

extreme engineering.com

## **AB-34 and AB-52 Auto-belay Installation Techniques**

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## Auto-Belay Installation Techniques

### **READ BEFORE PROCEEDING**

Installation of an Extreme Engineering (or any manufacturer's) Auto-belay system requires a minimum level of mechanical ability. If you do not feel that you have the minimum level of mechanical ability and understanding, Extreme Engineering highly recommends that you seek professional help prior to and during any Auto-belay installation.

Always check local building codes and requirements prior to the installation of Auto-belays to ensure compliance with local governing codes.

### **PRIME BEFORE YOU CLIMB**



**WARNING:** The air pressure in the auto-belay system is what causes the cable to be retracted when releasing the cable or climbing the wall with the cable attached to the climbing harness. This restriction of movement provided by the air pressure alone is NOT enough for proper operation of the auto-belay.

If air is displaced from the air/oil tank into the hydraulic check valve area of the auto-belay system, there will not be the proper restriction of movement when the cable is pulled out of the auto-belay. NEVER CLIMB a wall with an auto-belay that does not exhibit the proper restricted movement when extending the cable out of the auto-belay for the complete length of travel from the top to bottom of the climbing wall surface. There is a very noticeable difference between air pressure pulling on the cable versus the restricted movement caused by oil when the cable is extended.

The oil in the system is what provides the proper restriction to control the speed of decent when a climber is being lowered to the ground by the auto-belay. If there is air in the system when a person has climbed to the top of the wall and then lets go to lower back down to the ground, the decent will NOT be slow and controlled. Personal injury may occur if the air has not been fully purged from the system.

Reference section 1 for further information on:

**“PRIME BEFORE YOU CLIMB”.**

# Auto-Belay Installation Techniques

## 1. Prime Before You Climb

After installation of an Auto-belay, exercise the Auto-belay (“PRIME BEFORE YOU CLIMB”) ensure proper operation. Release each Auto-belay cable from its eye-bolt holding point on the climbing wall. Pull the cable out until it is fully extended. Perform a pumping action with the cable three to four feet in and out several times. Perform this pumping motion until the proper resistance level is felt when pulling on the cable. If the proper resistance is not felt, do not use that climbing run and Auto-belay until normal and proper operation is achieved. Contact Extreme Engineering Technical Support for help in troubleshooting.

If proper resistance is felt when extending the Auto-belay cable, you can now perform a test climb. Put on a climbing harness and connect the cable to the harness with the carabiner. Climb up onto the wall no more than three feet off of the ground. Let go and ensure the Auto-belay cable safely lowers you to the ground versus an unrestricted drop to the ground. If the Auto-belay operates properly, the Auto-belay test climb can now be completed. Climb to the top of the climbing wall. DO NOT let go until you once again exercise the Auto-belay for proper resistance when the cable is extended out. Perform several pull up and down motions with your hands and feet still holding you to the climbing surface. If proper resistance is felt, you may now let go and ensure the Auto-belay slowly lowers you to the ground. If you do not feel the proper resistance when performing the up and down body motions, do not use the Auto-belay to lower you to the ground. You must climb down the wall using your hands and feet on the handholds. Repeat the Prime Before You Climb operation all over again. Should the Auto-belay fail to present the proper resistance at the top of the wall again during the body up and down motions, contact Extreme Engineering for troubleshooting help. Do not use any Auto-belay that fails to pass the Prime Before You Climb operation until the situation is corrected. If proper resistance and operation is not achieved during this verification, do not use the Auto-belay until the problem is found and resolved. If the cable will retract, allow the cable to fully retract to the top of the wall to prevent anyone from using that particular climbing run. If the cable wont retract, leave it attached to the eye bolt holder and do not allow anyone to use the climbing run.

Do Not allow anyone to climb the wall until all Auto-belays have been exercised and demonstrate proper cable retraction and proper resistance for extending the cable. If after a minimum of four extension and retraction pumps of the cable does not establish the proper restriction when pulling on the cable, the Auto-belay is not operating properly. Do Not Use the Auto-belay. If proper restricted extension of the climbing cable is not felt when testing at the top of the climbing panel, the Auto-belay is not operating properly. Do Not Use the Auto-belay. Note: It is the air pressure that causes the cable to retract back into the Auto-belay. If the cable does not retract properly, there are no obstructions to the cable movement and the air pressure is at the proper level, the Auto-belay is not operating properly. Do Not use an Auto-belay that is not operating properly.

