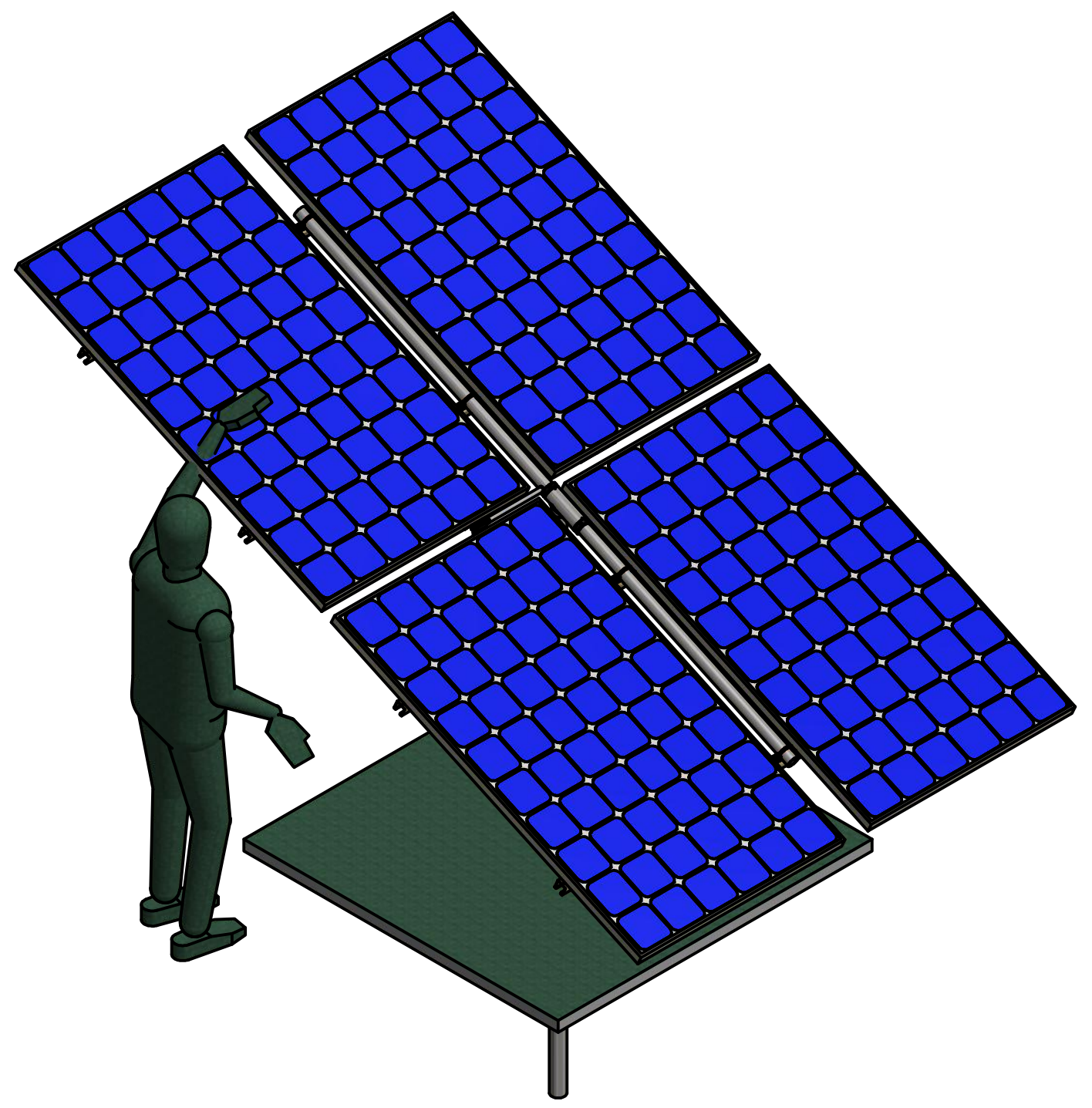
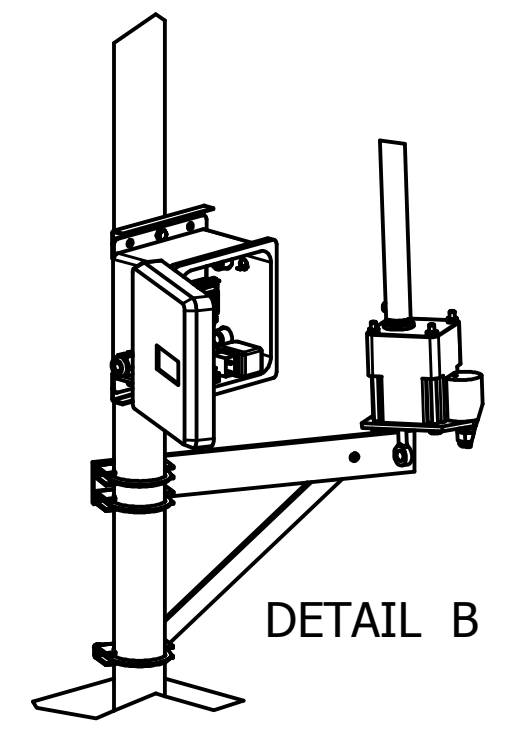
