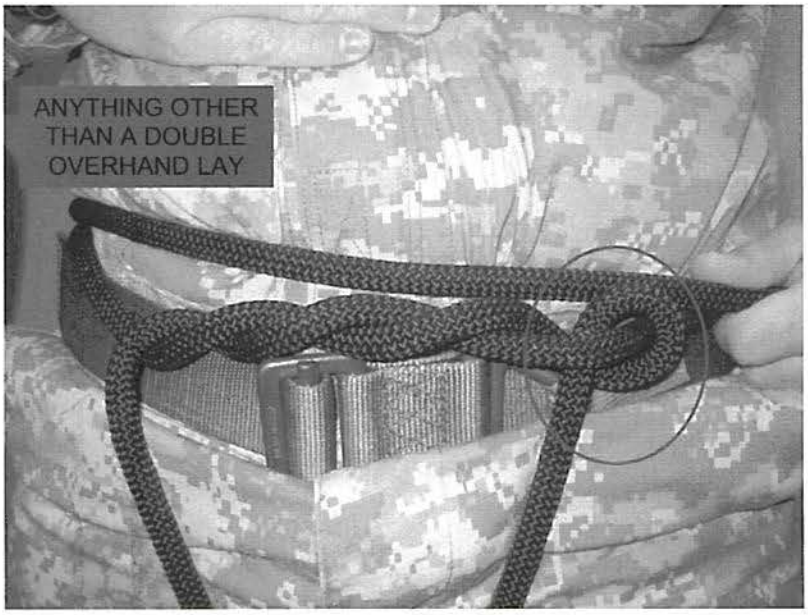
CARABINER BACKWARDS (MINOR)



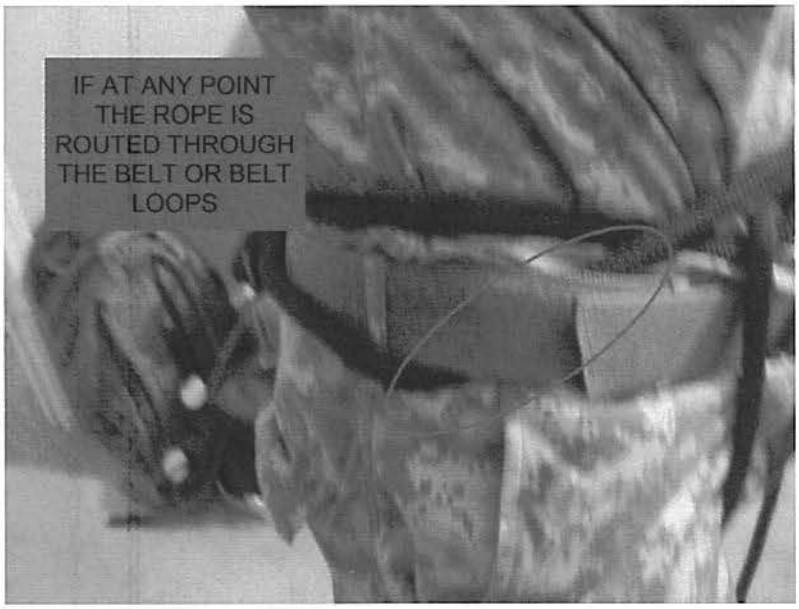
CARABINER THROUGH OVERHAND LAY (MAJOR)

CARABINER TOUCHES SQUARE KNOT (MAJOR)

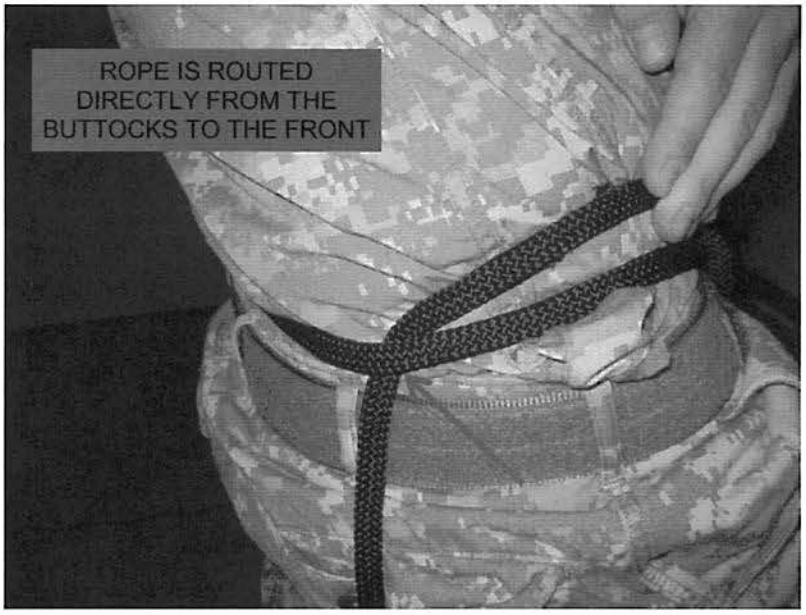
IMPROPER OVERHAND LAY (MINOR)



