

# Tech Rescue Sequences v 1.2

## This is a set of instructions for

- (I) setting up a lowering system with an asymmetric prusik belay,
- (II) releasing a stuck friction hitch on a lowering system,
- (III) switching from lowering to raising,
- (IV) switching from raise to lower,
- (V) passing a knot during lowering, and
- (VI) passing a knot during raising.

These technical rescue sequences are methods that all team members participating in rope rescue trainings and operations understand and practice, so that participants have a common knowledge base. There are numerous methods that can accomplish these maneuvers, and there may be specific situations where other methods are appropriate and may be used. We chose these methods because they are standard methods using standard equipment, they are adaptable to a broad range of situations, and use a minimal amount of common lightweight rescue equipment. These methods are applicable to twin tension, dedicated main/dedicated belay, and single line systems.

## Terminology:

- ✦ The “load side” of the rope is the rope under tension going over the edge to the load.
- ✦ The “free side” of the rope is the slack rope piled neatly at your feet.
- ✦ The “bitter end” of the rope is the unused end of the rope on the running side of the rope. Some of the techniques described below rely on using the bitter end of the rope to construct a mechanical advantage or load release system. If the bitter end of the rope was for some reason not accessible (e.g., the end of the rope is used in the anchor) another piece of rope can be substituted (e.g., the free side of the rope may be tied off anywhere there is enough rope to meet the need, or the 10m length of 8mm accessory cord that is part of one’s personal gear).
- ✦ The “haul prusik” in an MA is the prusik that is pulled on to lift the load. Some MAs have more than one haul prusik. Triple-wrap prusiks in a loop of nylon accessory cord work best for haul prusiks.
- ✦ The “ratchet prusik” is the prusik that holds the load while the MA is being reset.
- ✦ The “belay prusik” is a hands free, whistle test compliant belay. These systems use an asymmetric prusik (four wraps on the load side, one wrap on the anchor side) tied using a VT prusik cord.
- ✦ PMP = prusik minding pulley
- ✦ DCD = descent control device
- ✦ DMDB = dedicated main, dedicated belay
- ✦ TTDC = twin tension dual capability
- ✦ MA = mechanical advantage

## General Notes:

- ✦ Carabiners should have gates facing away from the rock and downwards.
- ✦ Carabiners should not be opened while part of a life support system.
- ✦ For this system to be dual capability, use an VT prusik tied as an asymmetric 4:1 prusik as the ratchet in MA systems and as the back-up prusik in lowering systems. Triple wrap prusiks in 8mm accessory cord can be used for haul prusiks and in load-release systems.
- ✦ To secure a DCD means to use the brake side of the rope traveling through the DCD to tie off the DCD so that it will not slip. To tie off a Conterra Scarab for a brief stop, lock the rope around each of the two anchor-side horns with a half hitch on each horn. For an extended stop, back the half hitches up with a mule knot. Other DCDs have different but similar ways to secure the DCD, generally relying on a mule knot.
- ✦ When a release hitch is necessary, the methods described below use the bitter end of the rope to construct a release hitch. If for some reason the end of the rope is inaccessible (e.g., it was used to build the anchor), tie a loop where there is available rope, attach that to the anchor, and proceed as if that was the end of the rope.

## I. Set up for lower:

1. DCD hanging from a ~20" extension (e.g. doubled double length runner, shoulder length runner) with a friction hitch back up on the brake side and the standing end of the rope running through a 'tailing' carabiner or pulley. Here, the back-up friction hitch should be a 4:1 asymmetric prusik tied with a VT, as shown.
2. The methods given below could be used for either the main line in a DMDB system, a TTDC system, or even a single line system.
3. The belayer uses a scissor grip on belay prusik when line is under load; hitchhiker grip when line not under load or under light tension.



Base DCD Setup

## Securing the Scarab

Make a loop in the brake strand. Note orientation of the brake strand relative to the Scarab.



Place that loop on horn #4 on the Scarab.