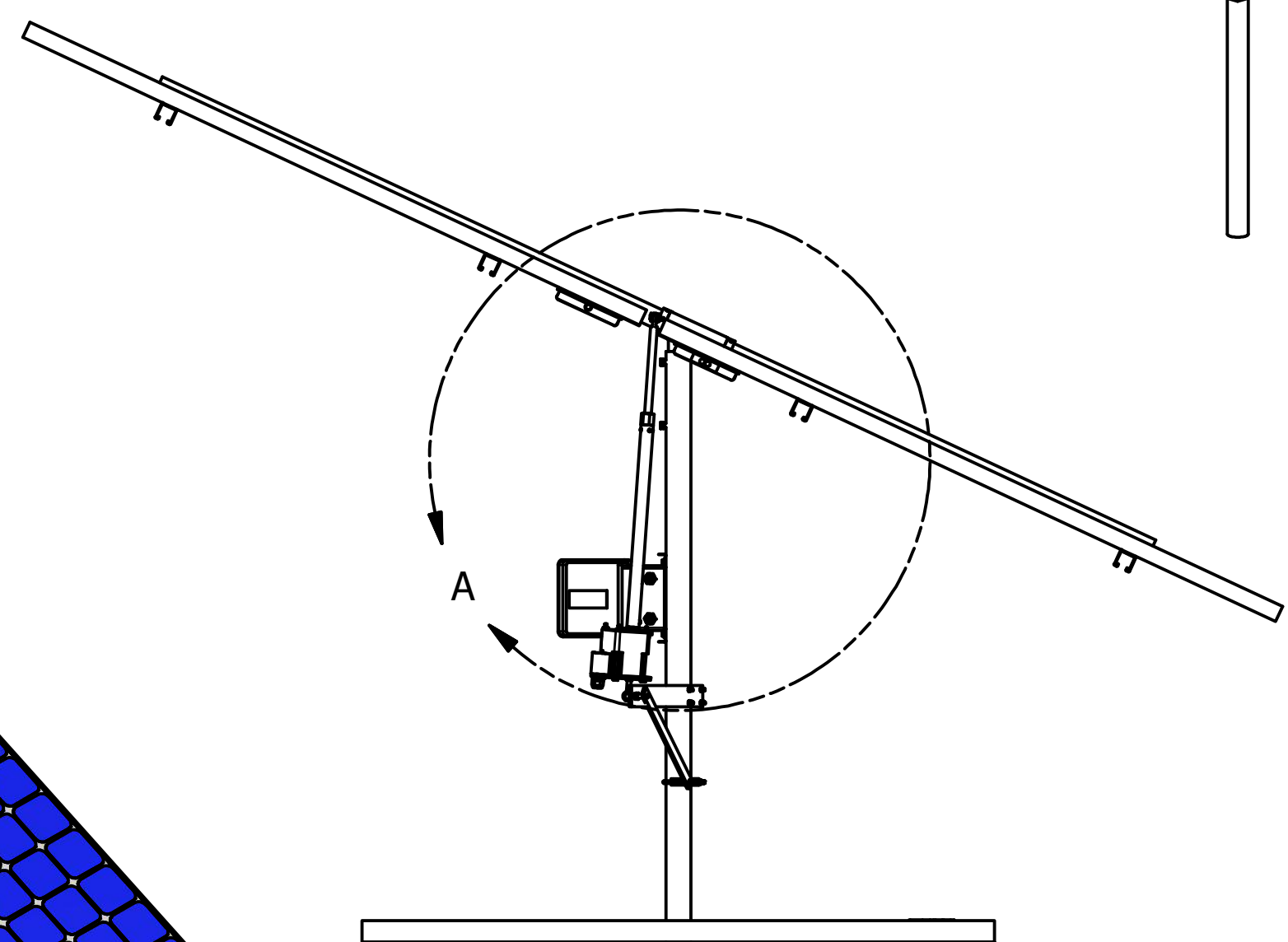