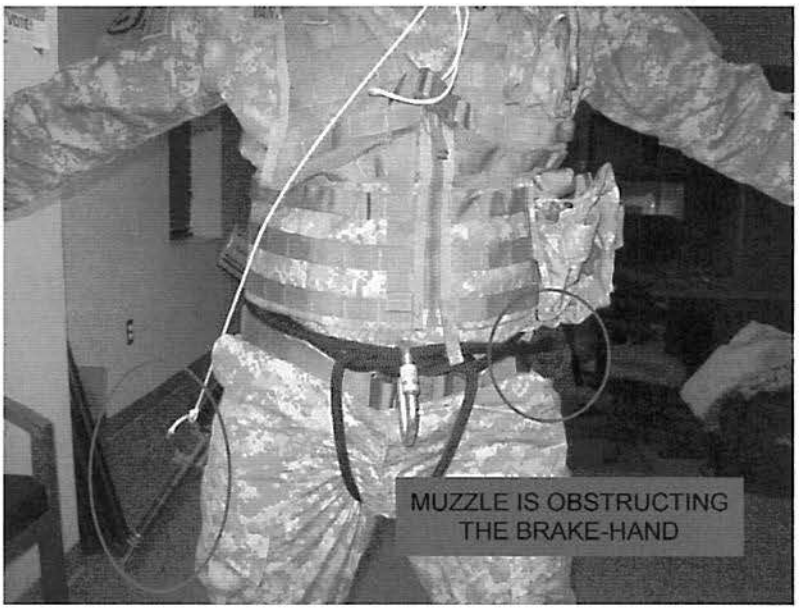
ROPE ROUTED THROUGH BELT (MINOR)



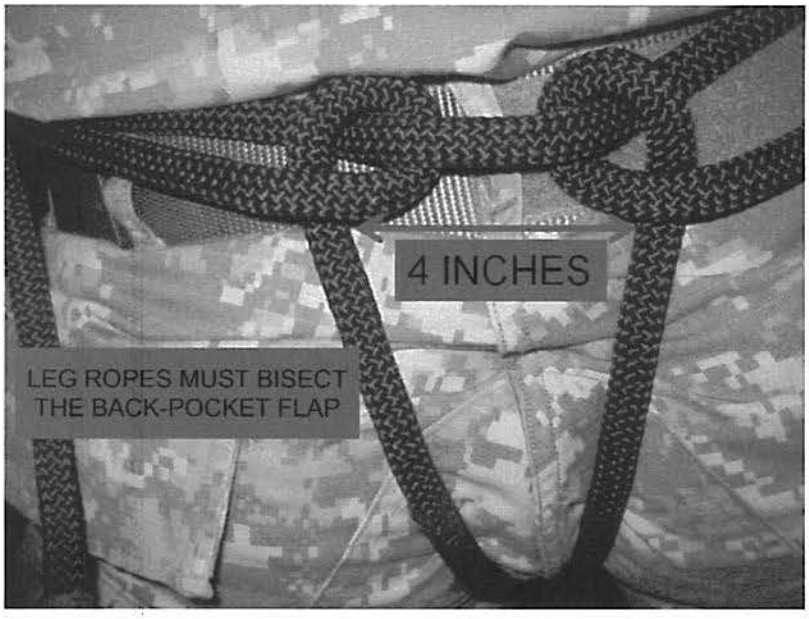
MISSING HALF HITCH(ES) (MAJOR)



WEAPON IMPROPERLY SLUNG (MINOR)