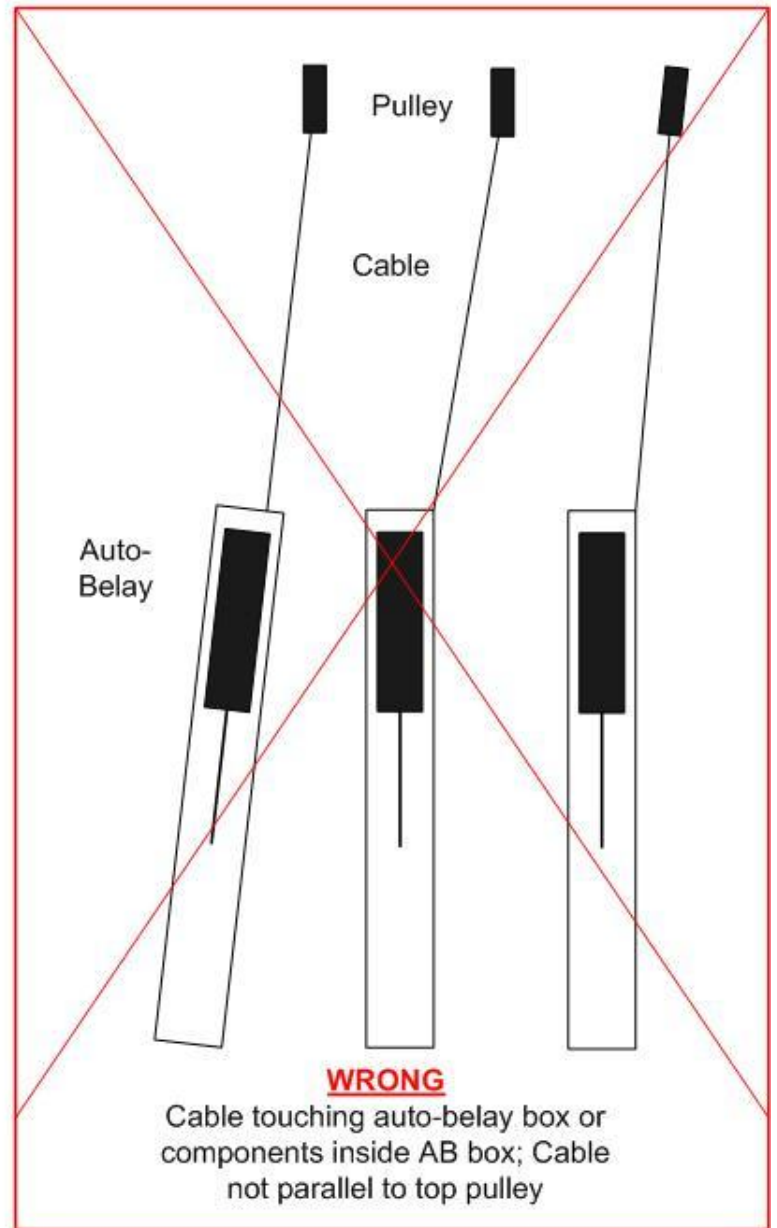
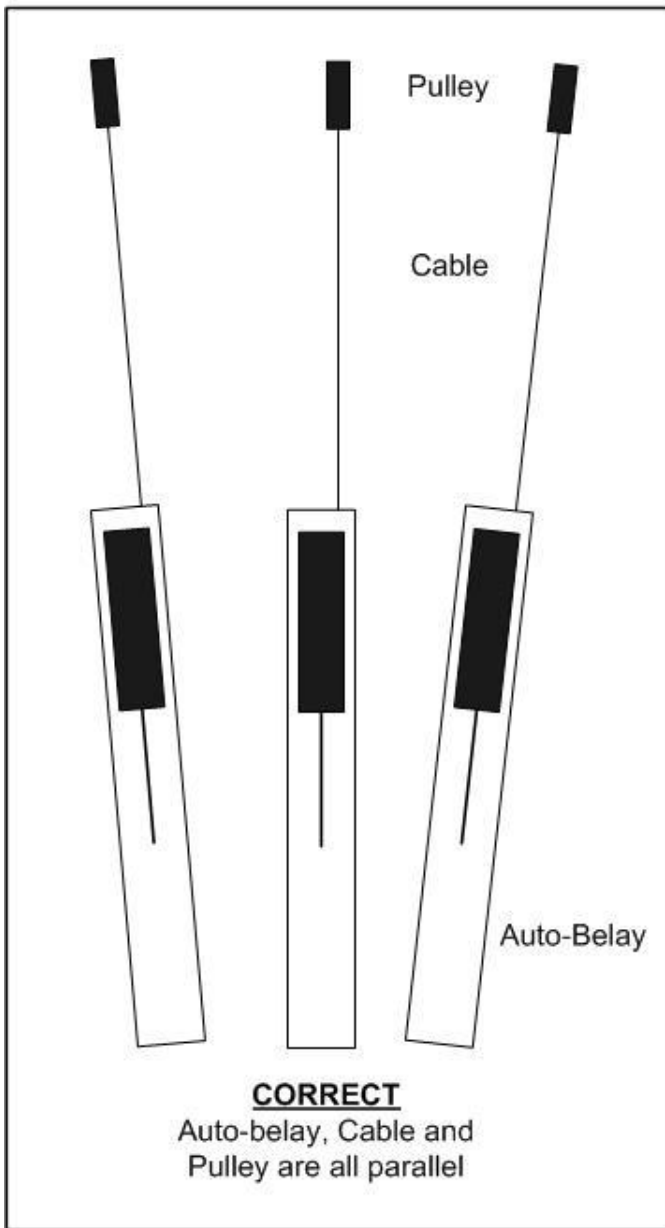
# Auto-Belay Installation Techniques

## 2. Standard Steel Bolt Torque Specifications

- **Grade 5** (All attachment bolts must be at least grade 5)
  - 3/8 -16: 33 ft-lbs
  - 1/2 -13: 78 ft-lbs