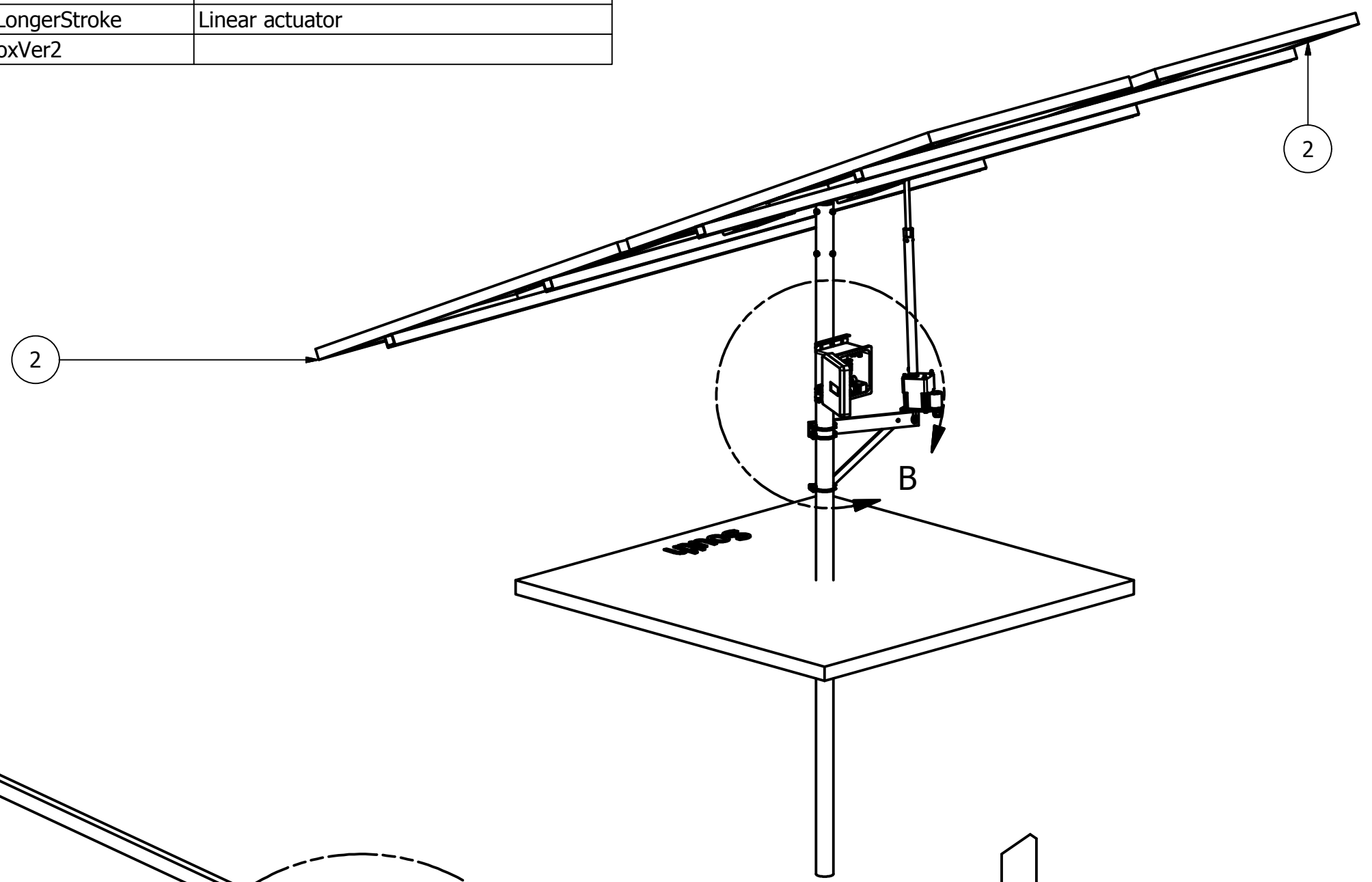
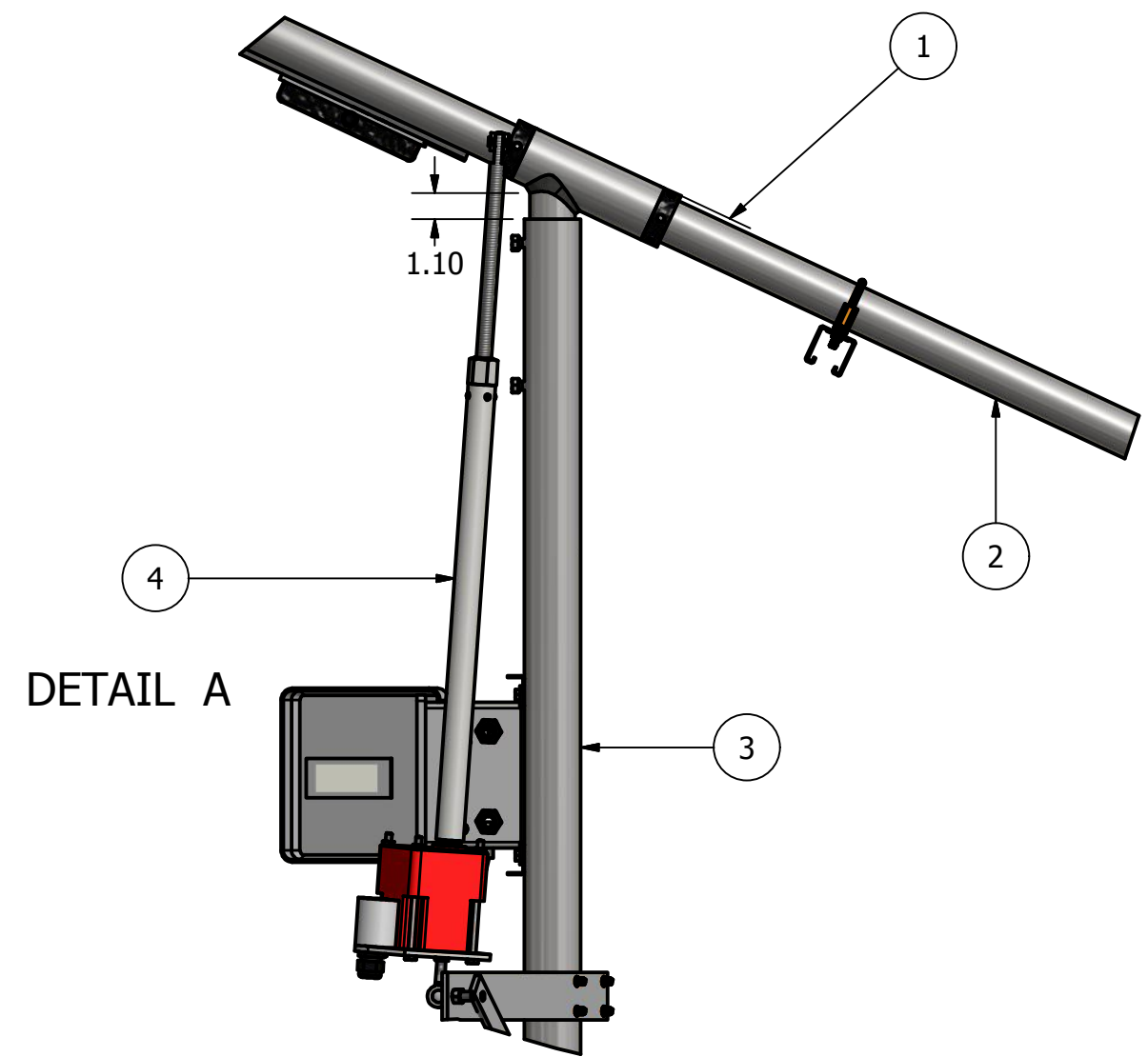


