

UPM 12XHD, 12XHD Custom, 15X, 18X



PIVOT CAP: 9 1/4" O.D. 15" TALL PIPE SOCKET

CENTER TUBE: 5" X 5" X 3/16", LENGTH IS 52" (12XHD), 60" (15X) OR 5" X 5" X 1/4" X 68" (18X) STEEL SQUARE TUBE

CROSS PIECE: 3 1/2" X 3 1/2" X 3/16", LENGTH IS 58" (12X, 15X) OR 3 1/2" X 3 1/2" X 1/4" X 68" (18X), SQUARE TUBE – 2 PLACES

LONGITUDINAL: 3" X 3" X 3/16", LENGTH DEPENDENT ON MODULE USED, SQUARE TUBE – 2 PLACES

ALUMINUM RAILS: 3" X 1 1/2" X 3/16" PUNCHED ALUMINUM ANGLE (12X) OR 3" X 1.3" X 1.5" PUNCHED ALUMINUM CHANNEL (12X, 15X, 18X) LENGTH DEPENDENT ON MODULE USED – 2 OR 3 SETS DEPENDING ON MOUNT.

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Standard Pivot Cap sized for 8" schedule 40 or 80 Pipe Depending on Mount

		REVISION:
		02.09.16

www.generalspecialtiesmfg.com

208-265-5244

Materials

Box #	Item
Box #1	Pivot Cap, hardware bag #1
Box #2	Crosspiece (1 of 2)
Box #3	Crosspiece (2 of 2)
Box #4	Center tube, telestrut and telestrut bracket, winch and pulley, winch foundation and bracket, hardware bags #2-7 (for 12X HD Custom, 15X, 18X) and bag #8 (for 12X HD or 12XHD Custom with aluminum angle rails <i>only</i> , all others have aluminum channel rails and don't require these brackets)
Box #5	Longitudinal (1 of 2)
Box #6	Longitudinal (2 of 2)
Box #7 Box #8 Box #9	Rails: Either aluminum channel or angle depending on model ordered (only 1 rail box for 12X HD. 2 rail boxes for 12X HD custom. 3 boxes for 15X, 18X)

Hardware Packets:

Bag #1:

- For Pivot Cap

Bag #2:

- For Center tube to Crosspieces

Bag #3:

- For Crosspieces to Longitudinals

Bag #4:

- For Telestrut bracket to Longitudinals

Bag #5:

- For Winch to Winch Foundation and Winch bracket to post

Bag #6:

- For Longitudinals to Brackets/Rails

Bag #7:

- For Panels to Rails
- Instructions

Bag #8:

- For 12X HD & 12XHD Custom with angle rails only - brackets for Rails to Longitudinals

Recommendations for Dimensions of Post Hole for Standard Installation of General Specialties Manufacturing Top of Pole Mounts

UPM Model	Depth of Hole	Width of Square Hole / Cubic Yards of concrete needed	Diameter of Round Hole / Cubic Yards of concrete needed
All 12XHD	85"	42" / 3.21 CY	52" / 3.86 CY
All 15X	90"	46" / 4 CY	57" / 4.92 CY
All 18X	96"	46" / 4.35 CY	57" / 5.25 CY

Your building department may require the foundation for a PV array post mount to be designed by a structural engineer licensed in the state where the PV array is to be erected. This is required because failure of a post mount foundation may be a threat to the safety of people and property in its proximity. At a minimum, failure will result in costly damage to the PV modules. The foundation described here is suitable for most soil types, but no warranty of its suitability for your particular soil or wind conditions is offered or implied.

If you are unable to dig holes of these dimensions because you encounter bed rock or if you have very loamy or loose sandy soil, (get the recommendation of a soil engineer or building department), then you may have to seek a design for an alternative foundation construction.

For type and size of pole to install in concrete foundation, refer to chart below.

General Specialties Recommendations for Pole Height and Dimension for Top of Pole Mounts

We cannot guarantee a standard 1.67 safety factor if these recommendations are not observed. Since we cannot assess each customer's individual site and conditions, a professional installer and the local building department should be consulted for the safest and most effective installation.