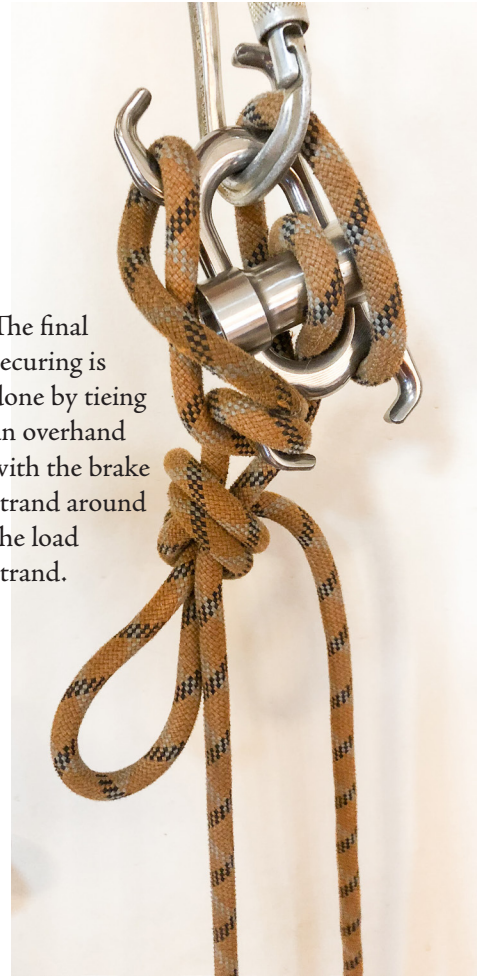
Tighten that loop as tight as you can.



Repeat steps 1 and 2 on horn #3.



The final securing is done by tying an overhand with the brake strand around the load strand.



## Alternate method to secure Scarab using mule knot



### II. Stuck belay friction hitch released with an improvised 2:1 or 4:1:

1. Grab a carabiner and clip it to the carabiner to which the DCD is attached.
2. Grab a bight of rope on the running (anchor) side of the tailing carabiner and clip it to the biner you placed on the DCD biner.
3. Pull up on this to release the load on the stuck friction hitch and continue the lower.

### III. Lower to raise transition.

1. Secure the DCD.
2. Remove the rope from the tailing carabiner.
3. Clove hitch the free side of the rope to the anchor 1 - 1.5 meters from the belay prusik.
4. Place a triple-wrap prusik on the loaded side of the DCD and clip it into the extension sling the DCD is clipped to.
5. Use the DCD to transfer the load to this prusik. This will become the haul prusik.
6. Remove the DCD.
7. Place a PMP onto the rope on the free side of belay prusik and clip that into the anchor.
8. Build the appropriate MA using the triple-wrap prusik as the haul prusik and the belay prusik as the ratchet prusik in the MA.
9. Inspect and raise.