PARTS LIST				
ITEM	QTY	PART NUMBER	DESCRIPTION	
1	1	ColumnTop		
2	1	1Axis_Ver2		
3	1	BaseVer2LinAct		
4	1	ActuatorLongerStroke	Linear actuator	
7	1	ControlBoxVer2		



DRAWN Bill Swann		10/28/2014		Watt-Tracker.com,LLC.	
CHECKED				TITLE	
QA				Overall View	
MFG					
APPROVED					
SIZE	DWG NO	REV			
C	1Axis_Ver2LinAct				
SCALE				SHEET 1 OF 9	

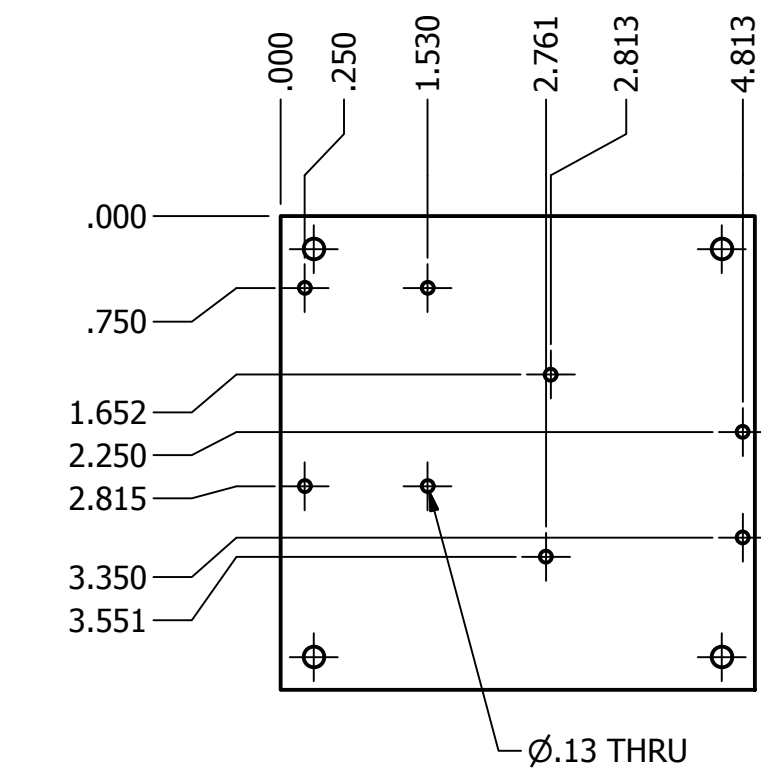
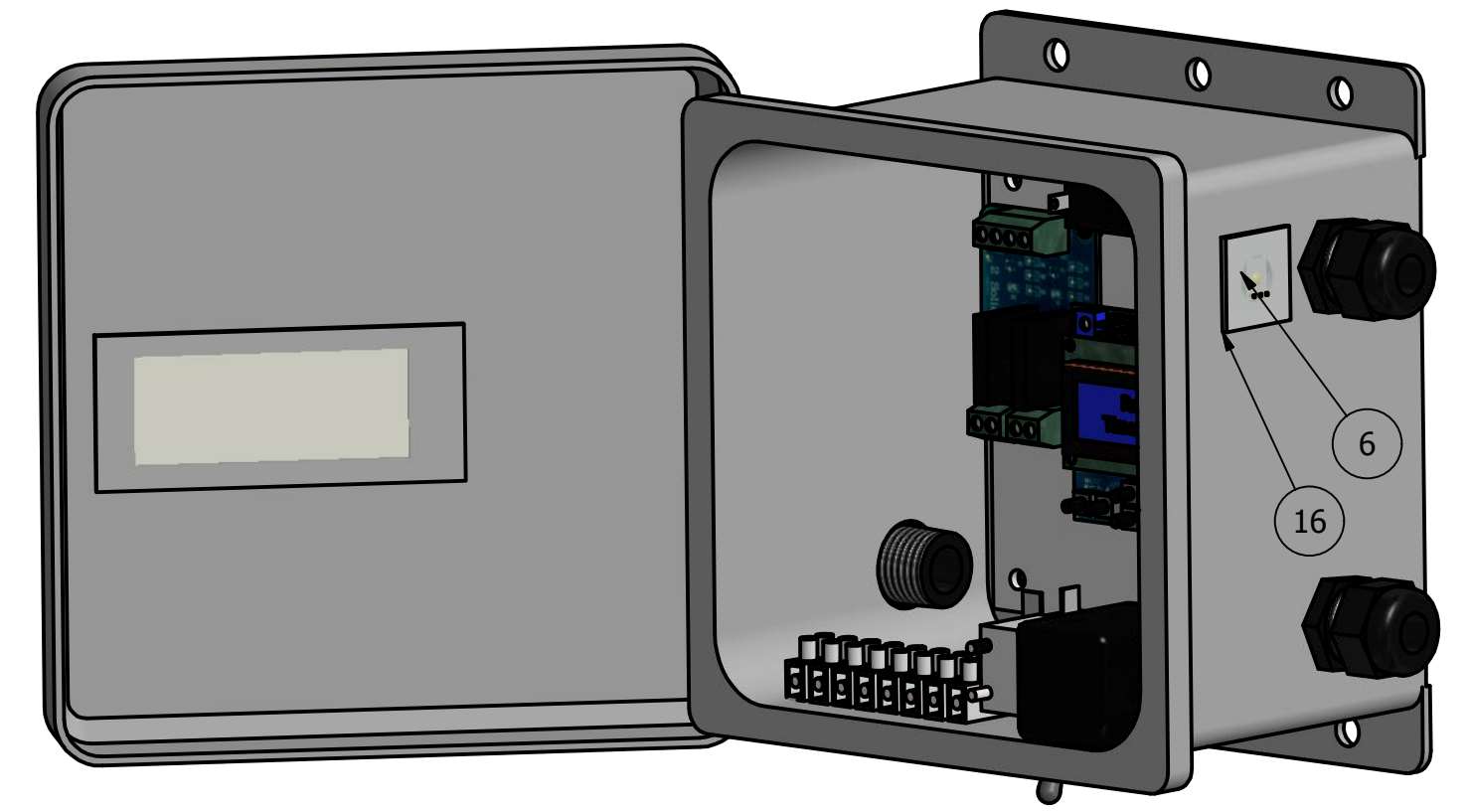
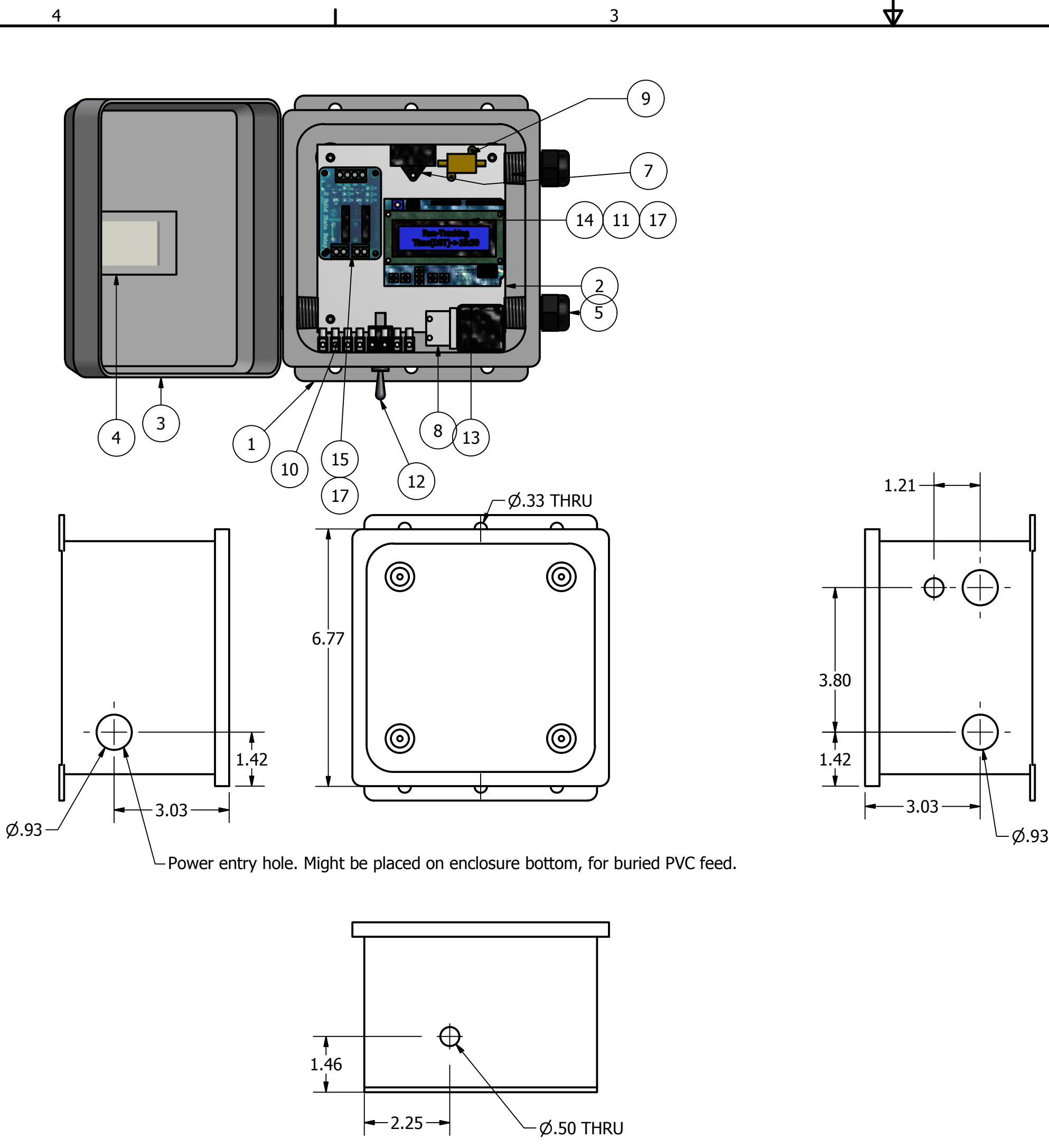
Description, Single Axis tracker

