



KNOTS AND HITCHES

NOMENCLATURE

Hitch	A temporary method of securing an object, fastened so that it can be readily undone, i.e., Half Hitch.
Bend	The tying of the ends of two ropes to make a continuous rope, i.e., Becket Bend.
Knot	The tying of the parts of one or more ropes so that they will not slip, i.e., Bowline.
Bight	Formed by making a loop in the rope.
Working End	The part of the rope which is used in tying the knot.
Standing Part	The long unused portion of the rope.

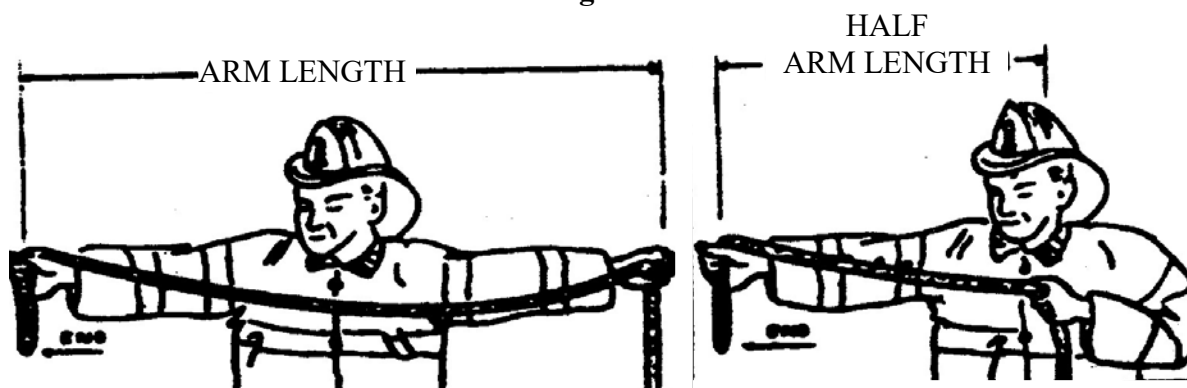
REQUIRED LENGTH OF ROPE FOR KNOTS

Bowline on a Bight	-	1½ arm lengths
Rolling Hitch	-	1½ arm lengths
Knots to Hoist Ladders	-	1½ arm lengths with a 1 ft. end

MEASUREMENT

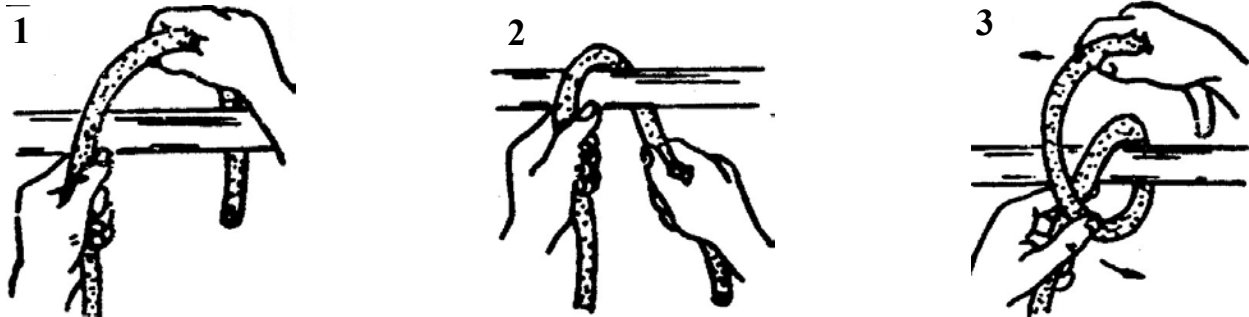
Measurement of rope required to form the various knots and hitches is made by stretching the arms out and holding the rope between the hands. The full distance measured is one arm length. A half arm length is measured by holding the rope in the left hand at the center of the chest and stretching the rope to the right. Note that approximately 6" is allowed to dangle from the right hand.