UPM Model	Post Size (sch = schedule, or thickness of pipe wall)	Max Pole Height above concrete Base w/array @ 45° tilt	Clearance between top of concrete and lowest point on array @ 45° tilt	Max Pole Height above concrete base w/array @ 60° tilt	Clearance between top of concrete and lowest point on array @ 60° tilt	Max Pole Height above concrete base w/array @ 90° tilt See Footnote 2	Clearance between top of concrete and lowest point on array @ 90° tilt See Footnote 2
UPM12XHD 9 Modules: 6 rails, 3 columns of 3 panels Standard stock tee socket size 8", optional upgrade to 10" available	8" sch 40 8 5/8" OD	10' 6"	7' 6"	8' 6"	4' 10"	7' 4"	11"
	8" sch 80 8 5/8" OD	15' 9"	12' 9"	12' 9"	9' 1"	11'	6' 3"
	10" sch 40 10 3/4" OD	19' 3"	16' 3"	15' 9"	12' 1"	13' 6"	8' 9"
	10" sch 80 10 3/4" OD	21'	18'	21'	17' 4"	20'	15' 3"
UPM12XHD 10 Modules: 6 rails, 3 columns of 3,4,3 panels Standard stock tee socket size 8", optional upgrade to 10" available	No 8" sch 40						
	8" Sch 80 8 5/8" OD	14'	9' 9"	11' 6"	6' 2"	9' 9"	3' 4"
	10" sch 40 10 3/4" OD	17' 3"	13'	14' 2"	8' 6"	12' 3"	5' 10"
	10" sch 80 10 3/4" OD	21'	16' 9"	21'	15' 8"	18' 9"	12' 4"

UPM Model	Post Size (sch = schedule, or thickness of pipe wall)	Max Pole Height above concrete Base w/array @ 45° tilt	Clearance between top of concrete and lowest point on array @ 45° tilt	Max Pole Height above concrete base w/array @ 60° tilt	Clearance between top of concrete and lowest point on array @ 60° tilt	Max Pole Height above concrete base w/array @ 90° tilt See Footnote 2	Clearance between top of concrete and lowest point on array @ 90° tilt See Footnote 2
UPM12XHD Custom 8 Modules: 4 rails, 2 columns of 4 panels Standard stock tee socket size 8", optional upgrade to 10" available	No 8" sch 40 8" Sch 80 8 5/8" OD 10" sch 40 10 3/4" OD 10" sch 80 10 3/4" OD	15' 3" 18' 9" 21'	11' 14' 6" 16' 9"	12' 5" 15' 3" 20'	7' 1" 9' 11" 14' 8"	10' 8" 13' 20'	4' 8" 6' 7" 13' 7"
UPM15X 12 Modules: 6 rails, 3 columns of 4 panels Standard stock tee socket size 8", optional upgrade to 10" available	No 8" sch 40 8" Sch 80 8 5/8" OD 10" sch 40 10 3/4" OD 10" sch 80 10 3/4" OD	11' 9" 14' 6" 21'	7' 6" 10' 3" 16' 9"	9' 6" 11' 9" 18' 3"	4' 2" 6' 5" 12' 11"	8' 3" 10' 15' 8"	1' 10" 3' 7" 9' 3"
UPM15X 10 Modules: 6 rails, 3 columns of 3,4,3 panels Standard stock tee socket size 8", optional upgrade to 10" available	No 8" sch 40 8" Sch 80 8 5/8" OD 10" sch 40 10 3/4" OD 10" sch 80 10 3/4" OD	12' 3" 14' 9" 21'	9' 3" 11' 9" 18'	9' 9" 12' 2" 18' 9"	4' 5" 6' 10" 13' 5"	8' 6" 10' 6" 16' 3"	2' 1" 4' 1" 9' 10"
UPM18X 15 Modules: 6 rails, 3 columns of 5 panels Standard stock tee socket size 8", optional upgrade to 10" available	No 8" sch 40 8" Sch 80 8 5/8" OD 10" sch 40 10 3/4" OD 10" sch 80 10 3/4" OD	9' 3" 11' 5" 17' 9"	4' 6' 2" 12' 6"	7' 6" 9' 3" 14' 3"	1' 2" 2' 10" 7' 10"	See footnote 1 See footnote 1 12' 3"	See footnote 1 See footnote 1 4' 7"
UPM18X 12 Modules: 6 rails, 3 columns of 4 panels Standard stock tee socket size 8", optional upgrade to 10" available	No 8" sch 40 8" Sch 80 8 5/8" OD 10" sch 40 10 3/4" OD 10" sch 80 10 3/4" OD	10' 12' 4" 19' 3"	5' 9" 8' 1" 15'	8' 2" 10' 15' 6"	2' 10" 4' 8" 10' 2"	7' 8' 7" 13' 3"	7" 2' 2" 6' 10"