1. The user should be qualified to work with 120 volt / 240 volt systems. The user should follow all code provisions mandated by the building code.
2. This single axis tracker carries 1000 watts of panels with Enphase microinverters. As such, the power connects to a 220 volt, 15 amp breaker in the breaker panel.
The location of the breaker should be on the opposite end of the breaker panel as the 220 volt service feed. Each array will generate 5 amps at 220 volts. If there are more than 2 arrays, the breaker and wire size should be selected accordingly.
3. The array should face south. It is tilted 20° from horizontal, optimizing energy harvested in the summer. The angle could be increased in more northern latitudes. However, the linkage geometry may have to be tweaked, to prevent binding. Since the bottom panels will be closer to the ground, the column embedded depth may need to be decreased.
4. Tracker movement is controlled with an actuator, made from common components. The stroke can also be changed, but change the EMT and threaded rod equally.
Rotation of the motor is controlled with an Arduino UNO Microcontroller or equivalent. In Houston, they are available at Microcenter, or RadioShak. The 110 volts to the motor is controlled by a 2 realy board, available fro EBAY, for \$5. See the electrical schematic.
5. The Arduino code is included. The code is simple, and works as follows: A light sensor is used to keep the Arduino clock accurate.
The array stores at night time in a horizontal position. At the appointed time the array rotates 40 degrees to the east. In 1 hour increments the array rotates 10 degrees to the west. After 8 moves to the west the array again levels itself.
6. Building codes in Houston require a lockable disconnect between the array and the breaker box, to protect a power company linemen in a power outage. Never mind that the inverter, by specification, does not put power on the line in the absense of a grid signal. Never mind that many other states do not require a locakble disconnect. Progress is slow!
One of the hardect tasks in the installation is running the power back to the breaker box. In Houston, it is a buried PVC pipe, in a 18" deep trench.
7. The manufacture of the structure requires cutting steel, and welding, and lathe work. The assembly consists of a post set in concrete, At the top is a 5" section of pipe, that has bearing races machined in - hence making a bearing. Hence the power of the actuator motor is only 8 watts.
8. The synchronous motor is one of the more pricy components. But a used one can be obtained at Ebay fro \$25. A capacitor is required with the motor, and available from Oriental motor.
9. A 3-D CAD model is viewable at http://www.watt-tracker.com/SingleAxis_1000W.html
10. The designer's e mail is william.swann2@gmail.com. E mail me for copy of the Arduino code.