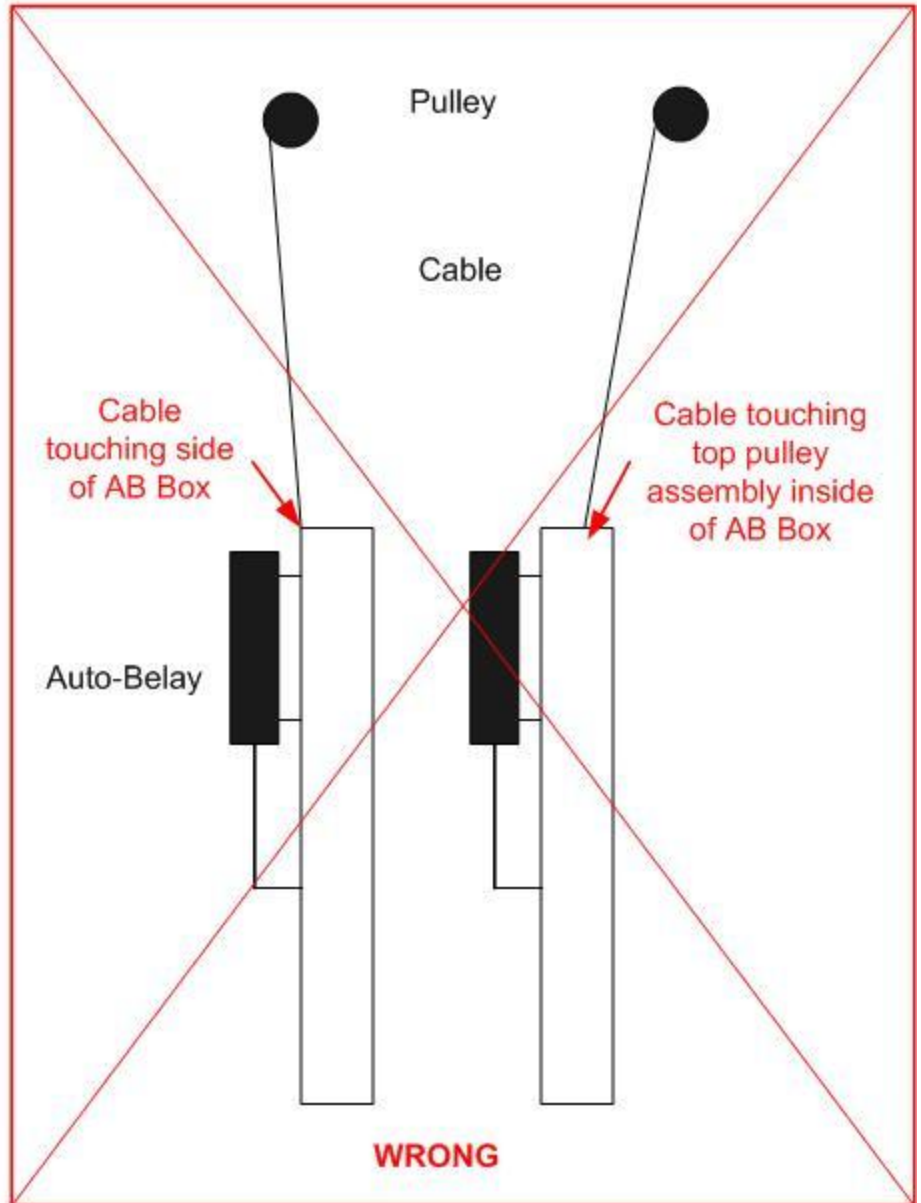
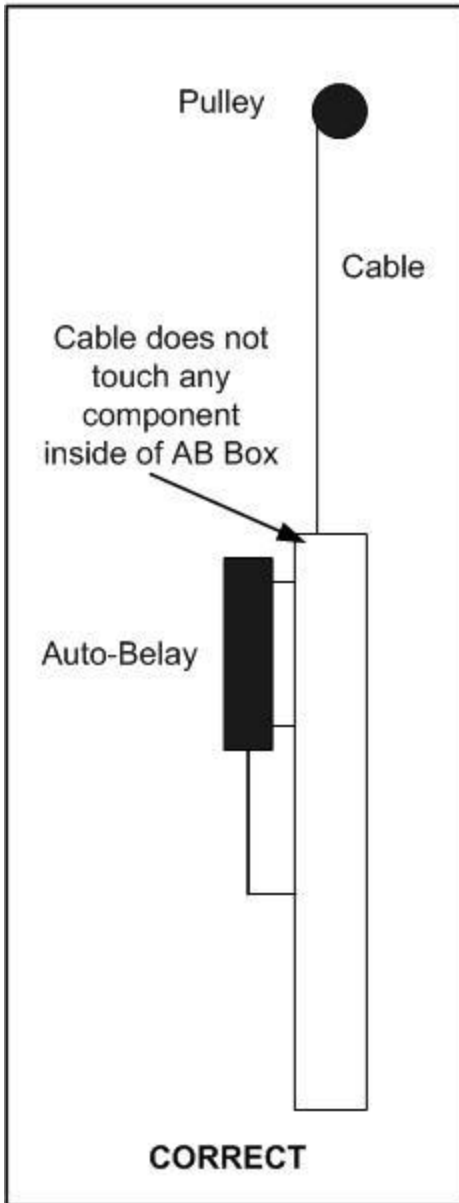
## 3. Auto-belay/Cable/Pulley Alignment

### Front View



# Auto-Belay Installation Techniques

## Side View



# Auto-Belay Installation Techniques

## 4. Angle Iron Crossbeams And Clamp Plate Attachment



# Auto-Belay Installation Techniques

## 4.1. Attach Bottom Angle Iron

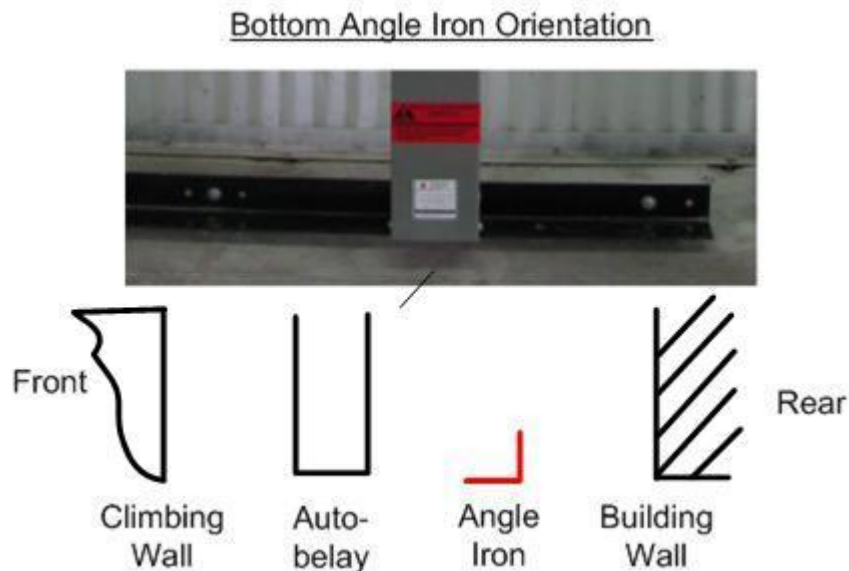
### ➤ Torque Specifications:

- **Grade 5 Bolt: 3/8-16: 33 ft-lbs**
- **Grade 5 Bolt: 1/2-13: 78 ft-lbs**

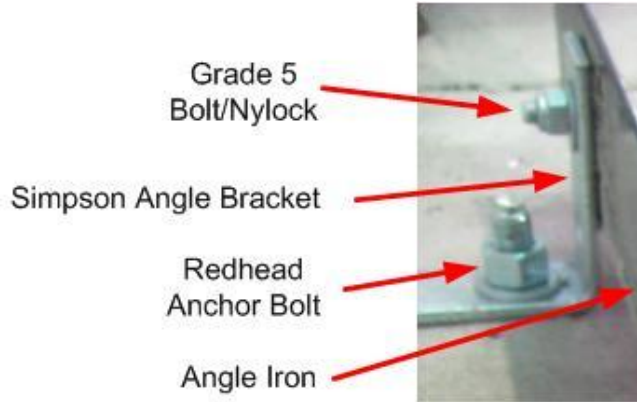
There are various methods which can be utilized to attach the bottom angle iron to the building wall or floor. When attaching into concrete floors or solid concrete walls, use 1/2" x 4 1/4" Redhead Anchor Bolts. The minimum spacing between anchor bolts into a concrete surface is 18". Follow the anchor bolt manufacturer's instructions when installing anchor bolts.

