



# TIPS, TOOLS AND TECHNIQUES - 2023



SOLAR ENERGY INTERNATIONAL

Renewable Energy Education for a Sustainable Future



**Remove spark plug - add 4 to 5 drops of gas in cylinder. Replace spark plug and spark plug wire and start generator**

**Run a hole saw in reverse to widen a hole (easier to control than running saw forward). Cut to a depth of 1/4" then run forward**





**Use a piece of conduit to assist pulling wire connected to wire gutter**



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**Mark reels  
large and  
small to  
track wire  
colors**

circuits



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“Solaredge”  
inverter  
requires 8  
clear  
modules to  
start



circuits



**Air intake  
through open  
windows**



**Building with large exhaust vent for air cooled generator –  
deep snow conditions**



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# Cordless Palm Hammer

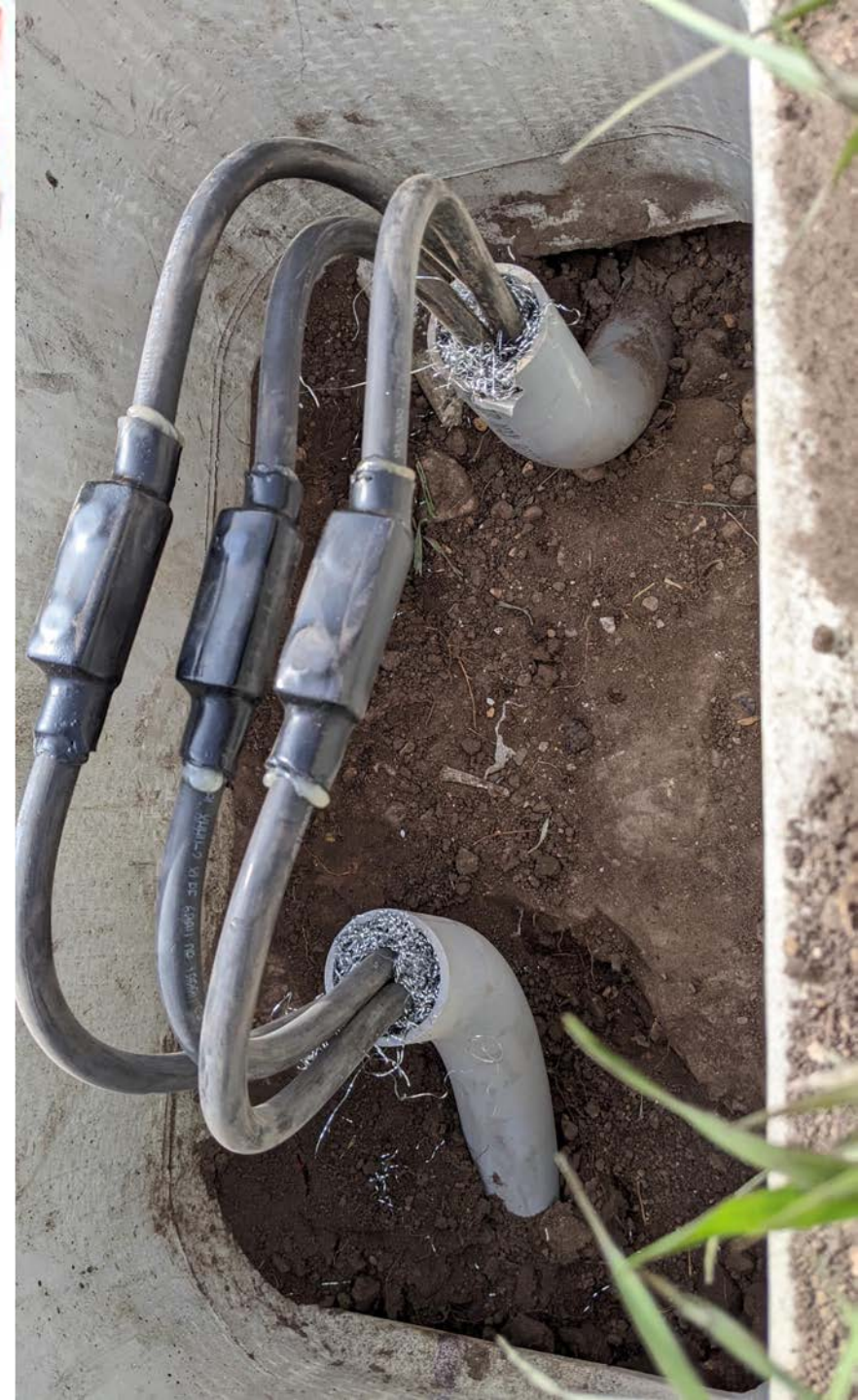


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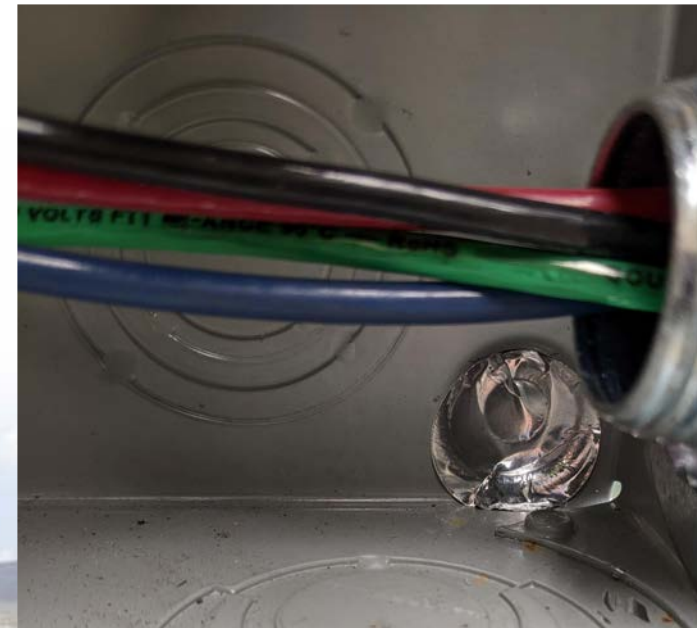
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Use stainless steel scouring pad to plug conduit ends for rodent control



**Plugging  
unused  
holes in  
electrical  
boxes is a  
NEC code  
requirement  
NEC  
110.12(A)**



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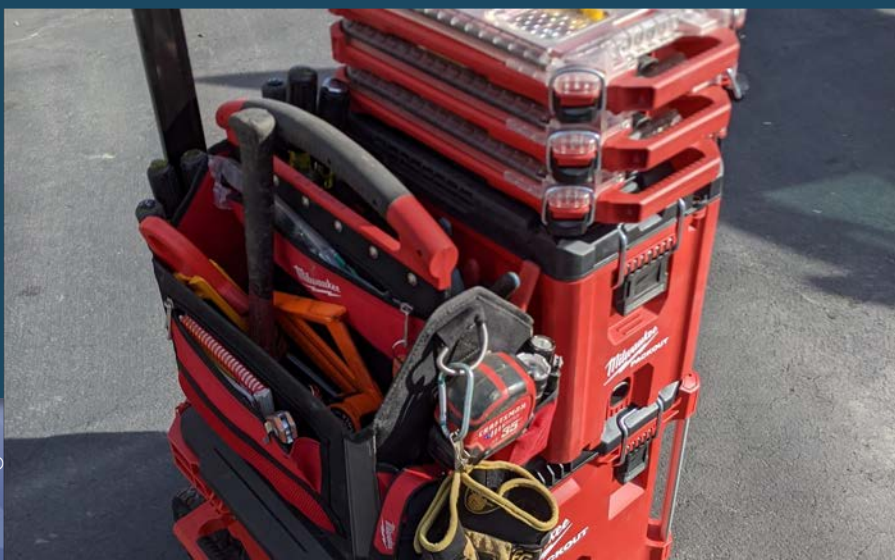
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**Many larger  
diameter wires  
have printed  
lengths every  
foot**





# “PACKOUT” SYSTEM BY “MILWAUKEE”



“Sunpower”  
flexible solar  
module

**E**  **Solar Panel Specifications**  
50W SunPower Flexible Panel



Weight :	Voltage :	Power :	Length :	Width :	Height :
2.43 lbs (1.10 Kg)	17.7-21.5 Volt	50 W	25.7 IN (653 mm)	21.9 IN (556 mm)	0.8 IN (20 mm)