Construction Notes

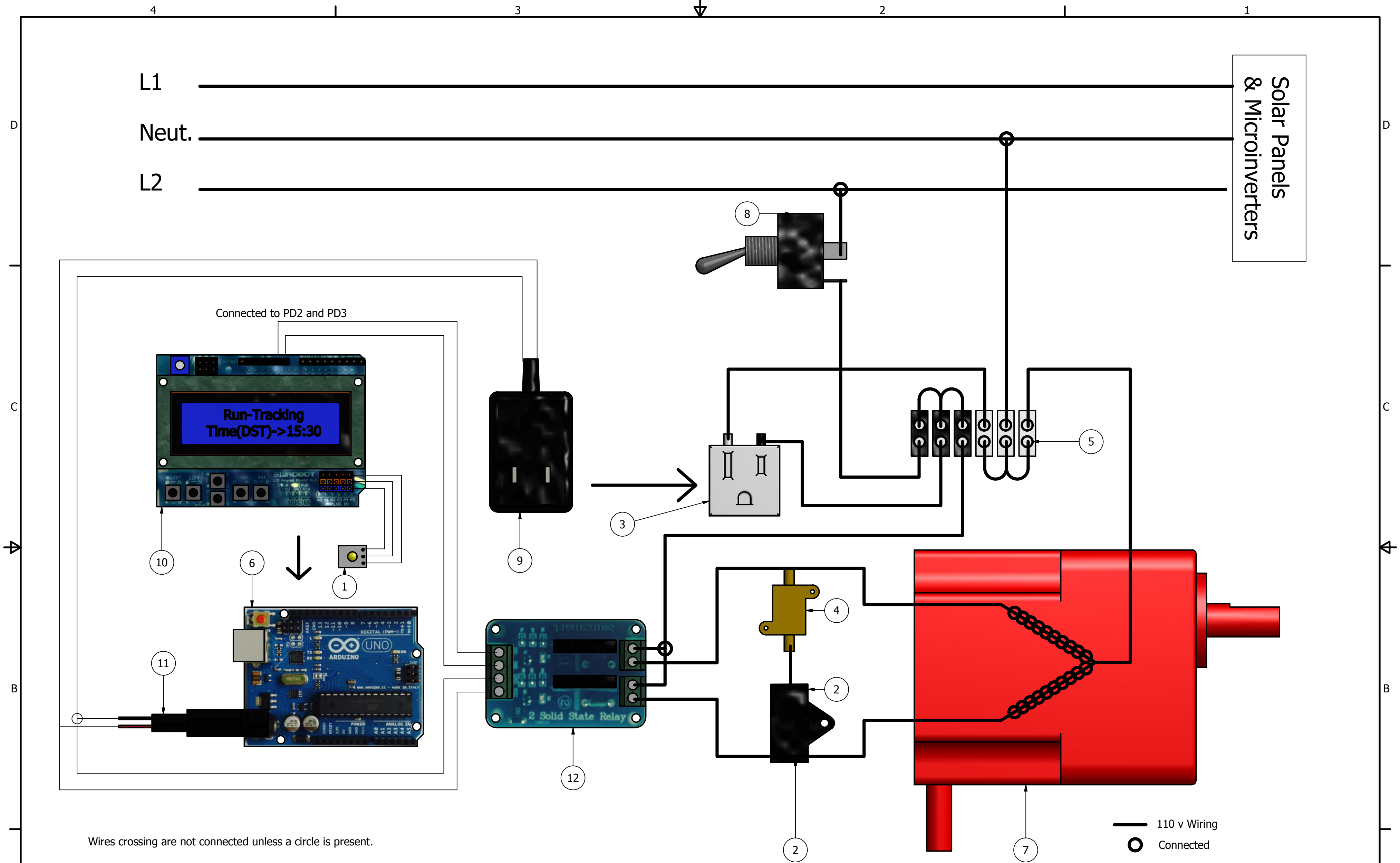
1. Unistrut length: The unistrut, to which the panels are connected, can be any rust resistant material. Substitutions can be galvanized stop sign posts or 1.5"/1.75" square tubing.
Holes may have to be drilled dependent upon the mounting hole locations on the panels and the clamps.
The overall length is also dependent upon the size of the panels.
2. The steel pipe structure should be galvanized also. For the top of pipe "T" weldment, grind off the galvanized coating before welding. Coat the weld with cold galvanized spray paint.
3. All materials should be rust resistant. Fasteners can pe the plated type.
4. When cementing post in ground, face the 2 holes for control panel mounting facing north.
5. Spar length: This may change dependent upon the panels used. The length is slightly longer than the distance between the outer panel mounting holes, for 2 adjacent panels.
6. Column Embedment: For wind loading, the column is imbedded in the ground by 40". Recommend concrete on the bottom Ø12 x 12" high.
And similarly on the top, with the concrete protruding from the ground by a couple of inches. Use a makeshift concrete form for the top.
- 7.