Figure 1



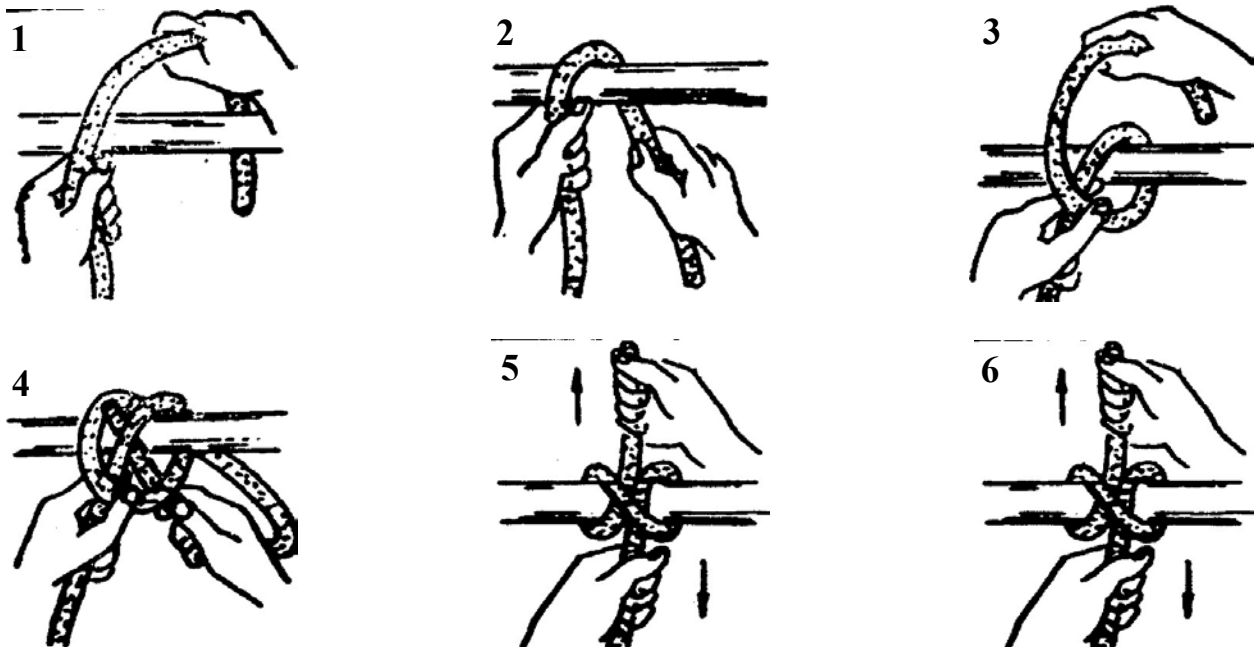
Knots and hitches are shown tied loosely to demonstrate the proper method. In method practice knots and hitches shall be made up securely.

HALF HITCH



The half hitch is used when hoisting or lowering tools and equipment. It is also used as a binder to secure knots.

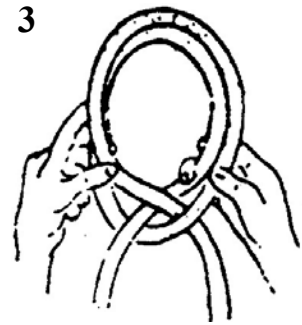
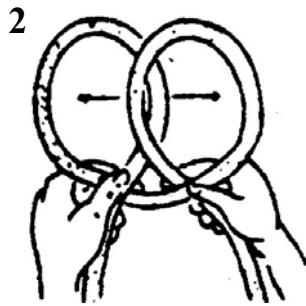
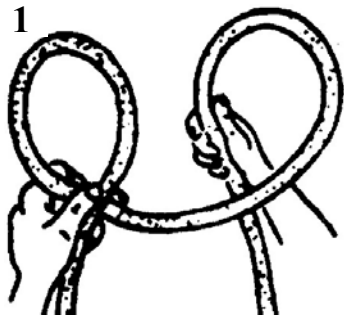
CLOVE HITCH



The clove hitch is formed by making two half hitches. It is used in the hoisting and lowering of tools and equipment, in the hoisting of hose lines, when drafting water and various other operations. Unless otherwise specified, a binder shall always be tied in conjunction with a clove hitch, except where it is tied away from the working end of the rope (slip-over clove hitch).

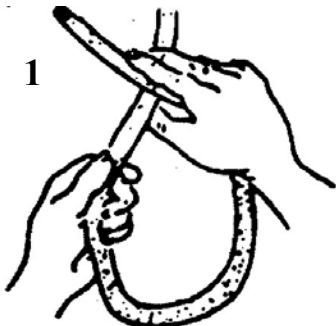
When making a clove hitch for the hoisting of tools and equipment, the pull on the rope may be from the upper or lower hitch depending on how the hitch was started or if the slip-over hitch was used.

SLIP-OVER CLOVE HITCH

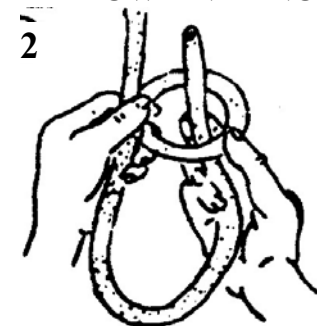


The slip-over clove hitch is made by forming two half hitches in the hand. It may be used to advantage by slipping the completed clove hitch over the end of the object, as in hoisting the hook, halligan tool or extinguisher.