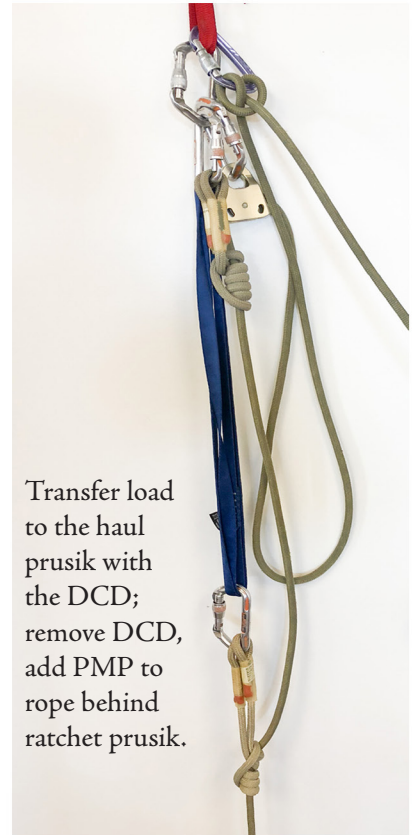
## Lower to Raise Sequence



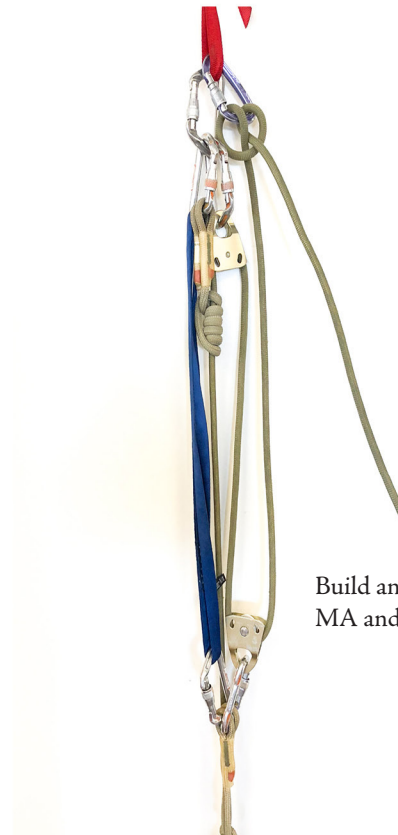
Remove rope from tailing carabiner and secure DCD



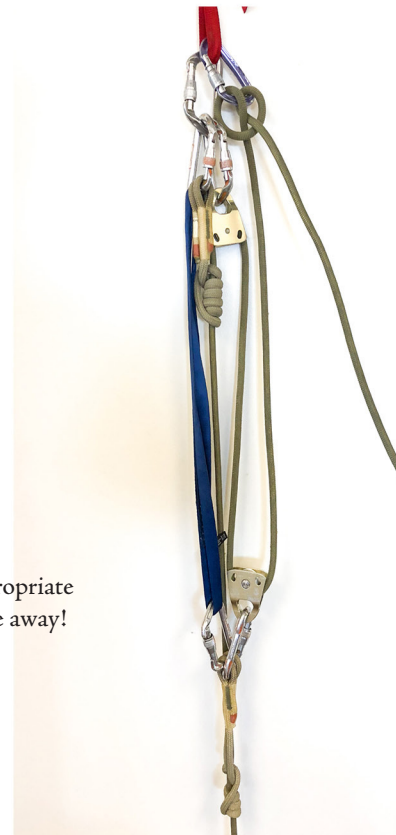
Place a new friction hitch below the DCD and clip it to the anchor extension. be a standard prusik too.



Transfer load to the haul prusik with the DCD; remove DCD, add PMP to rope behind ratchet prusik.



Build an appropriate MA and raise away!



#### **IV. Raise to lower transition.**

1. Bring the haul prusik up to about 1 meter below the ratchet prusik and set the ratchet prusik. You will need this 1 meter of slack later in the sequence.
2. Find the bitter end of the rope, tie a figure-eight loop in the end and clip it to the anchor, run the this rope down through a biner on the haul prusik, and back up to the anchor and tie off with a munter mule knot on a pear-carabiner. You now have a munter on a 2:1 (Photo).
3. Reverse the haul system to lower the load on to the tied off munter mule system.
4. Clear the now unloaded pulleys and carabiners from the system, but leave the ratchet prusik; it will now become the belay prusik.
5. Clip a doubled double length runner into the anchor and attach a DCD to it.
6. On the load side of the prusik, thread the rope through the DCD and tie it off.
7. Release the mule knot and use the munter hitch to lower the load onto the DCD.
8. If the belay/lower control end of the rope isn't already running through a tailing carabiner above the belay prusik add one now.
9. Inspect and lower.