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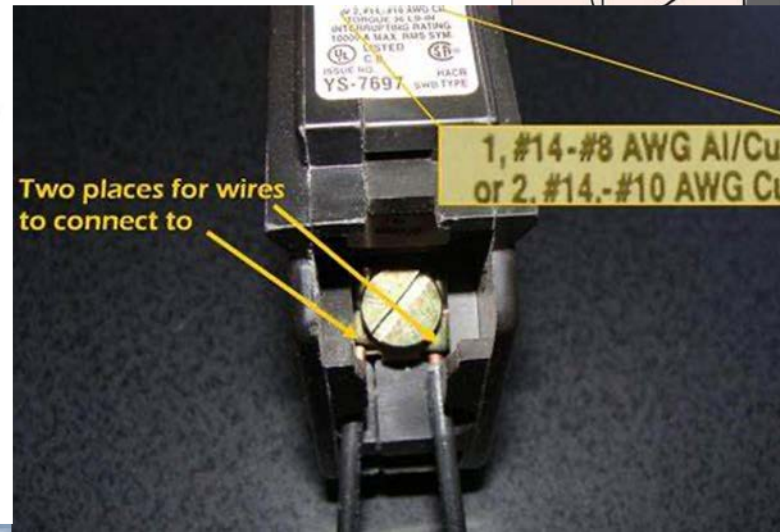
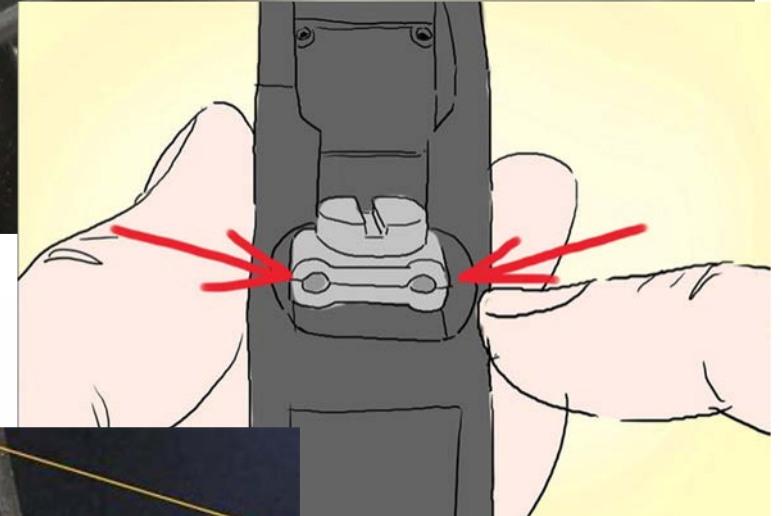
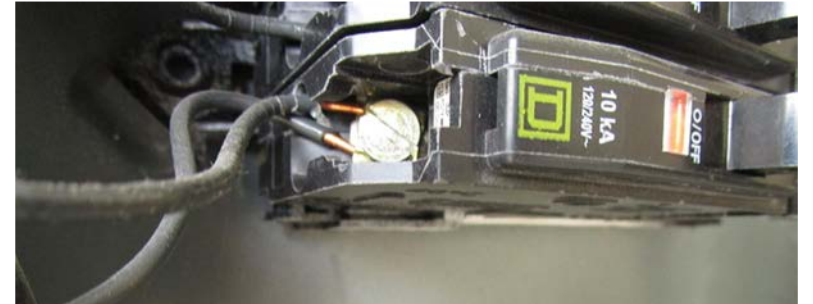
**Flexible –  
adjustable battery  
cables**



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# Some 10 to 30 amp breakers rated for two wires



## Terminations

The 10–30 A circuit breakers have pressure plate terminals suitable for single or two-wire terminations. Copper or aluminum conductors may be used as outlined in Table 2. QO-GFI 15–30 A and QO-AFI circuit breakers have pressure plate terminals suitable for single-wire terminations. These circuit breakers are suitable for use with 60°C or 75°C conductors.

The QO 35–200 A and all QO-PL and QOT tandem circuit breakers have box-type lugs suitable for single-wire terminations. These circuit breakers are suitable for use with 75°C conductors.