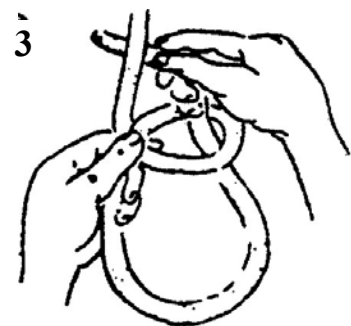
THE BOWLINE KNOT



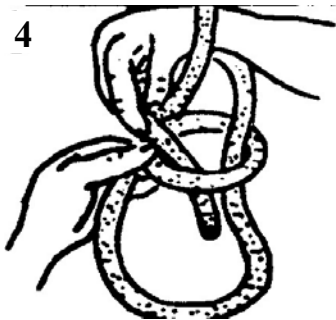
With rope held in this position, press down with fingers and up with thumb of right hand and forming loop in rope.



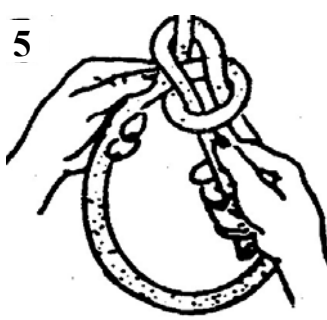
Loop is held in position with left hand until knot is completed.



End of rope brought up through loop with right hand, taken around in back of rope held in left hand.



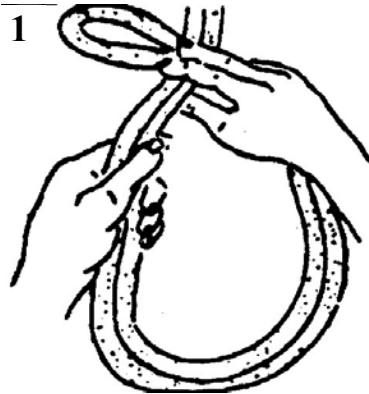
Continue to bring rope around until end is placed down into loop held with left hand.



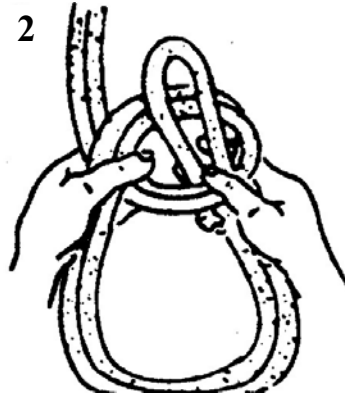
Take hold of rope end coming down through loop with right hand and pull tight to complete knot.

The bowline knot will not slip nor tighten under tension and is easily untied. It is used in hoisting and lowering ladders (20' and over). The bowline is useful where a loop is needed that will not slip.

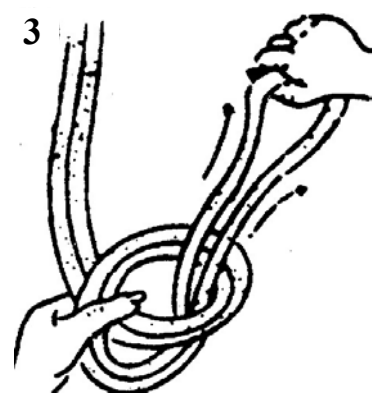
THE BOWLINE ON A BIGHT



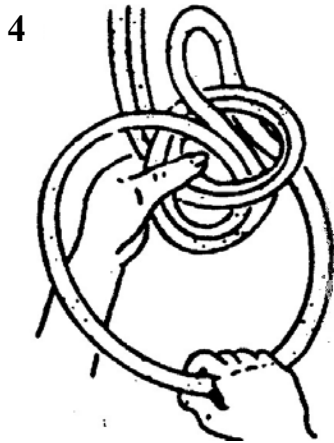
1
Measure 1 1/2 arm lengths; loop rope back on itself. Hold doubled rope in left hand about 4' from looped end. Place loop across doubled rope above left hand.



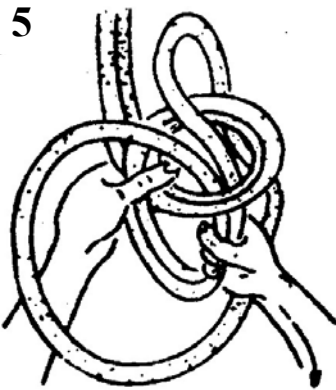
2
Form a small loop with left hand by turning the rope forward and up over the doubled rope held in right hand.



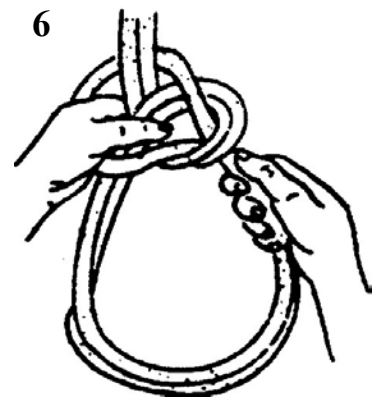
3
Pull the doubled end completely through the loop.