The bottom angle iron must be attached to structurally solid mount points on either the floor or wall. The bottom angle iron can be attached directly on the floor surface or raised up off of the floor using various brackets for attaching. When utilizing the clamp plate installation, all forces are applied to the top angle iron. The bottom angle iron's purpose is to keep the Auto-belay properly oriented and provide additional stability of the Auto-belay during usage.

In the following example, the angle iron has been attached to a concrete floor using Simpson Angle Brackets. This method of attachment provides spacing between the Auto-belay/angle iron and the floor. The Simpson Angle Brackets are attached to the concrete floor with the 1/2" x 4 1/4" Redhead Anchor Bolts. The angle iron is bolted to the Simpson Angle Brackets with 1/2" Grade 5 bolts, washers and nylock nuts.



## Auto-Belay Installation Techniques



### 4.2. Attach Top Angle Iron To Building Wall

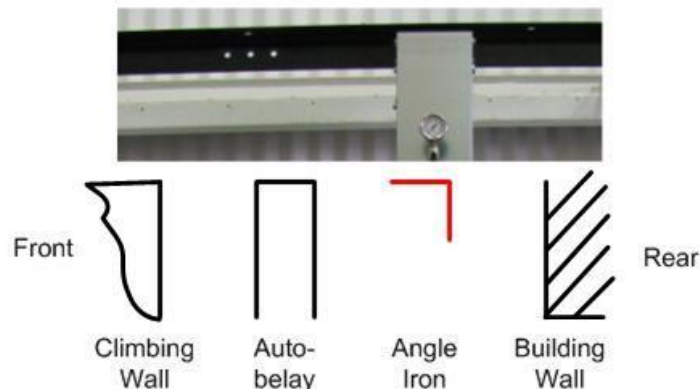
#### ➤ Torque Specifications:

- **Grade 5 Bolt: 3/8-16: 33 ft-lbs**
- **Grade 5 Bolt: 1/2-13: 78 ft-lbs**

There are various methods which can be utilized to attach the top angle iron to the building wall. When utilizing the clamp plate attachment technique, the top angle iron must be structurally solid and non-moveable. Under normal usage, all forces are applied to the top angle iron mount points. Thus, it is critical that the top angle iron be solidly mounted. If the top angle iron begins to flex up and down during usage, this can potentially cause the Auto-belay to become loose between the top and bottom angle iron mount points. Should this happen, the Auto-belay may shift from its proper location and can lead to operational issues, excessive wear on the cable pulleys and potentially allow the cable to rub on Auto-belay components.

When attaching into solid concrete walls, use 1/2" x 4 1/4" Redhead Anchor Bolts. Follow the anchor bolt manufacturer's instructions when installing anchor bolts. The minimum spacing between anchor bolts into a concrete surface is 18".

#### Top Angle Iron Orientation



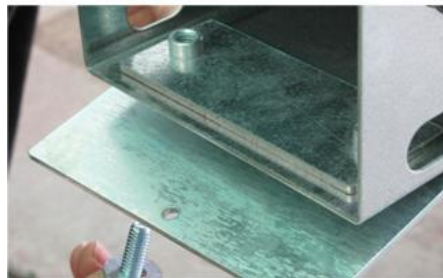
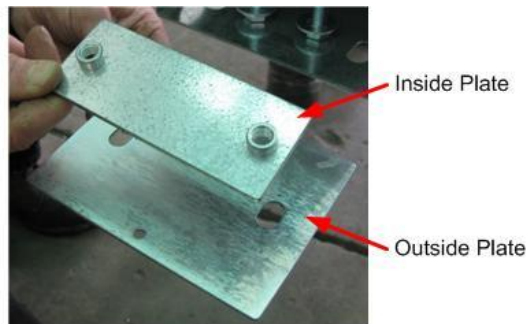
## Auto-Belay Installation Techniques

### 4.3. Attach Auto-belay To Angle Iron With Mount Clamp Plates

➤ **Torque Specifications:**

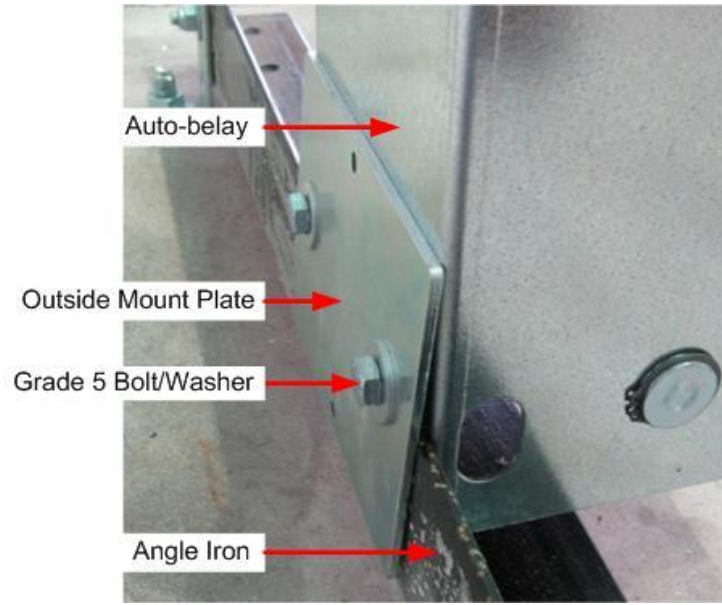
- **Grade 5 Bolt: 3/8-16: 33 ft-lbs**

The Auto-belay is attached to the top and bottom angle iron with the Auto-belay mount clamp plates. The small plate with the pem-nuts (rivet nuts) goes inside the Auto-belay box. The large plate goes on the back side of the Auto-belay and angle iron. The orientation of the clamp plates is shown in the following picture.