Footnote 1: There is not adequate clearance for these arrays with this size pipe. Use heavier schedule pipe or larger pipe diameter.

NOTE: We do not recommend tilting past 65° without using the optional 90° bracket kit. This kit fastens the array to the pole below the tee top which is the safest and strongest possible attachment for the 90° vertical position. Most mounts do not need to be tilted past 65° unless they are in far north latitudes or in areas with high snow loads.

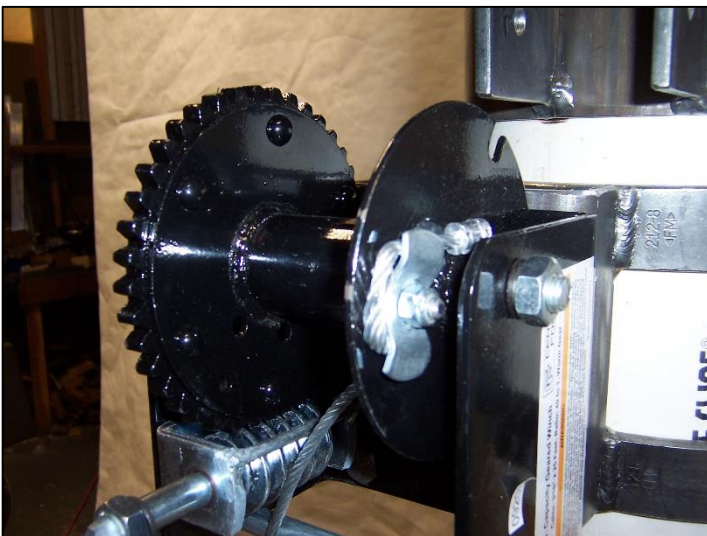
Assembly Instructions

UPM 12XHD, 15X, 18X

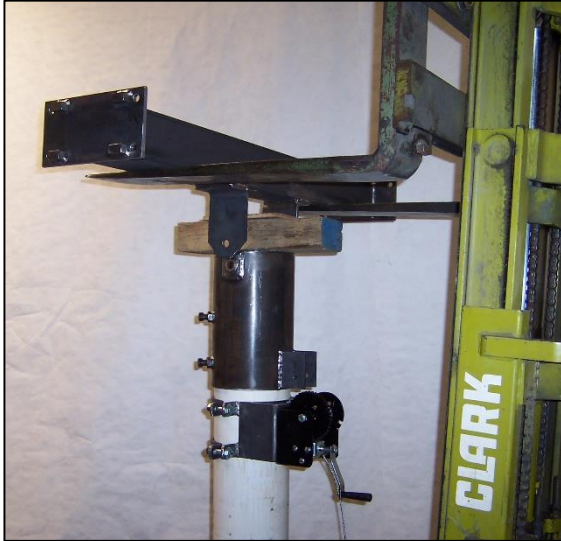


Place pivot cap on top of steel post. Orient pivot bore with bronze bushings east and west. The 4 set bolt nuts should face south. Secure the pivot cap with $\frac{3}{4}$ " square head set bolts.

It is essential that you bolt the winch foundation/bracket to post approximately 1" below pivot cap. Use level to center foundation lugs plumb with center of pivot bore. Securely tighten bolts before installing winch.