## Raise to Lower

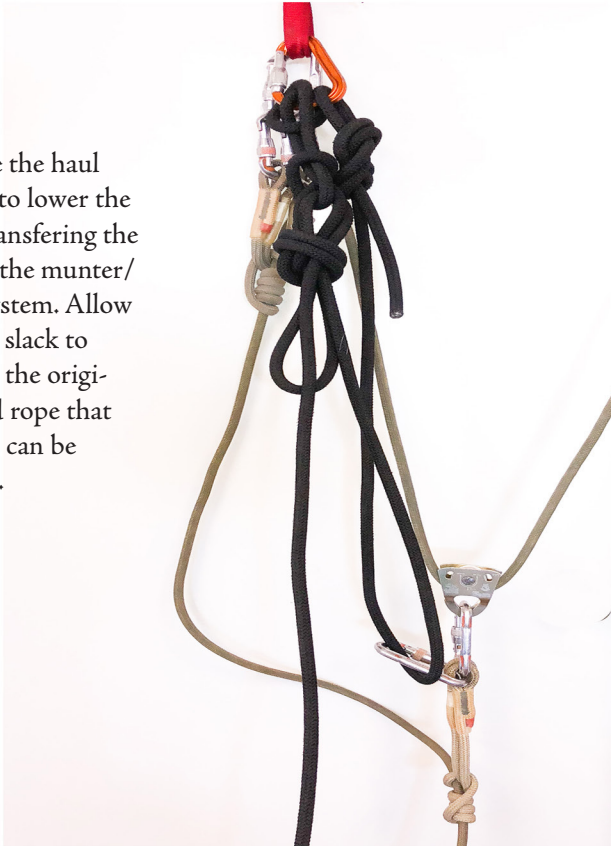
Set haul prusik 1M below ratchet. Use bitter end of the rope, or a second rope to tie figure 8 on anchor, route this rope back down to the haul prusik and back up to the anchor and use this rope to tie a munter/mule. (Black rope in photo).



Close up of munter/mule applied to anchor w/ bitter end of rope.

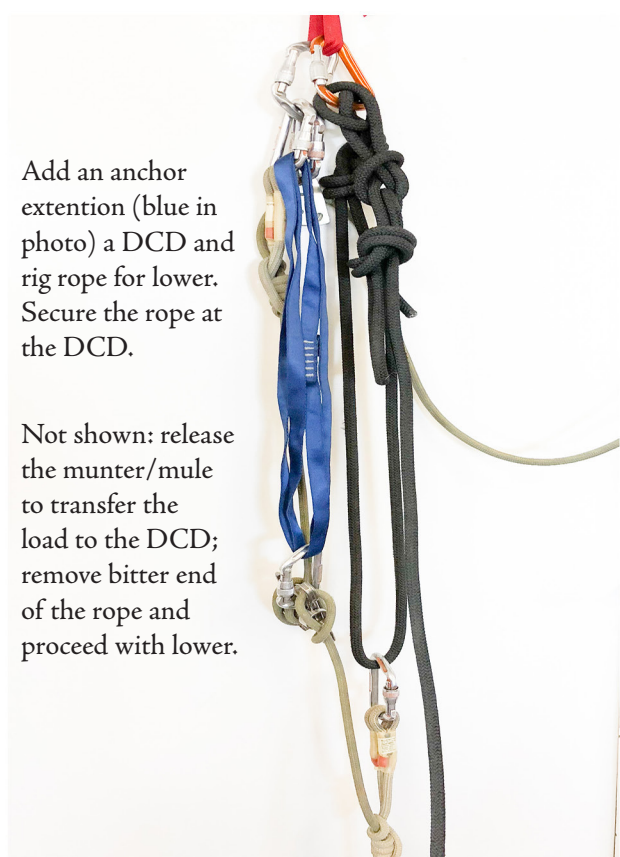


Reverse the haul system to lower the load, transferring the load to the munter/mule system. Allow enough slack to form in the original load rope that a DCD can be applied.



Add an anchor extension (blue in photo) a DCD and rig rope for lower. Secure the rope at the DCD.

Not shown: release the munter/mule to transfer the load to the DCD; remove bitter end of the rope and proceed with lower.