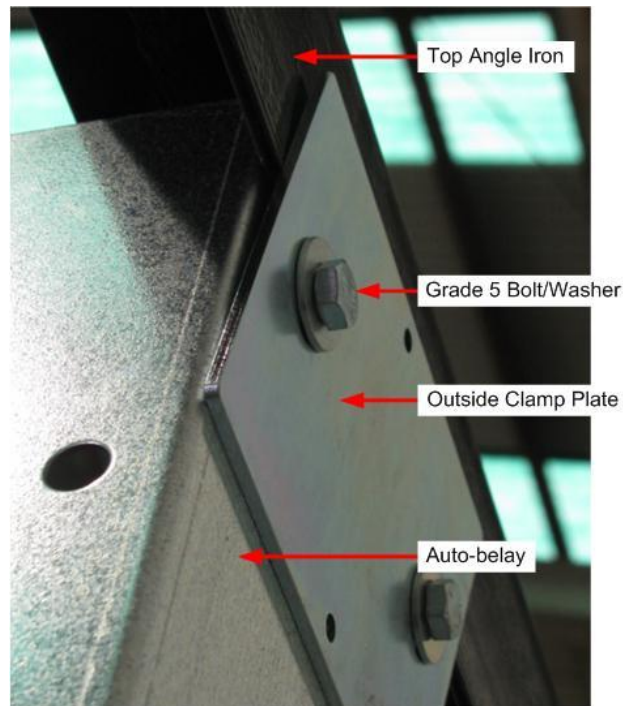


Loosely attach the clamp plates to the bottom of the Auto-belay. Lift and position the Auto-belay onto the bottom angle iron as seen in the following picture.

## Auto-Belay Installation Techniques



Once the Auto-belay is resting on the bottom angle iron, loosely attach the top clamp plates to the top angle iron. Do not tighten the top and bottom clamp plates until the proper alignment (reference section 1) of the Auto-belay has been completed.

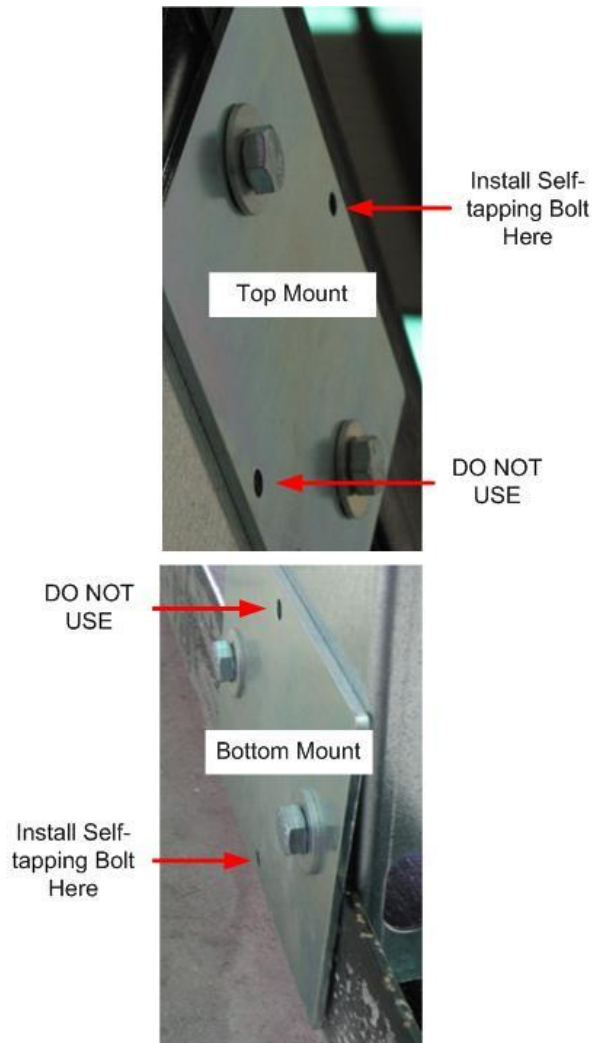


## Auto-Belay Installation Techniques

After completing the davit arm/pulley installation (reference section 5) and the Auto-belay has been properly aligned (reference section 1) the upper and lower clamp plates may now be fully tightened.

### 4.4. Secure Mount Clamp Plates

To prevent side to side movement of the upper and lower mount clamp plates, a self-tapping 1/4" bolt can be installed through the hole in the outside clamp plate and the angle iron. Do not place a self-tapping bolt in the hole of the clamp plate that is touching the Auto-belay box housing.