4
Fold the large loop behind the small loop.



5
Pull the doubled rope down through small loop.

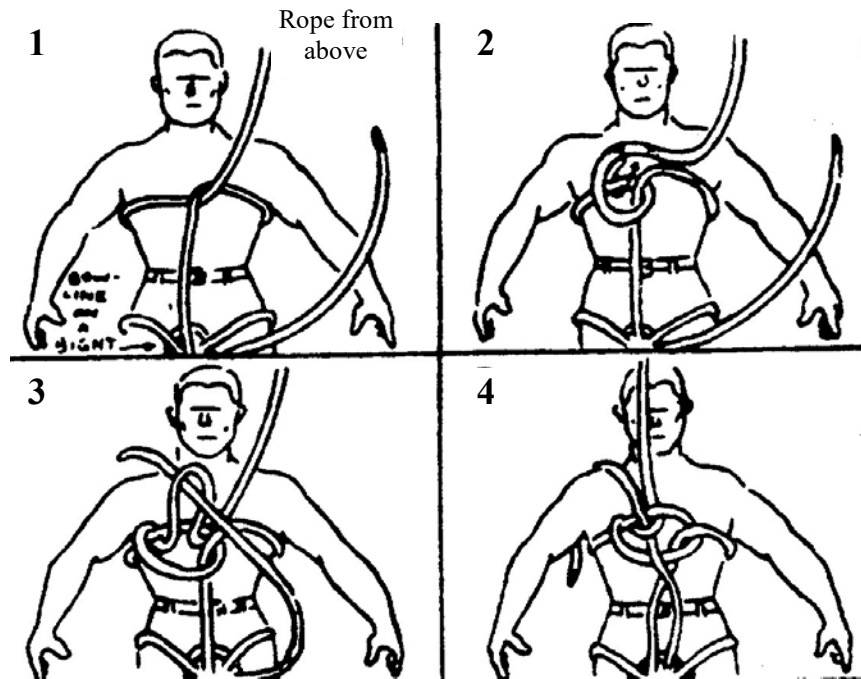


6
Make up knot securely.

The bowline on a bight is a very important knot. It is commonly used to lower a firefighter to rescue persons trapped at windows which are not readily accessible to ladders. Other rescue purposes include the lifting of persons from excavations, sewers, etc., and the lowering of persons from places where safer escape routes are not available. The bight forms a cradle to support the firefighter and the bowline prevents the rope from tightening or slipping. The bowline on a bight is used in conjunction with a half hitch and a slippery hitch tied about the chest.

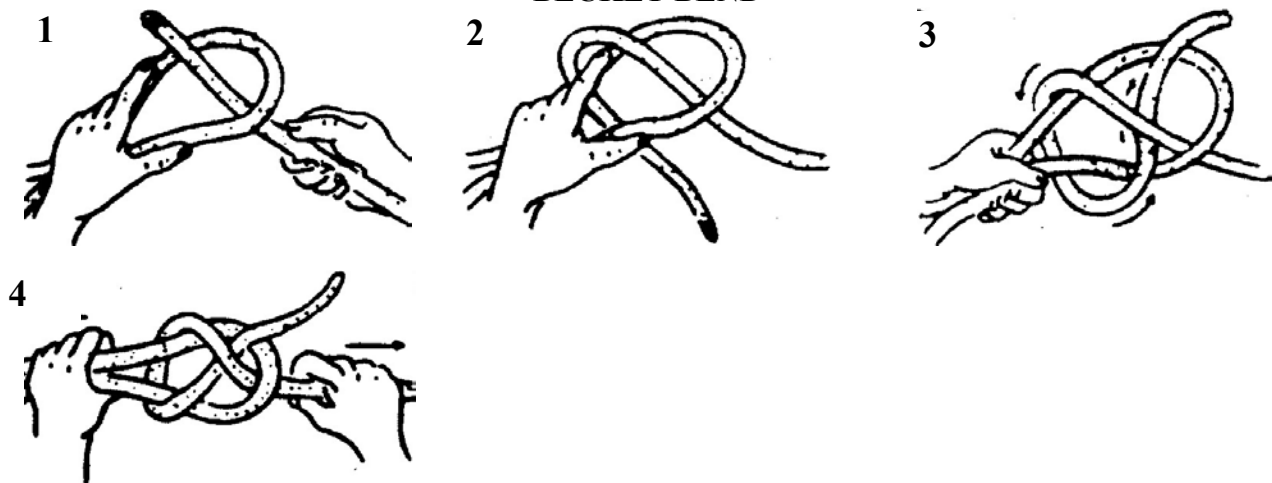
Note: The 4' referred to under illustration 1 is approximate. Allowances must be made according to size of the person to be lowered.