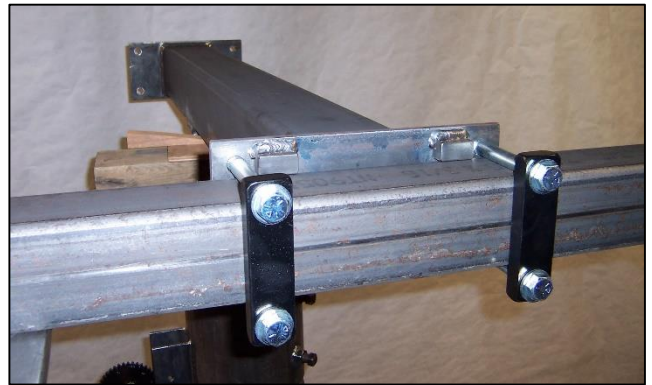
Bolt winch to foundation/bracket with 3 – $\frac{1}{2}$ " bolts. **DO NOT** cut plastic zip ties holding cable yet. Install handle.



Place 4" block of wood on top of pivot cap. Keep 2 wedges handy. This block **MUST NOT BE REMOVED** until telestrut, winch and cable are installed and fully secured. **Severe injury may result if center tube pivots without block or telestrut/winch restraining or controlling it!**

Lower center tube onto pivot cap. Line up holes in the center tube lugs with bore in the cap and insert 13" bolt. Note: 1 washer should be under nyloc nut.

Drive wedges from either side of center tube between block of wood and bottom of center tube. This will further stabilize center tube for the following steps.



Install 2 cross pieces. Make sure small socket head bolts reference either side of center tube end plates. Leave 5/8" x 6" clamp bolts just slightly less than tight to facilitate installing longitudinals in next step.

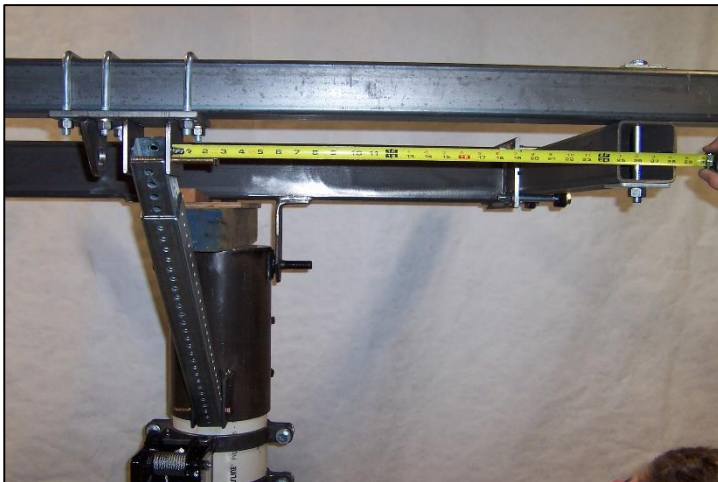
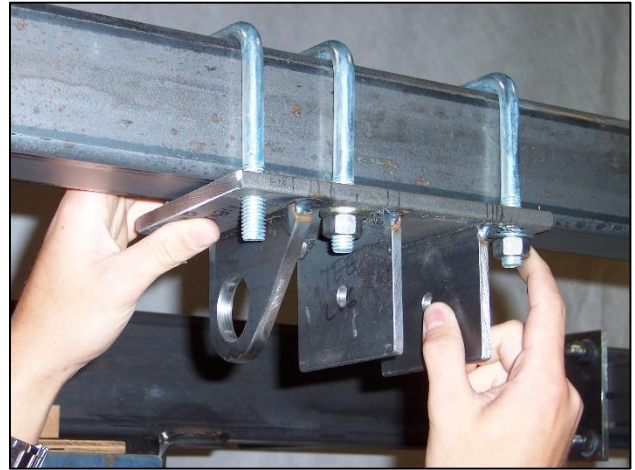
Make sure your wedges are snug! Install longitudinals (2 1/2" sq. washer on top, 3" sq. washer on bottom) with 8" bolts. When both longitudinals are installed, tighten the cross piece clamp bolts and the 4 cross piece/longitudinal connection bolts.