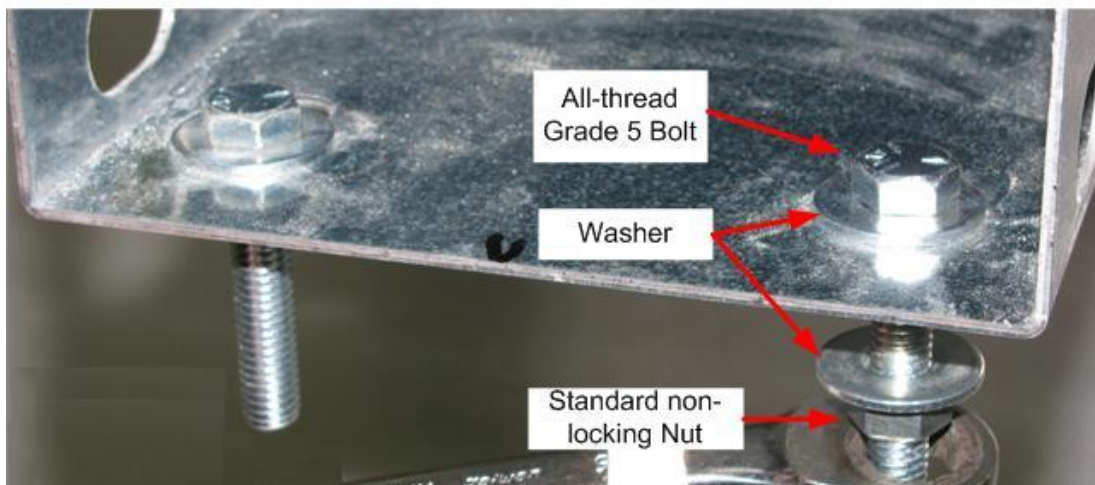
# Auto-Belay Installation Techniques

## 5. Thru-bolt Mount

### ➤ Torque Specifications:

- **Grade 5 Bolt: 3/8-16: 33 ft-lbs**

If the Auto-belay needs to be attached behind the Angle Iron Crossbeams, a Thru-bolt mount can be created providing an easier attachment method. This is accomplished by attaching all-thread 3/8-16 grade 5 bolts to the Auto-belay with a non locking nut. Then insert the threaded part of the bolts attached to the auto-belay through the holes in the Angle Iron. Complete the Auto-belay attachment to the Angle Iron with washer and nylock nut.



## Auto-Belay Installation Techniques



## Auto-Belay Installation Techniques



# Auto-Belay Installation Techniques

## 6. Unistrut And Structural I-Beam



# Auto-Belay Installation Techniques

## 6.1. Attach Unistrut to Auto-belay

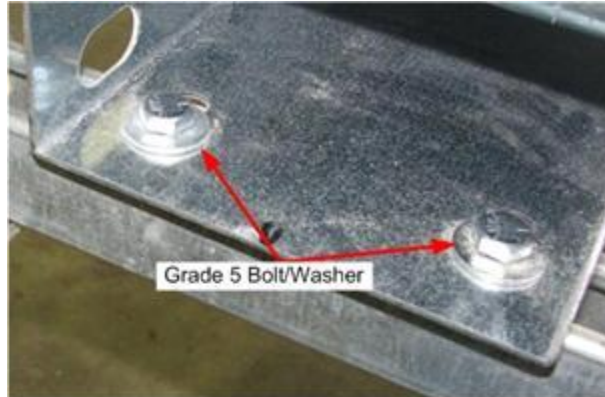
### ➤ Torque Specifications:

- **Grade 5 Bolt: 3/8-16: 33 ft-lbs**

The minimum gauge of Unistrut required for attaching Auto-belays is 1-5/8" x 1-5/8" x 12 gauge. There are several attachment brackets, nuts, etc. made specifically for Unistrut.

To facilitate an easier installation, attach the Unistrut to the Auto-belay first. Attach a proper length piece of Unistrut to each end of the Auto-belay using two 3/8-16 grade 5 bolts, washers and Unistrut Spring nuts.

## Auto-Belay Installation Techniques



Unistrut  
Spring Nut



Unistrut Spring Nut  
inserted inside  
Unistrut



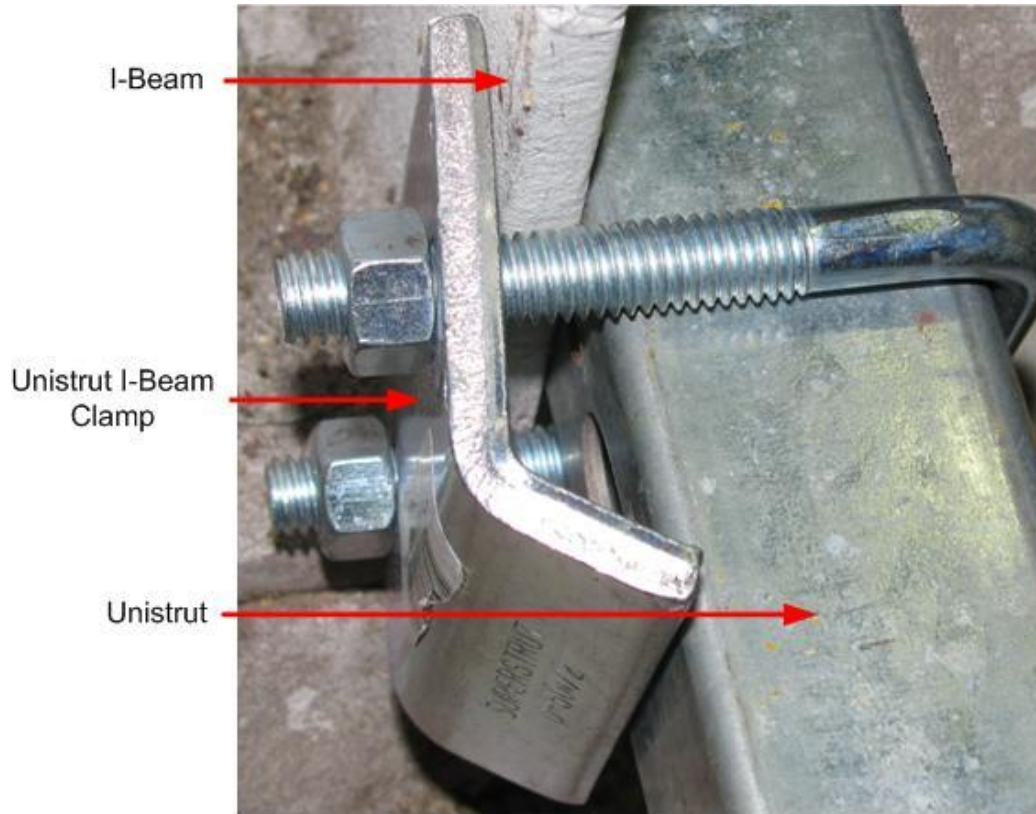
### 6.2. Attach Unistrut to Structural I-Beam

#### ➤ Torque Specifications:

- **Grade 5 Unistrut Clamp U-Bolt: 3/8-16: 33 ft-lbs**

There are Unistrut Clamps made specifically for attaching Unistrut to building structural I-Beams available where Unistrut is sold.