DRAWN Bill Swann	10/28/2014	Watt-Tracker.com,LLC.		
CHECKED				
QA		Assembly Notes		
MFG				
APPROVED		SIZE C	DWG NO 1Axis_Ver2LinAct	REV
		SCALE		SHEET 2 OF 9



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	Vynckier_6_6	
2	1	Vynckier_6_6backPanel	
3	1	Vynckier_6_6Lid	
4	1	PlexiGlasLLCD	
5	3	Heyco_p5NPT	Compact Liquid Tight Chord Grip,Heyco_1/2" NPT
6	1	LightSensor_MD0505	
7	1	Cap_Vexta	Oriental Motor P/N CH06BUL-C
8	1	FemalePlug	Ace Electronics
9	1	PowerResistor	400 ohm, 5-10 Watt
10	1	TerminalStrip_Ace_3P3Bipt	
11	1	UNO	Arduino UNO R3
12	1	Switch_Toggle	
13	1	WallWart_12v_500milAmp_Ace Electronics	WallWart
14	1	OSEPP_LCD_KEYPAD	Osepp LCD and 5 button keypad
15	1	SainSmartSS_Relay	2 amp, Microcenter, 160 mA@5v
16	1	PlexiGlasLightSensor	
17	8	StandOff	

DRAWN Bill Swann	10/28/2014	Watt-Tracker.com, LLC.	
CHECKED		TITLE	
QA		Control Box	
MFG		SIZE C	DWG NO 1Axis_Ver2LinAct
APPROVED		SCALE	REV
		SHEET 3 OF 9	



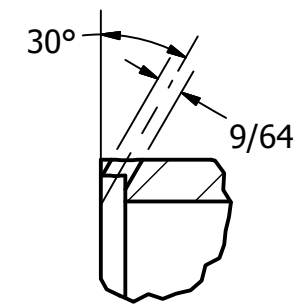
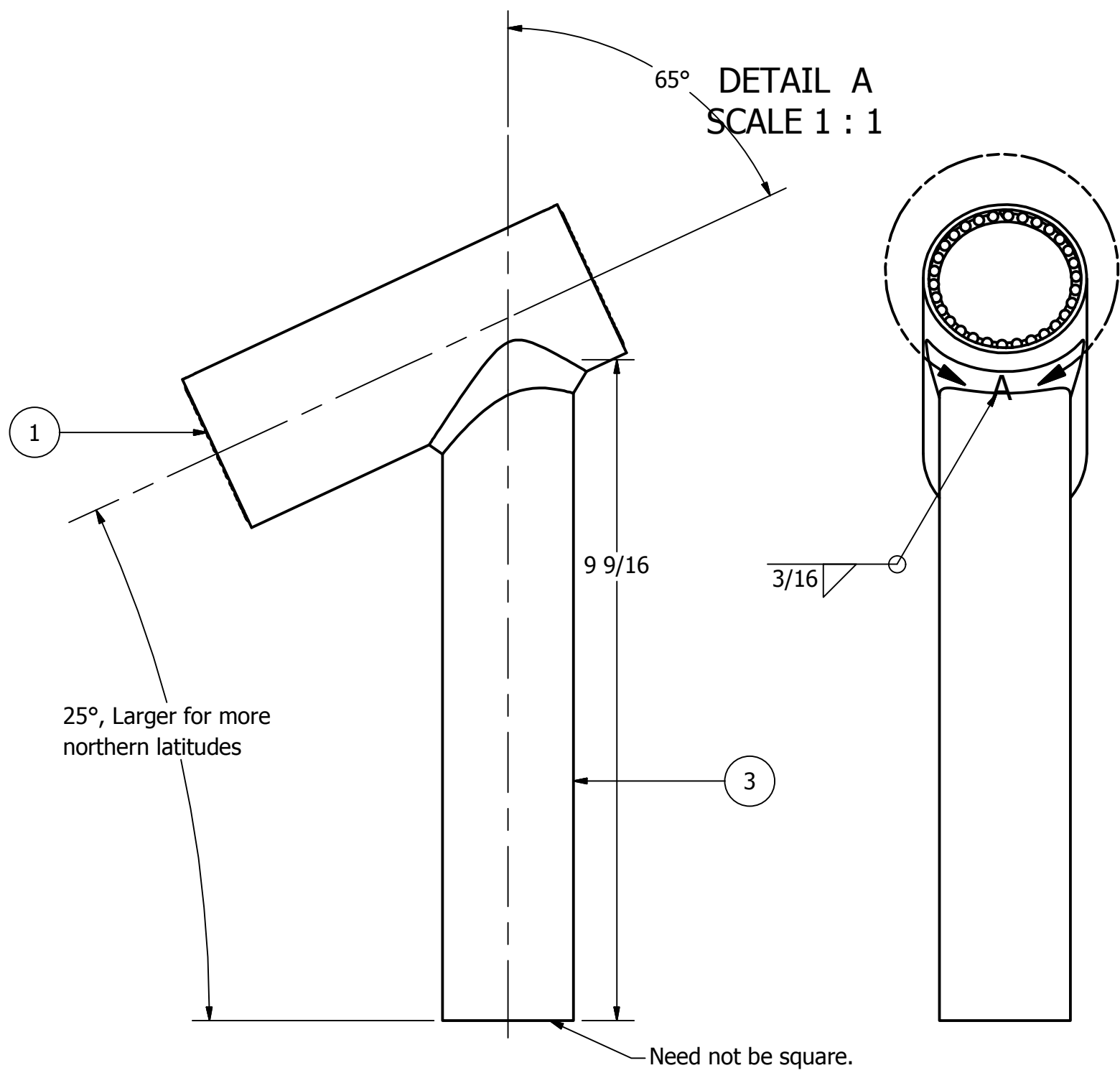
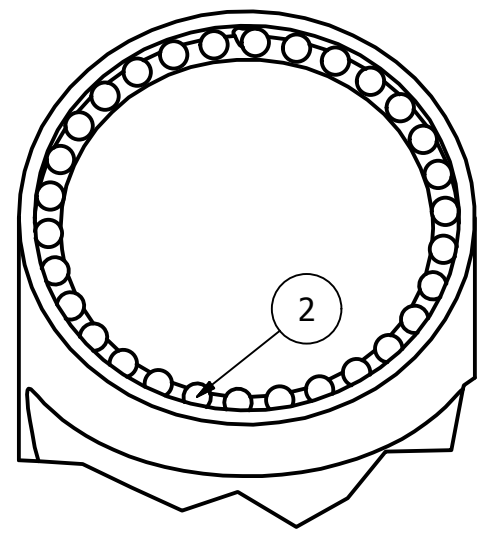
Wires crossing are not connected unless a circle is present.