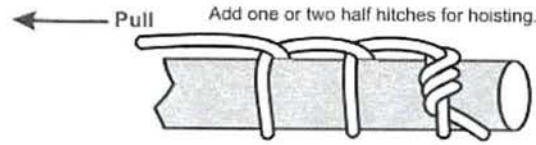
Table 2: Terminations

Circuit Breaker Types	Rating	Wire Size
QO, QOB, QO-VH, QOB-VH	10–30 A	(1) 14–8 AWG (1.5–3.3 mm <sup>2</sup> ) Al/Cu (2) 14–10 AWG (1.5–2.6 mm <sup>2</sup> ) Cu
	35–70 A	(1) 8–2 AWG (3.3–6.5 mm <sup>2</sup> ) Al/Cu

Timber Hitch  
used to pull wire  
through conduit.  
Wrap "Mule tape  
with duct tape or  
wrapping tape  
after tying knot



of a rope around the  
object and take a turn  
around the standing  
part. Tuck the working  
end back around itself  
3 times with the lay of  
the rope.



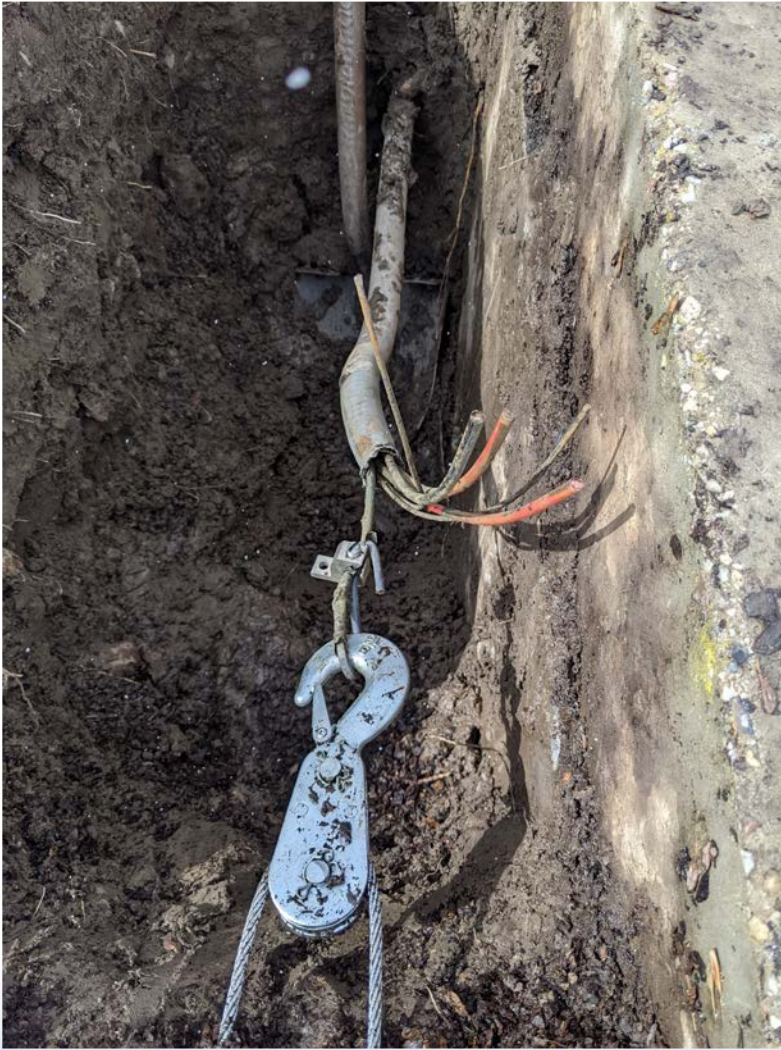
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# “Pitch Hopper”