SLIPPERY HITCH



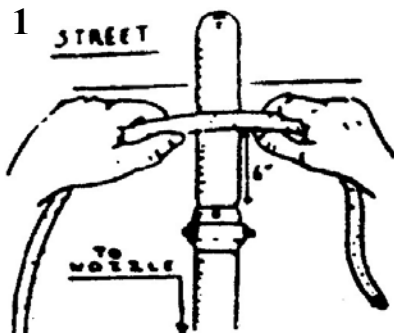
This knot is used in conjunction with the bowline on a bight when hoisting or lowering a person. It is tied around the upper chest to give stability and eliminate binding on the chest that would be caused by an ordinary half hitch.

BECKET BEND

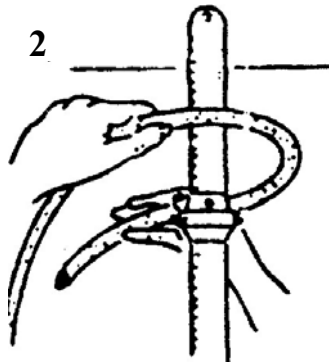


The becket bend is used to join the ends of two ropes.

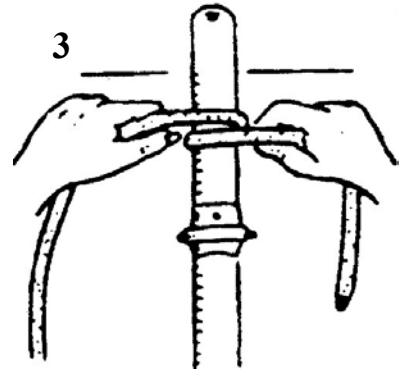
ROLLING HITCH



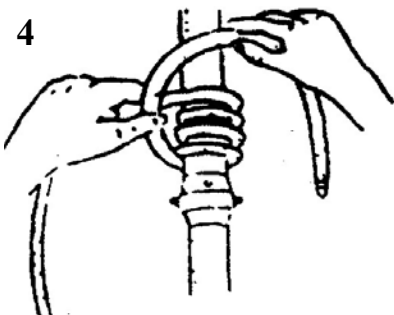
1
Hose butt is brought on to roof; 1 1/2 arm lengths of rope are measured; rope is held in left hand; knot is tied with right hand.



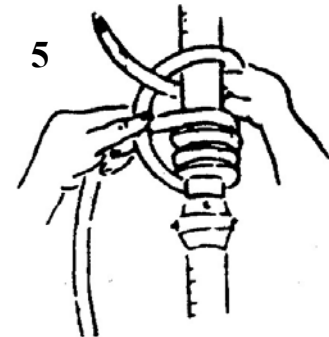
2
Rope is brought around and over hose below butt.



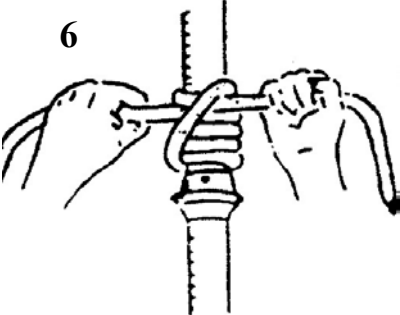
3
Continue turns around hose.



4
Until four turns have been made.



5
Bring rope end over the four turns and around hose with a half hitch.



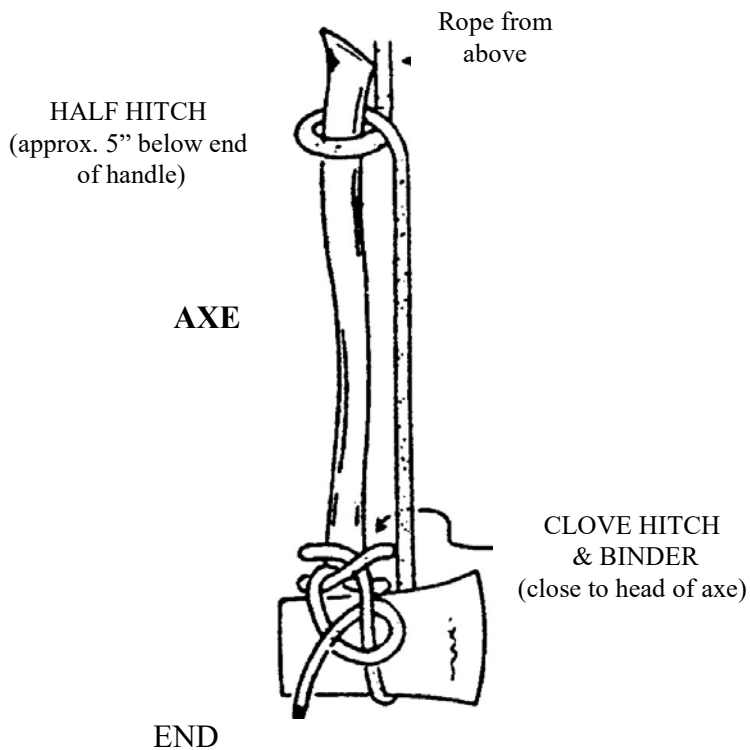
6
Slide the turns of rope close to hose butt and pull ends tight.