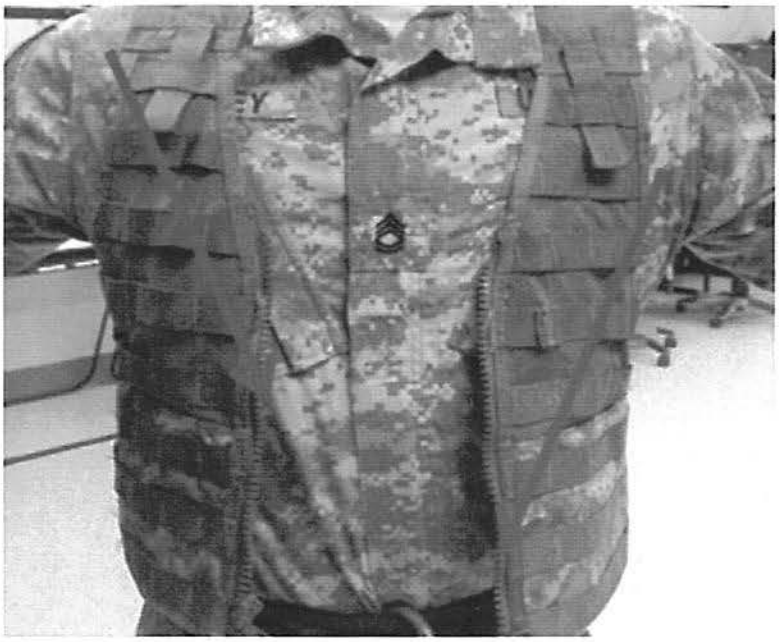
LEG ROPES TOO CLOSE (MINOR)



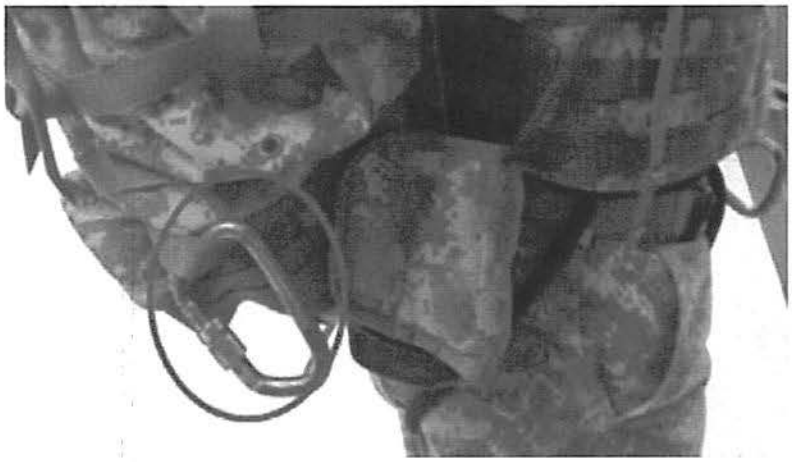
SEAT TOO LOOSE (MINOR)

RUCKSACK CHEST STRAP NOT SECURED (MAJOR)

FLC NOT ZIPPED (MINOR)