**"winch  
needed to  
remove  
wire from  
"Liquid-  
tight"**



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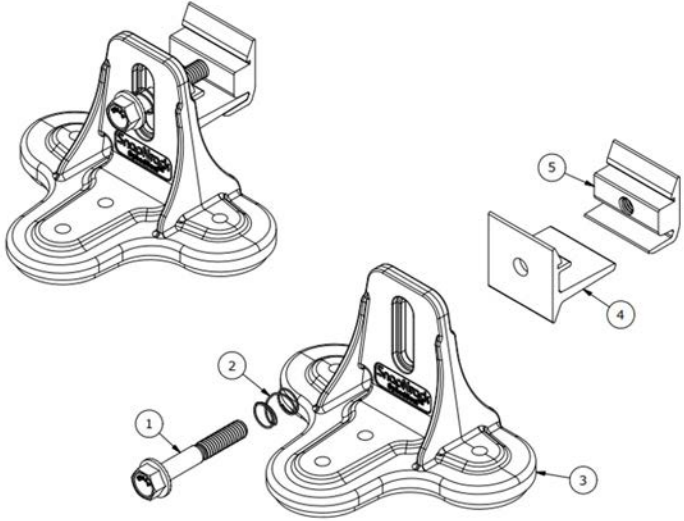
# “Mitrex” Solar Modules



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DESCRIPTION: SNAPNRACK, ULTRA RAIL SPEEDSEAL™ DECKFOOT	DRAWN BY: mwatkins	 561 MARKET STREET, 20TH FLOOR • SAN FRANCISCO, CA 94105 USA PHONE: (415) 580-4800 • FAX: (415) 580-4802 <small>THE INFORMATION IN THIS DRAWING IS CONFIDENTIAL AND PROPRIETARY AND IS NOT TO BE REPRODUCED, COPIED, STORED IN RETRIEVABLE MEDIUM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.</small>
PART NUMBER(S): 242-02173, 242-02174	REVISION: A	



PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	BOLT, FLANGE, SERRATED, 5/16IN-18 X 1-3/4IN, SS
2	1	SNAPNRACK, RL UNIVERSAL, MOUNT SPRING, SS
3	1	SNAPNRACK, SPEEDSEAL DECKFOOT BASE, SEALING, SILVER / BLACK
4	1	SNAPNRACK, ULTRA RAIL MOUNT THRU PRC, CLEAR
5	1	SNAPNRACK, ULTRA RAIL MOUNT TAPPED PRC, CLEAR

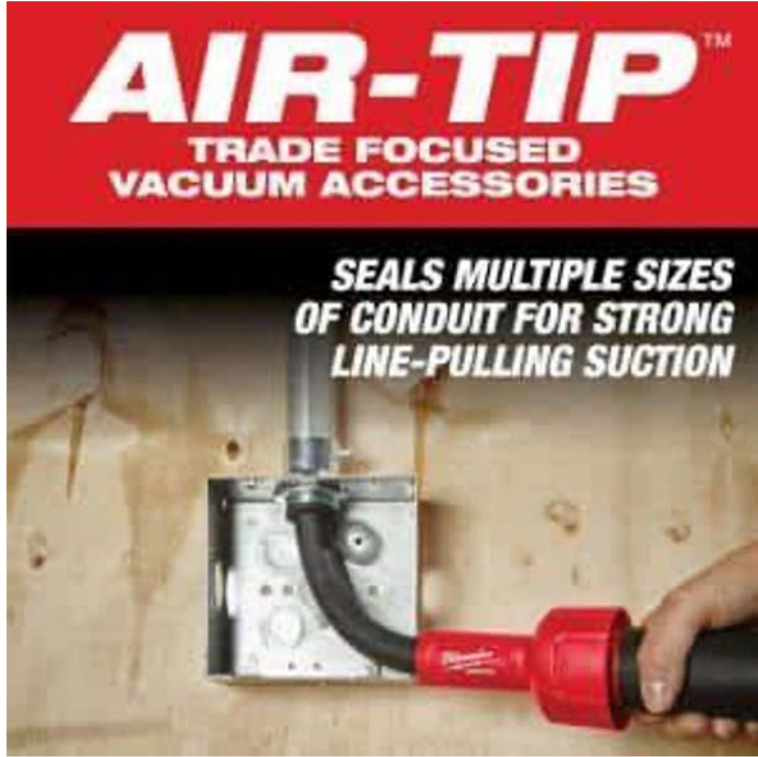
NOTE:  
CAN BE DECK-MOUNTED OR  
RAFTER-MOUNTED

MATERIALS:	DIE CAST A380 ALUMINUM, 6000 SERIES ALUMINUM, STAINLESS STEEL, FOAM	
DESIGN LOAD (LBS):	SEE STRUCTURAL ENGINEERING	OPTIONS:
ULTIMATE LOAD (LBS):	SEE STRUCTURAL ENGINEERING	SILVER / BLACK
TORQUE SPECIFICATION:	12 LB-FT	
CERTIFICATION:	UL 2703, FILE E359313; WIND-DRIVEN RAIN TEST FROM SUBJECT UL 2582	
WEIGHT (LBS):	0.65	