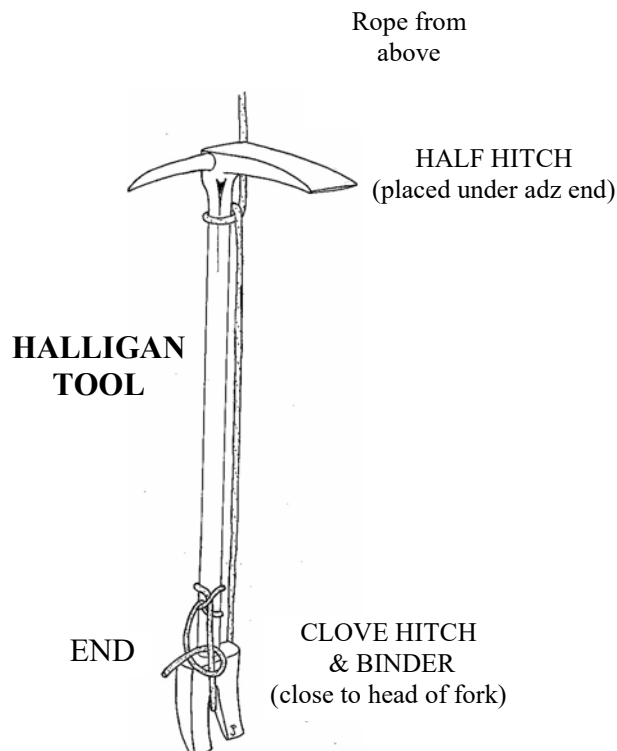
Ease hose butt over roof.
Take rope back on roof and tie to a secure object.

The rolling hitch is used to secure a hose line which has been hoisted via the outside of a building. It is tied directly beneath the couplings just below the edge of the roof or window. The free end of the rope is taken back on roof and secured to some substantial object. The rolling hitch relieves the couplings of the weight of the hose.

KNOTS AND HITCHES USED TO HOIST AND LOWER TOOLS AND EQUIPMENT

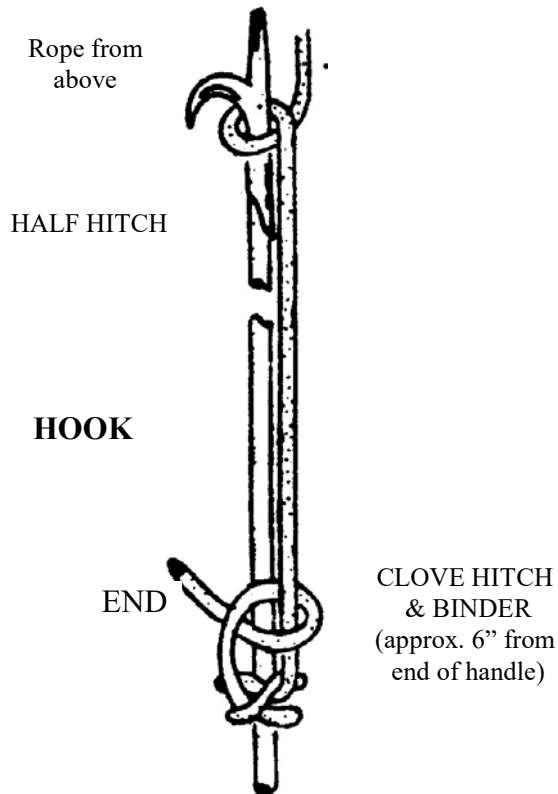


Tie a clove hitch and binder on handle close to blade. Bring working end of rope around blade and up to handle end. Tie a half hitch on handle. The axe is hoisted and lowered in vertical position with handle up.