Install the 2 1/4" x 2 1/4" end of telestrut between the lugs on the bottom of the pivot cap. Tighten the nyloc nut all the way.

Bolt telestrut bracket to longitudinal with 3 1/2" sq. u-bolts. The dimension between the "west" lug on the bracket and the inside of the cross piece for your specific mount can be found on the attached table.

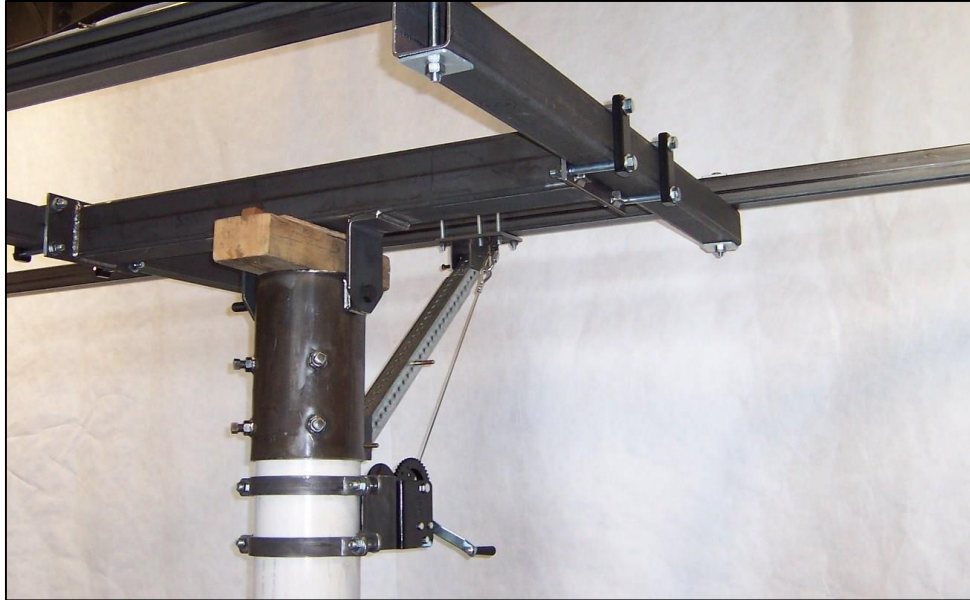


Insert 7/16" bolt through lugs and upper end of telestrut and tighten. Make sure middle bolt is installed through telestrut in the hole that is circled, tighten nyloc onto bolt.



Attach orange pulley to pad eye on telestrut bracket. Thread cable with quick link connector through pulley before closing pulley hanger with 3/8" bolt and nyloc nut. Now attach quick link to hole on left side of winch foundation (see attached Winch Detail).

Fully tighten collar on quick link. Pull tension on cable as it comes off winch drum and cut zip ties. Take up slack in cable by turning winch handle while still holding tension on cable. This will prevent it from jamming in winch drum.



Wind up all the slack. Then it is safe to remove wedges and wood block.



Move the longitudinals as close as possible to horizontal to one another to begin installing rails. 15X and 18X use channel rails and have no brackets. 12XHD uses angle rails and brackets to attach rails to the longitudinals.

Before proceeding, tighten 5/8" bolts at the end plates of center tube. Place 2 aluminum channels or angle on top of the longitudinals. Loosely attach 4 square u-bolts in holes provided at the bottom of the channels, or brackets for angles. Loosely place 2 PV panels on rail and attach to establish rail spacing.