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“Milwaukee”  
Air-Tip hose  
attachments  
for vacuuming  
string in  
conduit



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**Pre-lube  
conduit by  
pulling rag  
through  
before wire**



# “Ittool” wire tugger



Copyright 2020 - McLemore Auction Company

**with foot pedal control**



Mark  
depth of  
hole with  
black  
marker



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- Mount with pound in nail drive anchors in thick metal rather than self tapers





Switch  
cover with  
one side  
access  
only



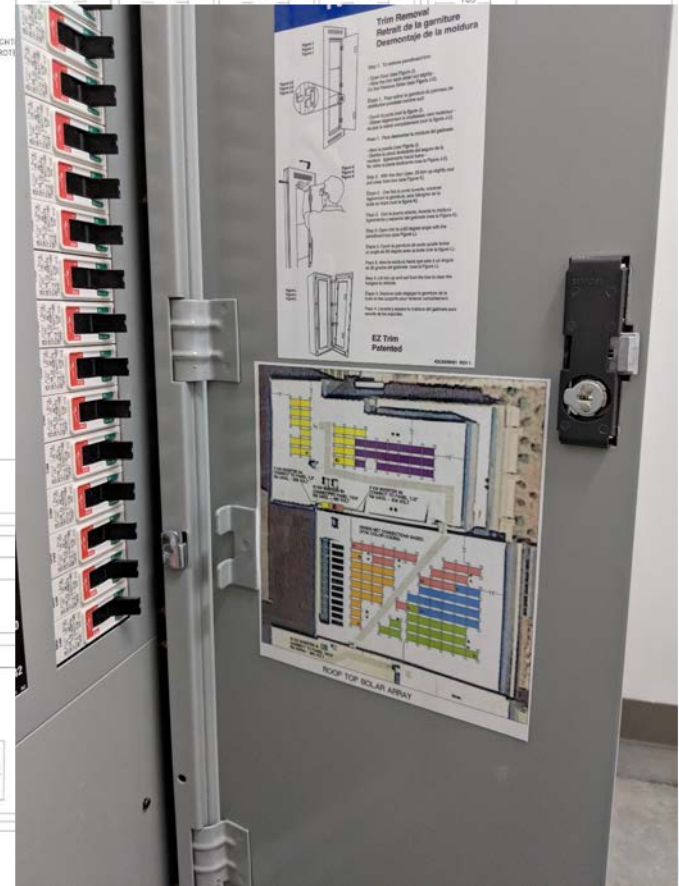
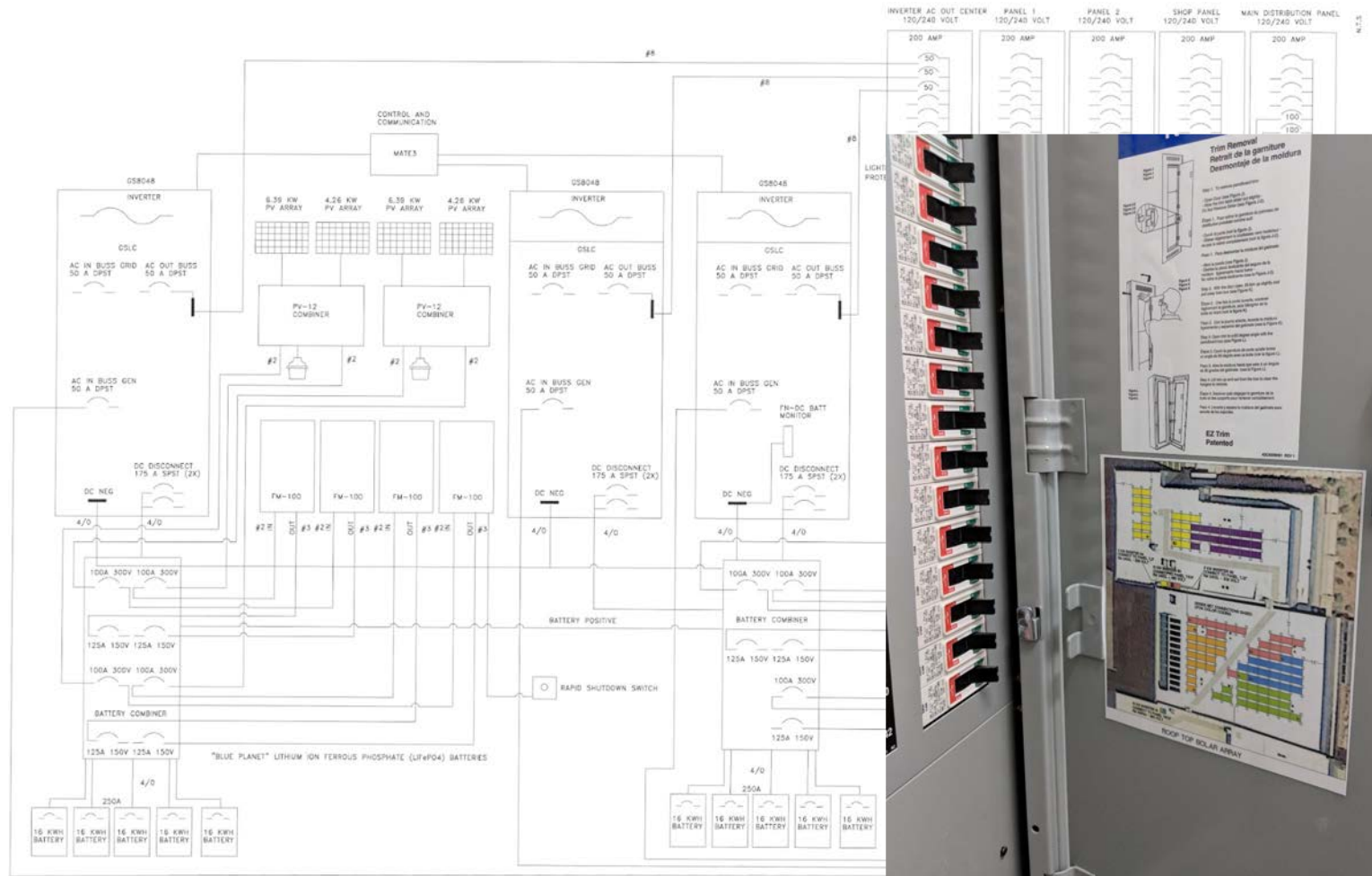
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# 2021 NFPA 70E Part 11, 205.2