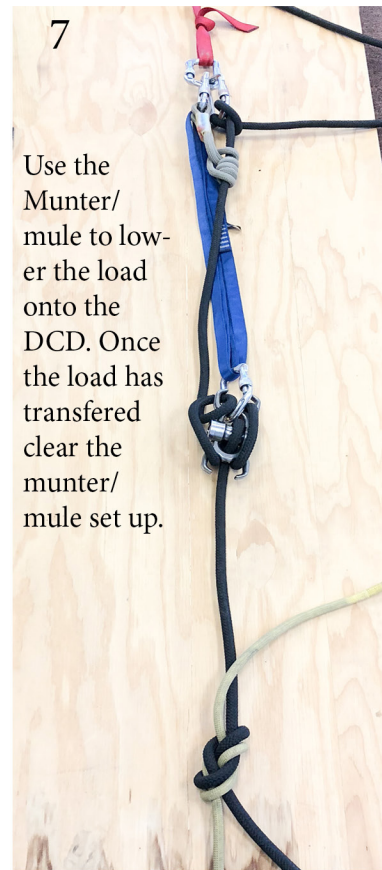
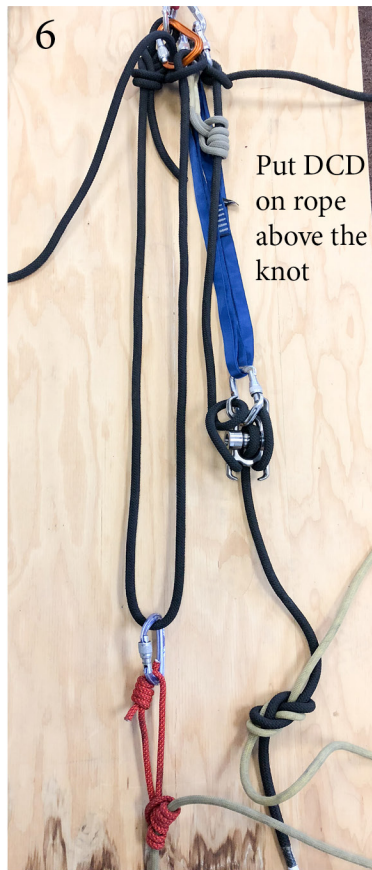
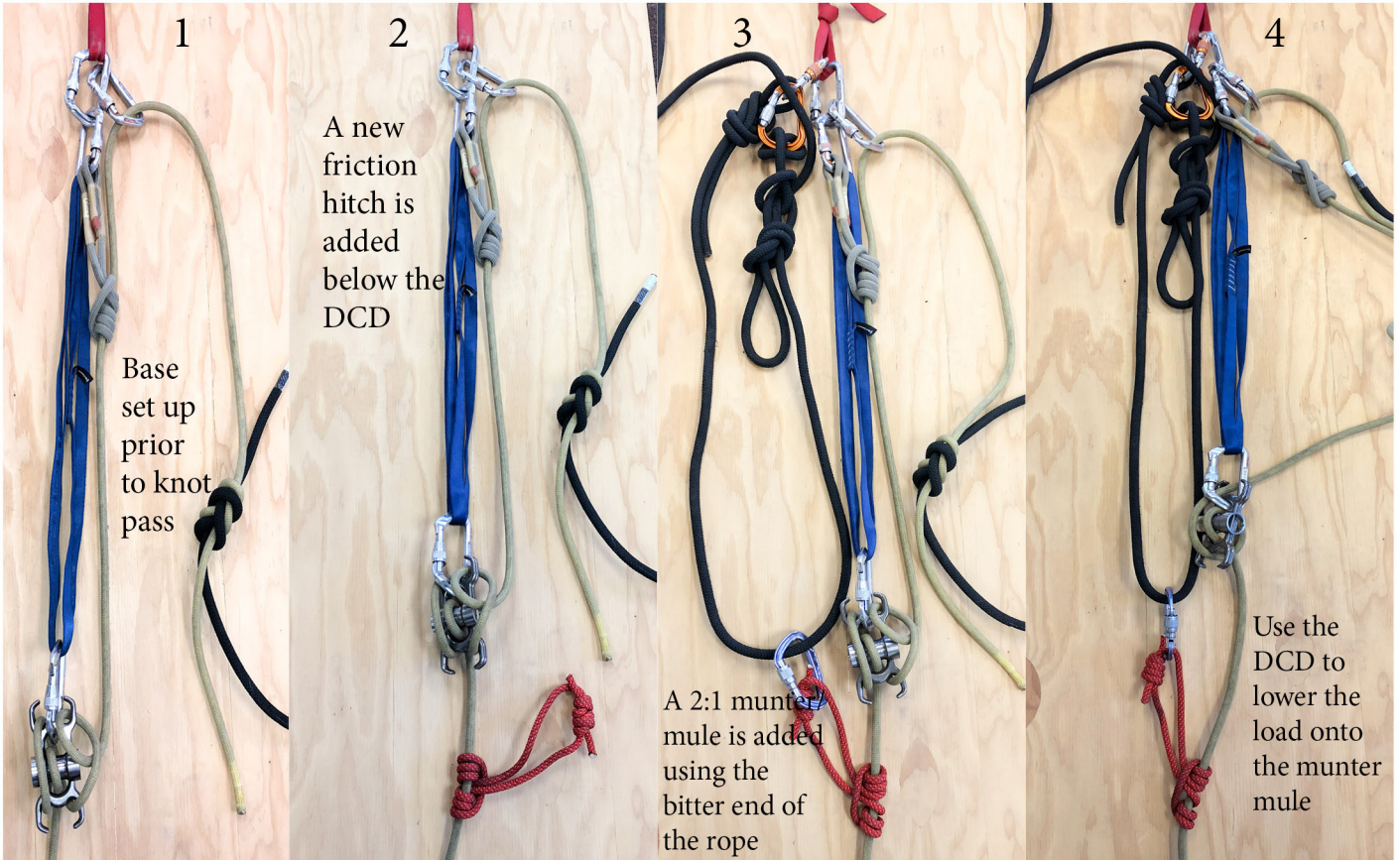


## **V. Knot pass during the lower.**

1. When the knot is  $\frac{1}{2}$  meter above the belay prusik, stop lowering and secure the DCD.
2. Back up the system with a secure tie-off to the anchor (clove hitch, figure-eight loop, butterfly, or mule knot) and clip this to the anchor.
3. Place a prusik just below the DCD and clip a carabiner to it.
4. Find the bitter end of the rope, tie a figure-eight loop in the end and clip it to the anchor, run the this rope down through the biner on the prusik below the DCD, and back up to the anchor and tie off to a munter mule knot on a pear-carabiner. You now have a munter on a 2:1.
5. Release the DCD, and lower with the DCD until the load is on the system you rigged with the bitter end of the rope.
6. Remove the belay prusik and place it on the free side of the knot you are passing, and attach it to the anchor.
7. Remove the DCD, place it on the free side of the knot you are passing, below the belay prusik, reattach the DCD to the anchor with its extension, and secure it.
8. Release the mule knot in the bitter end of the rope and lower through the munter hitch onto the DCD.
9. Inspect DCD and belay prusik.
10. Remove the 2:1 release system and continue lowering.



# Lower with knot pass



## **VI. Knot pass during the raise.**

1. Bring the knot as close to the ratchet prusik as practical and settle the load onto the ratchet.
2. Place a VT prusik on the load side of the knot you are passing and attach it to the anchor, using an extension as necessary. This will be the new ratchet prusik.
3. Inspect the new ratchet prusik.
4. Place a triple-wrap prusik 1-2 meters below the haul prusik. This will become the new haul prusik.
5. Using the bitter end of the rope, construct an MA using the new haul prusik.
6. Use the new MA to lift the load until the old ratchet prusik can be released and settle the load onto the new ratchet prusik.
7. Remove the initial MA and ratchet prusik.
8. With a tender minding the new ratchet prusik, use the new MA to haul.
9. Optionally, once the knot is sufficiently clear of the system, you may reconstruct the initial MA system so that a tender on the ratchet prusik is not necessary.