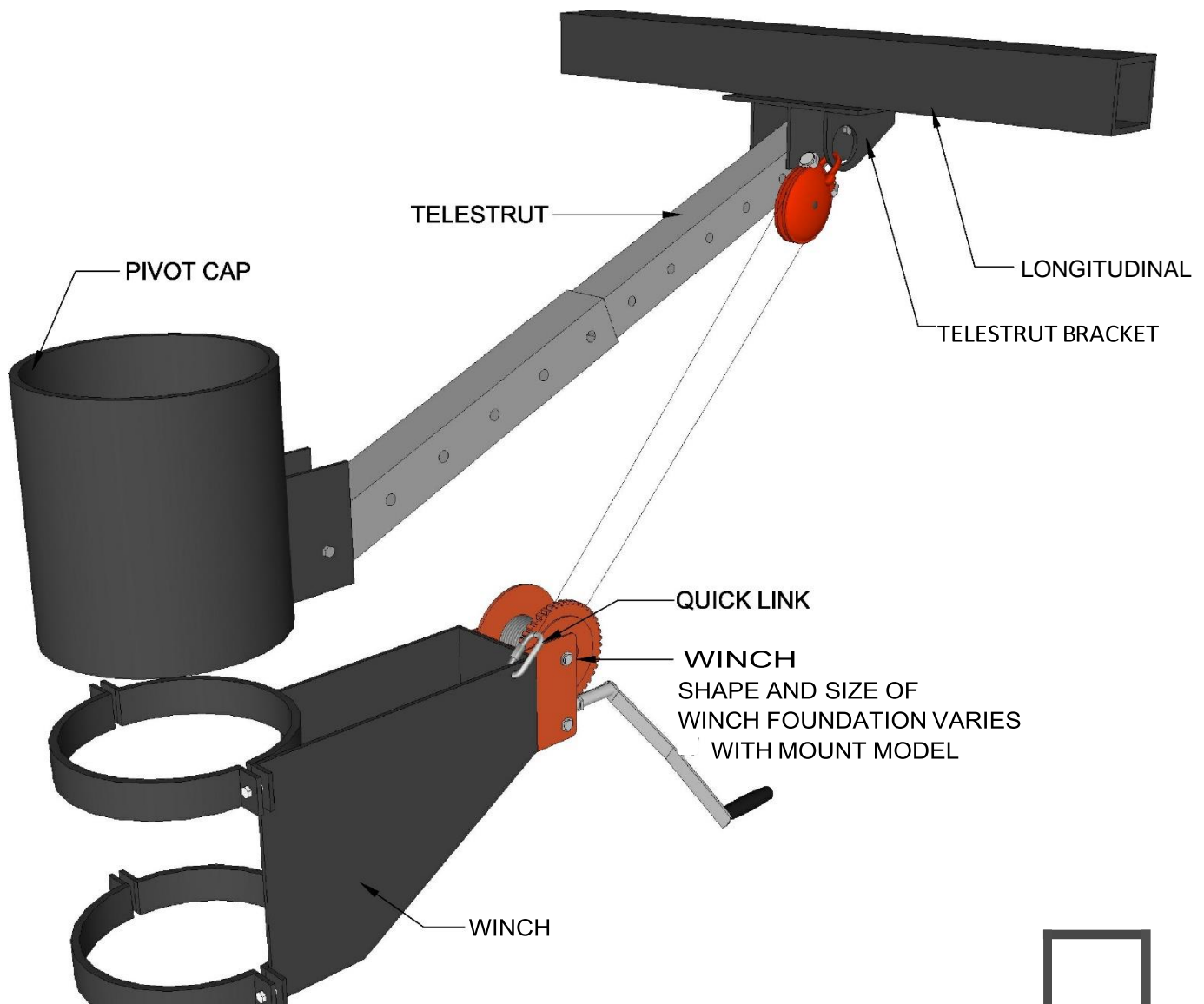
Center rails on longitudinals by equally measuring side to side to longitudinal ends. Then place the rest of the panels on the rails. NOTE: Leave the bolts on the PV panels screwed together but loose for now.



Repeat rail attachment procedure on left and right until all remaining panels are installed. When all panels and spaces are square and even to one another, tighten stainless steel panel bolts and all u-bolt nuts.