PARTS LIST

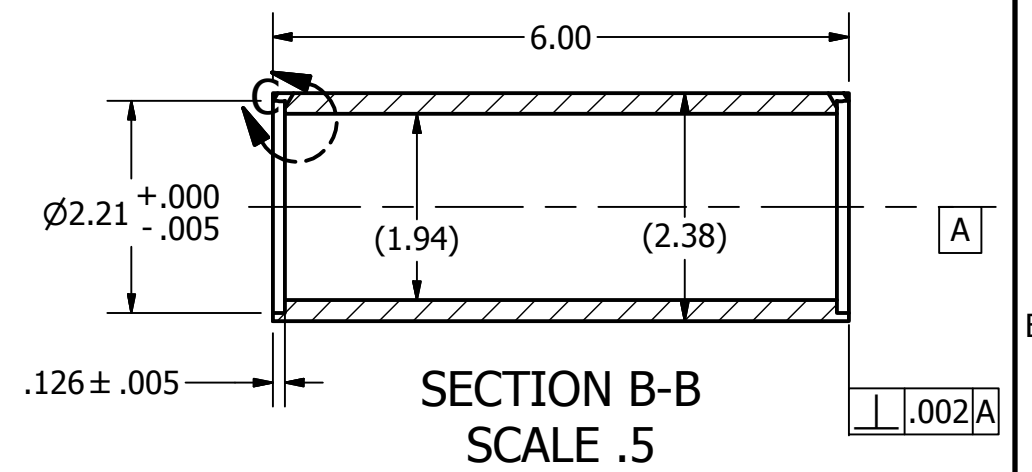
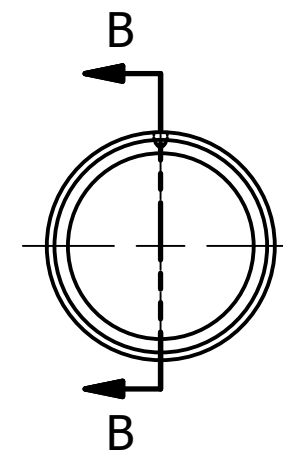
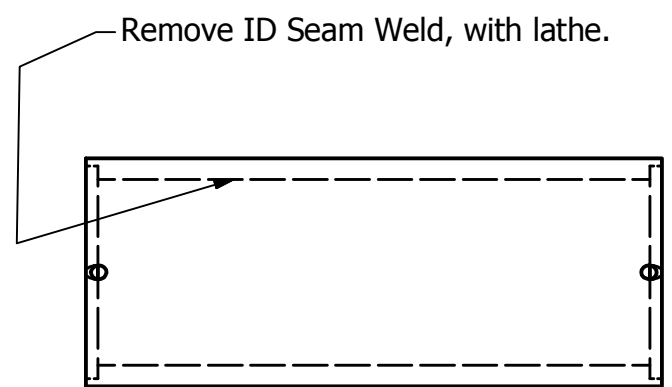
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	Light Sensor	AMBI Light sensor,Modern Device.com
2	1	Cap_Vexta	Oriental Motor P/N CH06BUL-C
3	1	FemalePlug	Ace Electronics
4	1	PowerResistor	400 ohm, 5-10 Watt
5	1	TerminalStrip_Ace_3P3Bipt	Terminal Strip
6	1	UNO	Arduino UNO R3
7	1	SMK550A_5GN9KA	Synchronous motor/gearhead/Ebay \$25
8	1	Switch_Toggle	Toggle switch, ON/OFF
9	1	WallWart_12v_500milAmp_Ace Electronics	WallWart
10	1	OSEPP_LCD_KEYPAD	Osepp LCD and 5 button keypad
11	1	ArduinoVoltageConnector	Matched to Arduino prong size
12	1	SainSmartSS_Relay	2 amp, Microcenter, 160 mA@5v

DRAWN Bill Swann	10/28/2014	Watt-Tracker.com, LLC.	
CHECKED		TITLE	
QA		Schematic	
MFG			
APPROVED			
		SIZE C	DWG NO 1Axis_Ver2LinAct
		SCALE	REV
			SHEET 4 OF 9

Raw Material costs only				
ITEM	QTY	PART NUMBER	DESCRIPTION	COST CENT
1	6.000 in	ANSI/AISC Rolled Steel - 2-6	Pipe Extra Strong	\$1.13
2	60	McM9529K36	hardened Stainless steel ball, 9/64"	\$3.63
3	10.000 in	ANSI/AISC Rolled Steel - 1 1/2-10	Pipe Standard Weight	\$0.68



DETAIL C
SCALE 1 : 1



DRAWN Bill Swann	10/28/2014	Watt-Tracker.com,LLC.	
CHECKED		TITLE	
QA		Weldment, main rotation bearing	
MFG			
APPROVED			
		SIZE C	DWG NO 1Axis_Ver2LinAct
		SCALE	REV
		SHEET 5 OF 9	