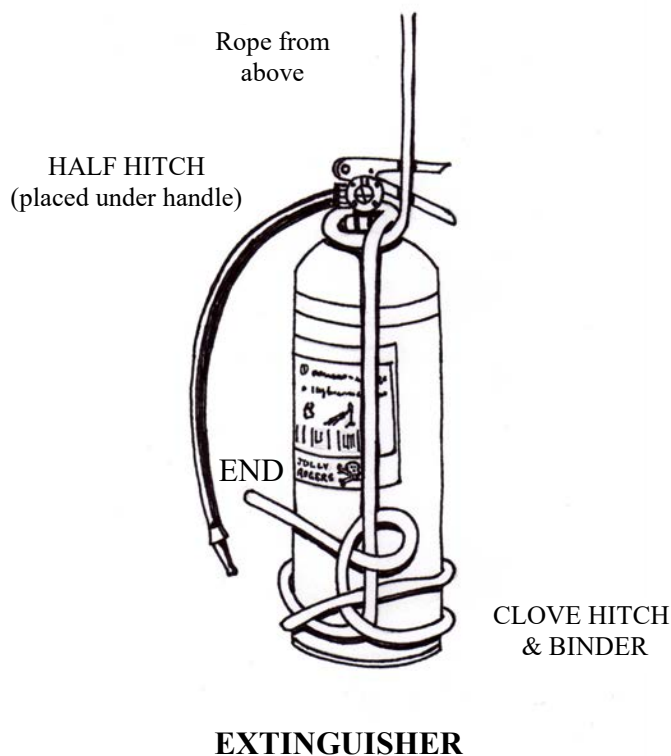


Tie a clove hitch and binder on halligan tool close to fork. Bring working end of rope through fork and up to adz end. Tie half hitch under adz end.

Halligan tool is hoisted and lowered in vertical position with adz end up.



Tie a clove hitch and binder on handle. Bring working end of rope up and tie a half hitch under hook. The hook is hoisted and lowered with the hook end up.

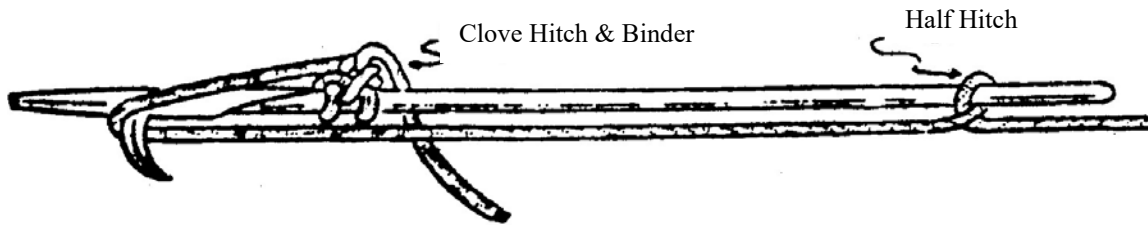


Tie a clove hitch and binder on lower part of extinguisher. Bring working end of rope up and tie a half hitch under cap. Extinguisher is hoisted and lowered in upright position.

Foam extinguisher is hoisted and lowered in same manner.

CO2, Pressurized Water and Dry Powder extinguishers are hoisted and lowered in same manner. Half hitch is tied under handle and discharge hose.

PULL-DOWN HOOK



Tie a clove hitch and binder on handle close to metal. Bring working end of rope around top of hook and back to handle end. Tie a half hitch around handle about 12" from the end. The hook is placed in position on the object to be pulled; a strain is kept on the rope and the firefighters move back to the working position.

Hooks are tied in this manner for pulling down partitions, fences, copings, etc., enabling members to work in safe areas away from falling objects.

BY ORDER OF THE FIRE COMMISSIONER AND CHIEF OF DEPARTMENT

Addition for PFS

SUBSTANTIAL OBJECT KNOT OR

CLOVE HITCH AND BINDER ON THE TAUT PART OF THE ROPE

The **Substantial Object Knot**, also known as a **Clove Hitch And Binder On The Taut Part Of The Rope**, is used to tie off to an anchor point during the Lowering A Member, Rescue Pick-Up and Single Slide Evolutions. It is tied by making three half hitches over the top of the rope.

Figure 1



Pull a double strand of rope around your substantial object. Fig. 1

Figure 2



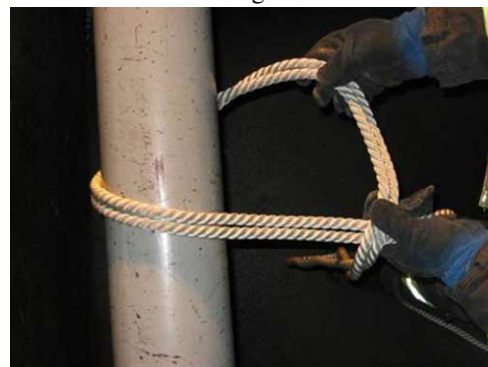
Have 4 feet of rope from the point where the ropes cross. Fig. 2,3

Figure 3



Cross the working end in your right hand over the rope in your left hand forming a letter 'D'. Fig. 4

Figure 4



Addition for PFS

Figure 5



Figure 6



Reach into the 'D' with your right hand, grab the working end and pull it through the hole creating a half hitch. Fig. 5 and Fig. 6