Assembly of UPM 12XHD, 12XHD Custom, 15X, 18X

Model	Dimension between telestrut bracket lug and inside of cross piece
UPM 12XHD	24 13/16"
UPM 12XHD Custom	24 13/16"
UPM 15X	28 13/16"
UPM 18X	33 5/16"

**STEP 1**

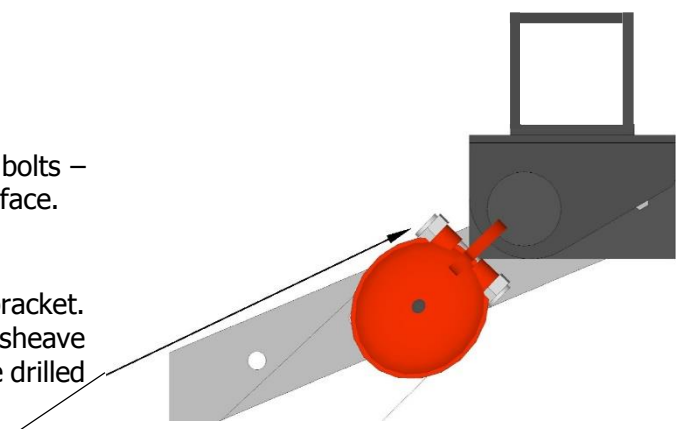
Bolt winch to winch foundation with 3 – 3/8" grade 8 bolts – put flat washer on each side of winch/foundation interface.

STEP 2

Attach red snatch block through "eye" in telestrut bracket. Before closing snatch block thread 1/4" cable around sheave of pulley. Then attach quick link at end of cable to hole drilled in winch foundation. Tighten collar with a wrench.

Be sure to thread nylon nut on closure bolt for snatch block all the way down to end of threads.

Note: At no point should you ever disconnect the telestrut in this system unless you have purchased a 90° tilt kit.

**WINCH DETAIL**

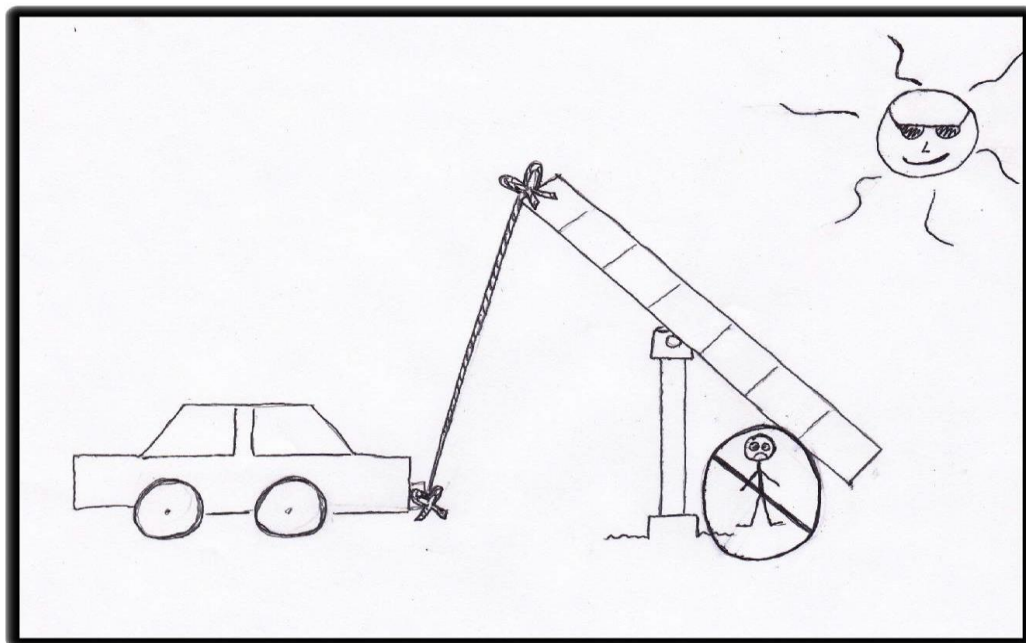
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15X, 18X

REVISION:

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WARNING!!!

Serious Injury or Property Damage
may occur if array shifts while adjusting tilt
angle without a safety line or winch attached and
secured!



DO NOT stand between post and lower side of the array while
seasonally adjusting tilt angle.

AND

Use the winch you purchased with your mount, or tie a safety rope
to top of array and wrap around car bumper or heavy
permanent object to control adjustment of array.

If your mount has set bolts on the tee, tighten them HARD when
you are finished adjusting.