## Auto-Belay Installation Techniques



### 7. Davit Arms and Pulleys

## Auto-Belay Installation Techniques



# Auto-Belay Installation Techniques

## 7.1. Attach Davit Arm to Structural I-Beam

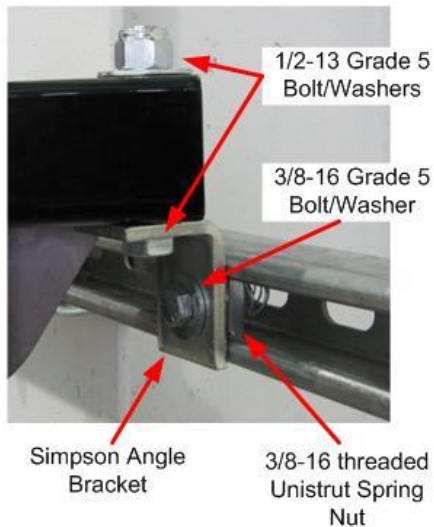
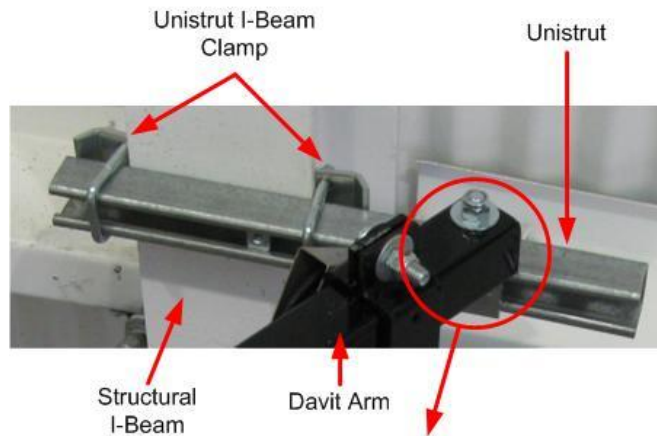
There are various methods which can be utilized to attach the davit arms for running the Auto-belay cables up and over from behind to the outside of the climbing wall surface. Davit Arm attachment requires a solid mount point in the area where the arm extends over the top of the climbing wall surface/framing as this area is where the forces are applied during use.

### 7.1.1. Using Unistrut

➤ **Torque Specifications:**

- **Grade 5 Bolt: 3/8-16: 33 ft-lbs**
- **Grade 5 Bolt: 1/2-13: 78 ft-lbs**

This example utilizes Unistrut, Unistrut I-Beam Clamps, Unistrut Spring Nut and Simpson Angle Brackets to attach the rear of the Davit Arm to the I-Beam.



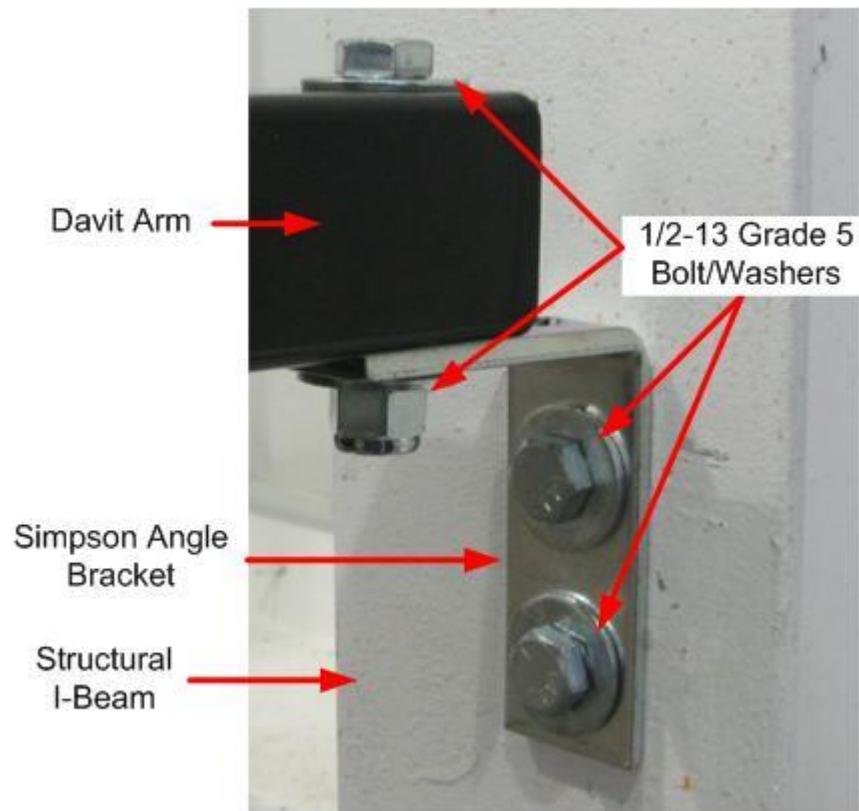
## Auto-Belay Installation Techniques

### 7.1.2. Simpson Bracket Attached to Structural I-Beam.

➤ **Torque Specifications:**

- **Grade 5 Bolt: 3/8-16: 33 ft-lbs**
- **Grade 5 Bolt: 1/2-13: 78 ft-lbs**

This example demonstrates bolting a Simpson Angle Bracket directly to the Structural I-Beam.