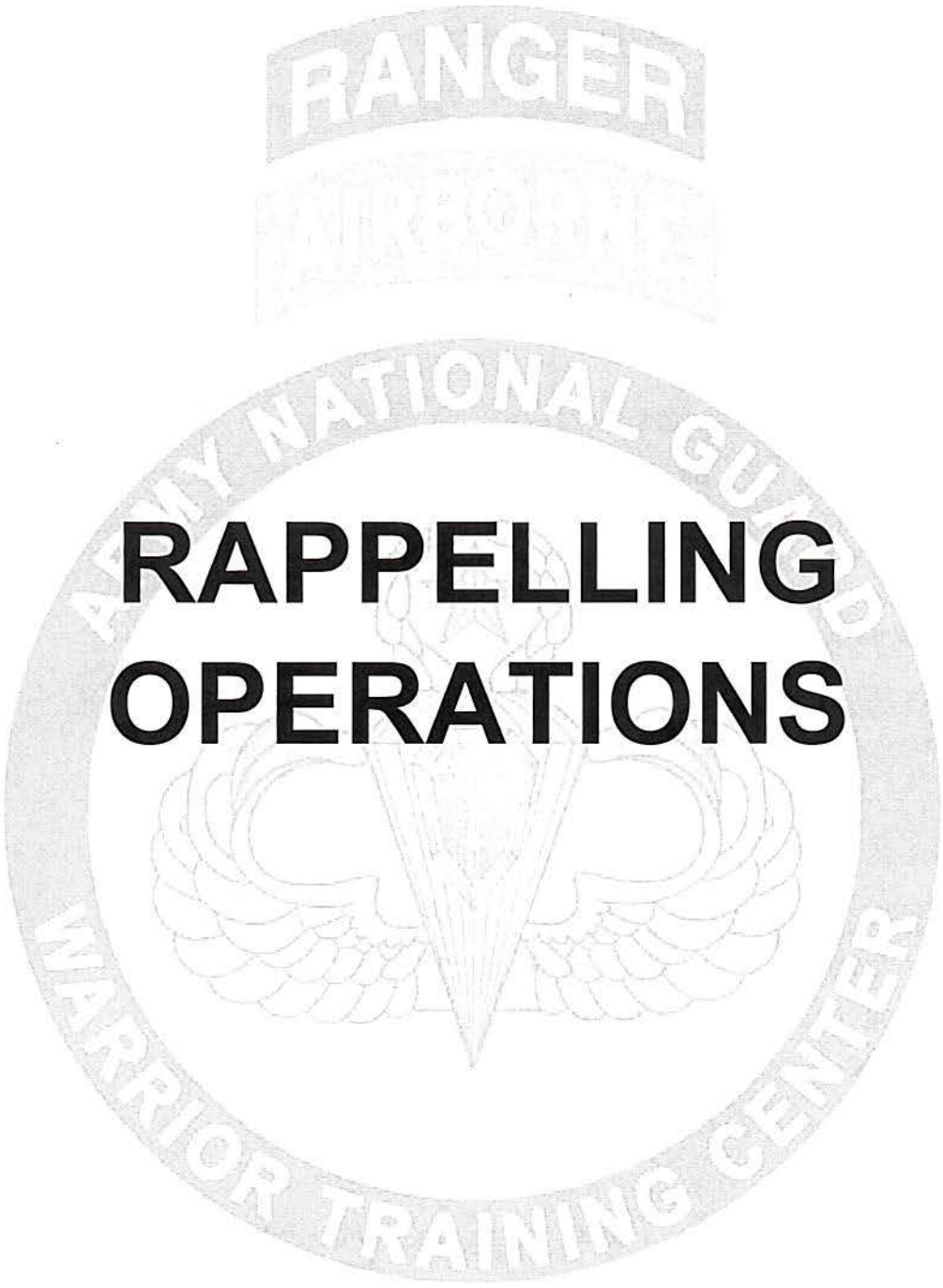


EQUIPMENT ON BRAKE-HAND SIDE (MAJOR)



Note: Equipment can be anywhere on the rappeller's brake hand side (exposed or unexposed). Equipment can be any piece of equipment that is not suppose to be there.

RUCKSACK NOT SECURED (MINOR)



RAPPELLING OPERATIONS

ARMY NATIONAL GUARD
WARRIOR TRAINING CENTER
RAPPEL MASTER SCHOOL

AIRCRAFT COMMAND AND CONTROL

MUST SCORE 100% ON THIS EVALUATION TO SCORE A **PASSING SCORE**, ONLY ONE RE-TEST IS ALLOWED.