Figure 7



Figure 8



Tighten by pulling forward with your right hand ONLY. Fig. 7

Addition for PFS

Figure 9



Figure 10



Make two more half hitches in the same manner. Fig. 8 , Fig. 9 and Fig.10

Figure 11



Tighten and set the knot. Fig. 11 A properly tied knot will have enough rope left to tie one more half hitch. Fig 11 and Fig. 12

Addition for PFS

Figure 12



A finished knot. Fig. 12

Figure 13

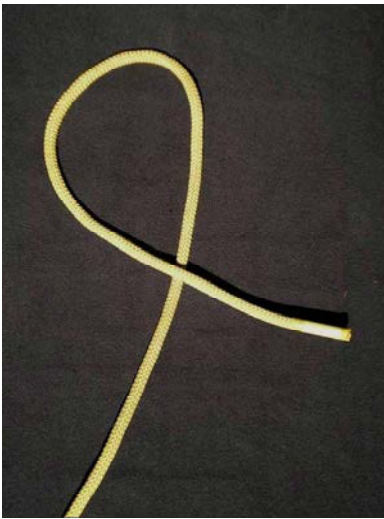


A loose knot for illustration purposes only. Fig 13

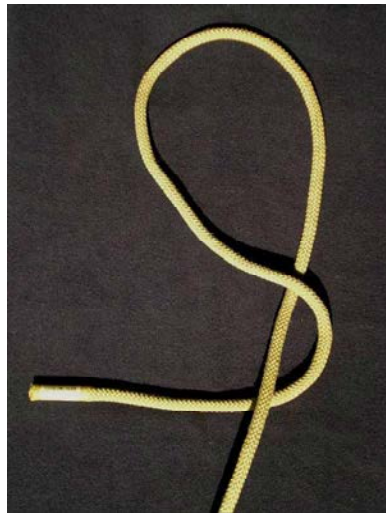
Addition for PFS

FIGURE 8 OR STOPPER KNOT

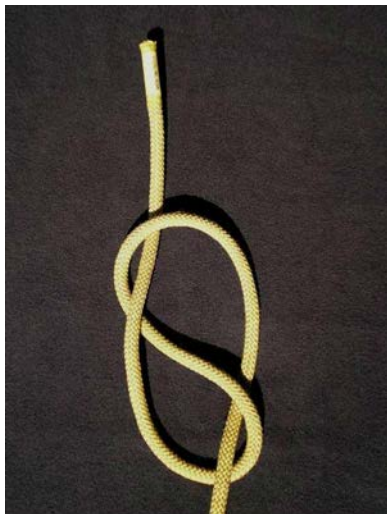
The Figure 8 knot is tied at the end of a rope and keeps the rope from slipping out.



Make a loop



Bring the end around the
standing part



Put the end through the loop



Dress and set the knot

Addition for PFS

BUTTERFLY KNOT

The Butterfly Knot is used to make a loop in the middle of a rope. It can be used as a tie-off point or to make a three directional pull.

Figure 1



Figure 2



Figure 3



Starting from the back of your left hand, make 3 loose loops around your hand.

Fig. 1, Fig. 2 and Fig. 3

Take the middle loop and pull it under the left loop to your palm.

Fig. 3 and Fig. 4

Figure 4



Now pass the loop in your palm over the other two loops. Fig. 4 and Fig. 5

Addition for PFS

Figure 5



The loop that went over from your palm now goes back under the same two loops back towards your palm. Fig. 5.

Figure 6



Pull the rope thru and take all the loops off of your hand. Fig. 6

Figure 7



MANAGING MEMBERS IN DISTRESS
CHAPTER 3, ADDENDUM 3
November 1, 2011

NYLON TUBULAR WEBBING

(Also Found in Volume 2)

Relocated for PFS

1. SPECIFICATIONS

- 1" nylon tubular webbing in 20' lengths
- Breaking Strength 4000 lbs
- Knotted breaking strength 3000 lbs

2. PREPARATION FOR USE

- 2.1 Before the webbing can be used in the field it must be made into a continuous loop by using a water knot (see Illustration).

3. PURPOSE

- 3.1 To be used to assist in the removal of an unconscious member or civilian from a hazardous environment.
- 3.2 Spinal immobilization may not be possible due to the need for immediate removal of the member from an imminently dangerous situation.
- 3.3 To enhance simple maneuvers through the use of knots attached to an individual firefighter's body or SCBA. This will improve leverage and allow additional individuals to assist in the removal. In the event that a firefighter should become unconscious during an incident, members in close proximity will be able to quickly conduct a removal.
- 3.4 Webbing shall only be used for **dragging** victims; no vertical lifts should be attempted.

4. DISTRIBUTION

- 4.1 Each Officer and member will be issued a length of webbing, which will become part of the member's personal equipment.

5. REPLACEMENT

- 5.1 *Redacted for PFS*