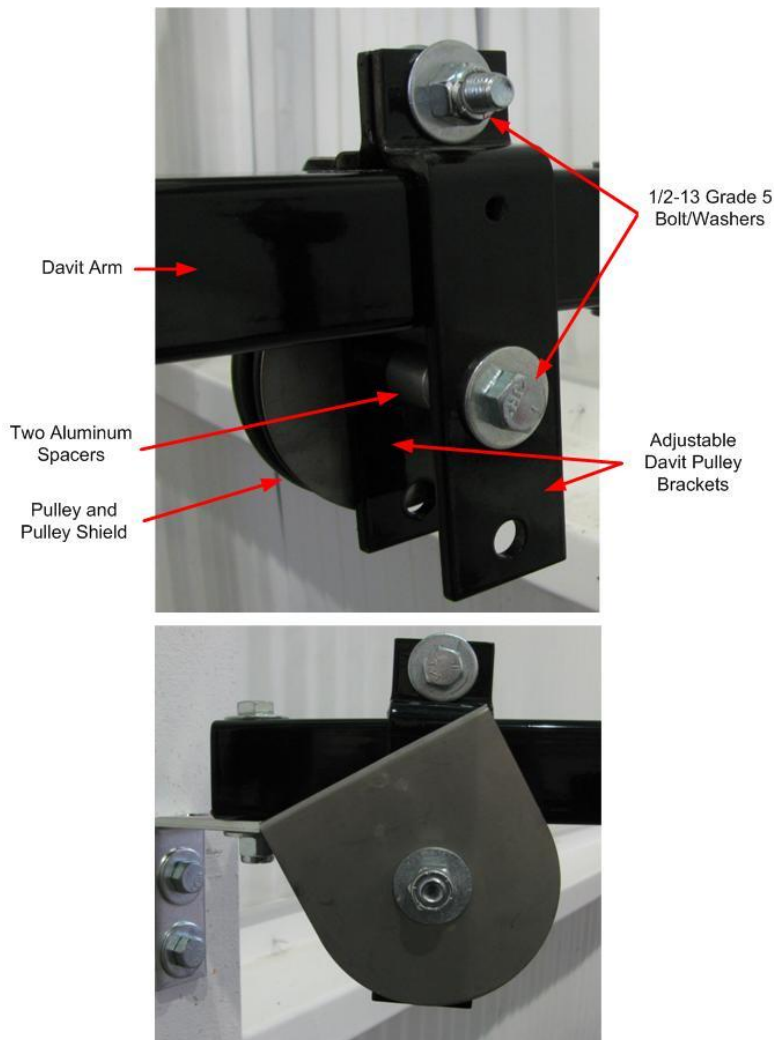
# Auto-Belay Installation Techniques

## 7.2. Attach Rear Davit Pulley To Davit Arm

➤ **Torque Specifications:**

- **Grade 5 Bolt: 3/8-16: 33 ft-lbs**
- **Grade 5 Bolt: 1/2-13: 78 ft-lbs**

The rear davit pulley is attached with the adjustable Davit Pulley Brackets. Using the adjustable brackets allows positioning of the pulley for aligning the cable with the auto-belay. Install the rear davit assembly and tighten enough to hold the cable and pulley assembly in place. The assembly can be slid backwards or forwards as necessary to align the cable with the Auto-belay. Reference section 1 for proper Auto-belay alignment. Once the alignment is completed, complete the tightening of the adjustable bracket bolts and install a self-tapping 1/4" bolt into the lockdown hole in the adjustable bracket. The self-tapping bolt will prevent the brackets from sliding on the Davit Arm.

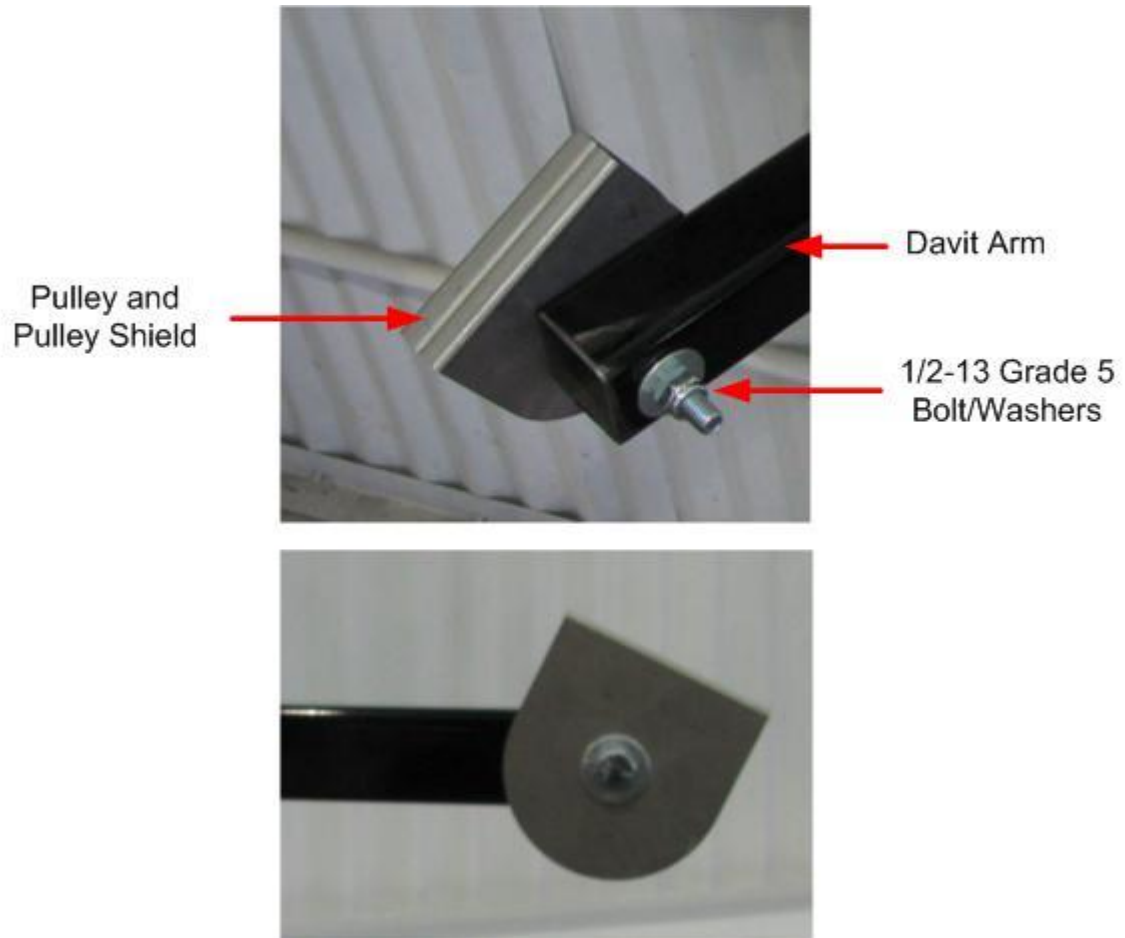


## Auto-Belay Installation Techniques

### 7.3. Attach Front Davit Pulley To Davit Arm

➤ **Torque Specifications:**

- **Grade 5 Bolt: 1/2-13: 78 ft-lbs**



# Auto-Belay Installation Techniques

## 8. Auto-belay Cable Length Calculation