1. ENTER HELICOPTER AND HOOK UP SAFETY LINE _____
2. PERFORM COMMUNICATION CHECK WITH PILOT AND GTA _____
3. WAVE ON RAPPELLERS USING THE PROPER HAND & ARM SIGNAL _____
4. INSPECT EACH RAPPELLER (BEGIN AT THE AFT, LEFT OF THE A/C)
   - A. KNOT TO THE INSIDE (ANCHOR POINT) _____
   - B. CHECK ANCHOR POINT **(CHECK EACH) RAPPELLER @ #2** _____
   - C. GUIDE HAND GLOVE **RAPPELLER @ #4** _____
   - D. SLEEVE _____
   - E. HELMET, EYE-PROTECTION, CHINSTRAP FASTENED _____
   - F. SHIRT STILL TUCKED-IN _____
   - G. CORRECT HOOK-UP (CARABINER LOCKED – ROUTING OF ROPES) _____
   - H. EXTEND BRAKE HAND, SLEEVE, GLOVE, ROUTING OF ROPES, REPLACE BRAKE HAND _____
   - I. ENSURE ENTIRE RAPPELLER IS INSIDE THE A/C _____
   - J. "*FREEZE, HEAD AND EYES ON ME*" (CORRECT HAND & ARM SIGNAL) _____
5. CHECK WITH BELAY SAFETIES (THUMBS UP) _____
6. ISSUE CORRECT FIRST COMMAND WITH HAND & ARM SIGNAL (GET READY) _____
7. INSTRUCT PILOT TO ASCEND, OBSERVED ASCENT FROM #4 ROPE (MAKE NECESSARY ELEVATION ADJUSTMENTS "*HIGHER*", "*LOWER*", "*HOVER*") _____
8. VISUALLY INSPECT THAT 20 FEET OF ROPE IS ON THE GROUND (VERBALLY STATED "*RED | ORANGE TAPE ON THE GROUND*") _____
9. ISSUE NEXT COMMAND WITH HAND & ARM SIGNAL (POSITION) _____
10. CHECK ALL CARABINERS IN CORRECT SEQUENCE (VISUAL CHECK ONLY-DON'T POINT) _____
11. AGAIN, VERIFY THAT 20 FEET OF ROPE IS ON THE GROUND _____
12. ISSUE NEXT COMMAND WITH HAND & ARM SIGNAL (GO) _____
13. GO TO THE DECK OF A/C AT THE #4 ROPE AND OBSERVE DESCENT OF RAPPELLER _____
14. REPORT TO PILOT WHEN ALL *RAPPELLERS ARE ON ROPES, TANGLED, ON THE GROUND, OFF ROPES, CLEAR, ETC…* _____
15. INSTRUCT PILOT TO DESCEND WHEN ROPES ARE CLEAR _____
16. RECOVER FROM DECK ONLY AFTER A/C IS FIRMLY GROUNDED _____
17. DISPLAY CONFIDENCE, REMAIN IN CHARGE THROUGHOUT _____

ARMY NATIONAL GUARD
WARRIOR TRAINING CENTER
RAPPEL MASTER COURSE
FORT MOORE, GEORGIA 31905

RAPPEL MASTER TOWER TALK-OFF

1. Call next rappeller forward

   "Next Rappeller step forward and sound off with what brake hand you are"

2. Instruct the Rappeller to hook-up

   "Hook-Up"

3. Check the hook-up

   "Two ropes closest to me going to the anchor point, Two ropes closest to you going to the ground, Your barrel is locked, Guide hand palm up, Brake hand palm down knuckle to spine contact, You are lane _____."

4. Instruct the Rappeller to get ready

   "Lane _____ Get Ready."

5. Instruct the Rappeller to get into position

   "Position, Turn and face the anchor point, walk back until your heels are over the edge of the tower, lean out and milk yourself into a good "L" shape position."
   (Note: The "L" shape position is where the Rappeller's legs are parallel to the ground)

6. Instruct the Rappeller what you would like for them to do while on rappel

   (Example: "Walk down the tower. Brake three times. During each brake look back up at me to receive your next command. Don't forget your 4-point body check")

7. Instruct the Rappeller to go

   "Go"

8. Continue to monitor and critique the Rappeller until they get to the ground.

NOTE: Being smooth and confident on the Rappel Tower performing your duties as a Rappel master reinforces the Rappeller's confidence. Ensure that you are prepared to instruct the belayer that the rappeller is falling if the Rappeller is unable/fails to control their descent to the ground.

Army National Guard Warrior Training Center
Rappel Master Course
Rappelling Gear / Equipment List

Item:
Harness, Mountaineering, Type I

NSN:
8465-01-578-8910

Item:
7/16" Steel Carabiner, 51 kN

NSN:
8465-01-415-5134

Item:
Aluminum Locking Carabiner 24 kN

NSN:
8465-01-578-8898

Item:
Rescue 8 Descender

NSN:
8465-21-905-7922

Item:
Belay Device, Mountaineering

NSN:
8465-01-578-7850

Item:
1" Tubular Nylon

NSN:
8305-00-268-2455

Item:
7mm Accessory Cord, Kernmantle

NSN:
4020-01-577-8686

Item:
StaticRappelling Rope, Kernmantle, 11mm

NSN:
4020-01-577-8714

Item:
Rope, Cutter, Electric

NSN:
4940-01-582-8347

Item:
Webbing, Type I, Size I

NSN:
8305-01-578-8909

Contact Info:	Organization	Number	Email	Title
SFC Kyle Lewis	Army National Guard - Warrior Training Center	706-544-6341	kyle.l.lewis6.mil@mail.mil	Rappel Master NCOIC
Mr. Richard Landry	RDECOM NSRDEC / Natick, MA	508-2334541	richard.d.landry.civ@mail.mil	Equipment Specialist

Notes: