Objective:

To provide a written reference for the basic use of a Multi-Purpose Device (MPD) for raising and lowering operations. This guide will also provide the operational sequences for utilizing 3:1 or 5:1 mechanical advantage as well as links to supplemental training materials.

Introduction: The Multi-Purpose Device (MPD) is a means for decent control and progressive capture during high or low angle rescue evolutions. The MPD can be utilized as either a 3:1 mechanical advantage or a 5:1 mechanical advantage depending on the operational needs. The MPD is a simple to use rescue system, which eliminates the need for excess equipment. It consolidates several of the components of traditional fire service based raising and lowering systems (i.e. R.P.M., Pig Rig etc.) in favor of one tool that provides the means to apply friction during decent and mechanical advantage during hauling operations. As opposed to the traditional R.P.M system, a load release device (i.e. mariners hitch) is no longer needed to convert from a hauling system back to lowering system. The MPD is the standard raising and lowering mechanism in the San Diego North Zone.

The MPD has several important features that its user should note before placing it in service (Figure 1). The first is the load-release handle on the front-plate of the device. The MPD is equipped with a locking cam inside the device. The cam compresses the rope, preventing it from moving. This safety feature ensures that the rescuer or victims are not lowered until they are ready. In order to release the cam, the MPD operator must lift the load-release handle and rotate it counter-clockwise. The device also features a rotary dial on the front-plate, which allows the operator to lock out the system when an operation is at a standstill. The bottom of the device features a small rigging hole called a “Becket” which can be utilized to attain 5:1 mechanical advantage. Finally, the top of the MPD is equipped with a rigging point used to attach it to an anchor or gathering plate.

Rigging:

The first step of setting up a lowering system for the MPD is to select an appropriate anchor. An appropriate anchor is generally referred to as “bomb proof”. This means the selected anchor point should not move, shift or relent under any circumstance during the operation. Adequate time should be taken to consider the expected load, movement and any additional stresses to the system that might arise to during the operation. Once the appropriate anchor is selected the rope must be fed through the MPD.
To accomplish this, orient the MPD so that the side displaying the rope orientation diagram is facing up (Figure 3). Spin the cover plate open 180 degrees (Figure 4) and feed the rope through until it makes a complete bend (Figure 5). Finally, close the cover plate. If installed correctly, the rope should follow the same path as the diagram with the load-end coming out the side marked “Kg” (Figure 6). The operator can give the rope a tug to ensure that the locking-cam is operating appropriately. The MPD is now ready to be rigged to an anchor or the gathering plate.

*** CAUTION***
If the rope was set up improperly, with the “load” threaded through the wrong end, the rope will freely pay out with no friction. This may lead to an uncontrolled decent of the rescuer and victim and could result in serious injury or death.

See figure 7
Lowering:

When in operation, the MPD must have the load release handle controller facing up. The rescuer assigned to the lowering station should be facing the rescue edge with the MPD to their right and the rope bag to their left. When the appropriate signal to lower the rescuer is received the MPD operator must lift and rotate the handle counter-clockwise. Doing so unlocks the cam inside the MPD and allows the rope to freely move in the direction of the lowering operation. If the operator were to let go of the handle, the cam would compress the rope and stop it from moving. In the fire service this is called a “dead-man” function. It is a safety feature that ensures that even if a tool’s operator were to “drop dead”, the rescuer’s safety would not be compromised.

As the rescuer begins to descend, applying friction via the MPD can control speed. The first line of friction is applied by simply pulling the rope back toward the operator around the primary friction notch. The angle of the bend will determine how much friction is being applied. The narrower the angle, the more friction, the slower the decent. Maximum friction is achieved in the angle shown in Figure 8. For very heavy loads a secondary friction device may be utilized. By placing a simple bend through the secondary friction device additional friction can be achieved.

Once the rescuer has reached the victim the operator should apply the MPD’s break. This can be achieved by simply rotating the dial in the middle of the front plate to point at the “locked” icon. If the operator needs to momentarily step away from the rescue system, a large overhand bend should be placed over the entire MPD, effectively serving as a “lock-out” and letting others know to not operate the system.

Figure 9 (Left): When the rescuer is lowered to the desired location or the system is being converted from lowering to hauling, move the middle rotary knob to the “lock” icon. This will prevent the cam from allowing rope to pass through, providing secure capture.

Figure 10 (Right): If the system operator must walk away from the MPD a large overhand knot should be tied around the entire device. The “lock-out” warning should inform anyone nearby that the system should not be used, as there is a load on the end.
Figure 11 (Above): An overhead shot of the MPD being utilized as a simple friction device for lowering a rescuer.
Raising:

3:1 mechanical advantage

When the rescuer and victim are ready to be hauled a simple 3:1 mechanical advantage hauling system can be set up in a few easy steps. First, place a three wrap prusik on the working end of the rope. Next, lay the running end in the shape of “Z”. Place a double swivel pulley in the distal bend of the “Z” and connect the prusik and the pulley with a carabineer. Rotate the dial in the middle of the MPD cover plate to the “unlock” icon and start hauling. When the system needs to be reset for additional hauling, the MPD will compress the rope using the built-in cam, then the prusik simply needs to be repositioned closer to the edge of the rescue and the hauling evolution can continue.

Figure 12 (Left) Place a prusik on the working end of the rope connected to a double-swivel pulley on the distal bend of the “Z” provides 3:1 mechanical advantage.

Figure 13-A (Middle): A view of the 3:1 mechanical advantage from the rescuers side.

Figure 13-B (Right) A view of the 3:1 mechanical advantage from the operator’s side
Figure 14 (Above): An overhead view of the MPD being utilized haul with a 3:1 mechanical advantage.
5:1 Mechanical Advantage:

If the rescue system operator should decide that more mechanical advantage is needed, a 5:1 system can be set up by simply feeding the rope through a single pulley clipped to the becket (Figure 15) and then fed through the second channel of the double-swivel pulley (Figure 16).

*Keep in mind that as one increases mechanical advantage the amount of elevation gained during hauling in relation to the amount of rope pulled will decrease. (For example, in a 3:1 system, when a rescue team pulls three feet of rope the rescuer and victim will rise 1 foot. Similarly, in a 5:1 system, if a rescue team pulls 5 feet the rescuer and victim will only rise 1 foot.)

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**Figure 15 (Left):** Demonstrates a single-carabineer attached to the MPD becket for 5:1 mechanical advantage.

**Figures 16 (Center):** Shows a firefighter feeding the rope through the second channel on a double swivel complete the 5:1 mechanical advantage set-up.

**Figure 17 (Right):** Shows a complete 5:1 mechanical advantage set-up from the MPD operator’s side.
If at any time during an evolution a rescuer needs to be lowered back down to the victim or the rescuer/victim package need to momentarily be lowered to a resting point, converting back to a lowering system is simple. The system operators simply need to unclip all the pulleys from the rescue system, so the MPD returns back to its original lowering configuration (see Figure 11).

**Figure 18 (Above):** An overhead shot of the MPD being utilized haul with a 5:1 mechanical advantage.
Supplemental Training Information

Learning and retaining the technical knowledge needed for rope systems can be difficult and at times written instruction may need supplementation. With this in mind, please use the following links or QR codes to find additional instructional videos on how to set up and use the MPD.

The first QR code will take you to an introduction to the MPD including concepts, common nomenclature, parts and pieces as well as care and maintenance.
- https://youtu.be/nXRw4YCuakU

The Second QR code will take you to a video demonstrating the full operations sequence for the MPD including rigging as well as 3:1 and 5:1 mechanical advantage raising and lowering operations
- https://youtu.be/k0lz7b1Y

The last video shows the important concepts for using the MPD as both a main line lowering system as well as a belay line.
- https://youtu.be/b5wddhNdLDw