A single-line diagram, where provided for electrical system, shall be maintained in a legible condition and shall be kept current

Laminate and place on inside of panel cover



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## Zilla Heat Mats Reptile Terrarium Heater

By Zilla

★★★★☆ 76 Reviews | 30 Answered Questions

**\$16.99** List: \$20.99 Save \$4.00 (19%)

Size

24-watt

4-watt

16-watt



# Battery box heater



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# Catalytic heater for lithium-ion batteries



## Camco Olympian Wave-6 Catalytic Heater

Item #: 19333

★★★★☆ 26 Reviews

**\$357.00** ~~\$458.99~~

Save \$101.99 (22% Off)



Earn 2,290 points on this product at our family of brands<sup>2</sup> when you use your Good Sam Rewards Credit Card [Learn More](#)



As low as \$32.73/mo. [Learn more](#)

Starting at \$33/mo with [affirm](#). [Prequalify now](#)



**Ship to Home**  
Delivery time calculated in checkout



**Order Pickup**  
Select store

FREE Standard Shipping over \$99.

Good Sam Members: FREE Shipping over \$69

Availability: In Stock

1

Add to Cart

### Shipping Restrictions

This item cannot be shipped internationally.



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# “Mud mixer” portable mixer



**1 CY per hour - \$ 3,000**

# Cat powered fish tape



**“DEP  
XTREME”  
Suction cup  
module lift**

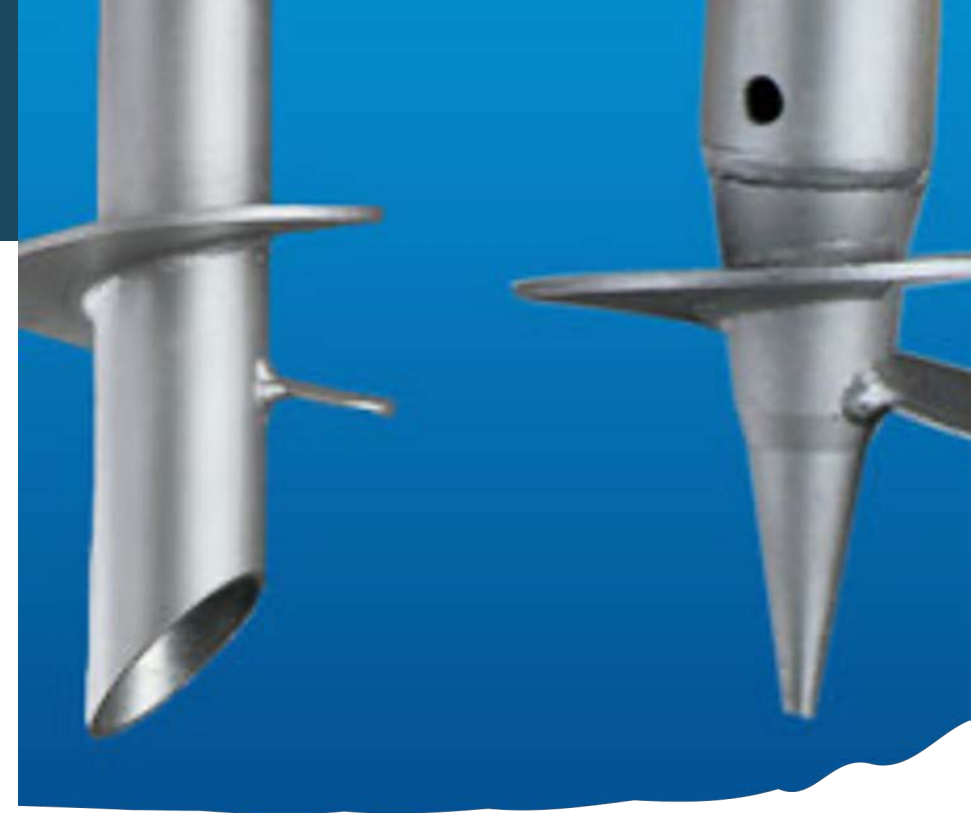




# Use PVC roller to remove modules

**PVC pipe  
used to  
roll off  
solar  
modules**





**Hand screw piles for solar**

# Conduit stand off support



# String reel uptake





**RELIANCE CONTROLS® PRO/TRAN  
2® PORTABLE GENERATOR  
TRANSFER SWITCH, 125V, 30A,  
NEMA L14-30, 4 CIRCUITS,  
METAL, GRAY - #304A1**

**304A1**

**FEATURES**

- Completely pre-wired for easy installation
- Eliminates the dangers associated with back-feeding
- Cover included to protect toggle switches and circuit breakers
- Metal cabinet, designed for indoor use
- Includes color-coded wattmeters and an L14-30 power inlet
- cULus 1008 Listed

Compare



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**Use a  
screwdriver  
to pre-bend  
wires in a  
junction box**





# **Metal roof penetration device for campers**

# How to drill larger hole

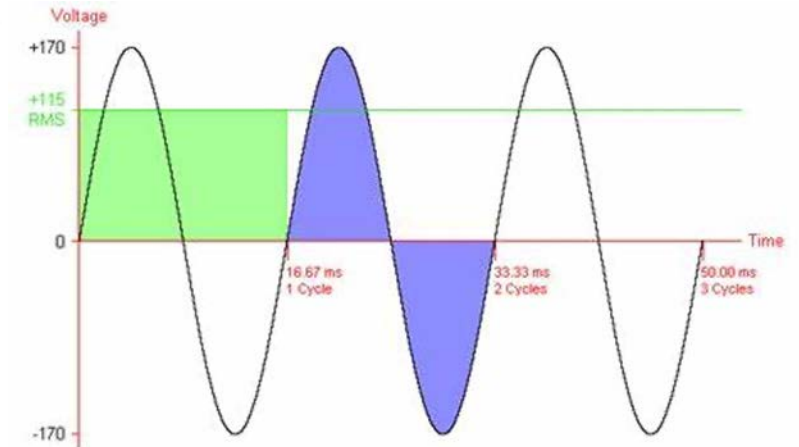
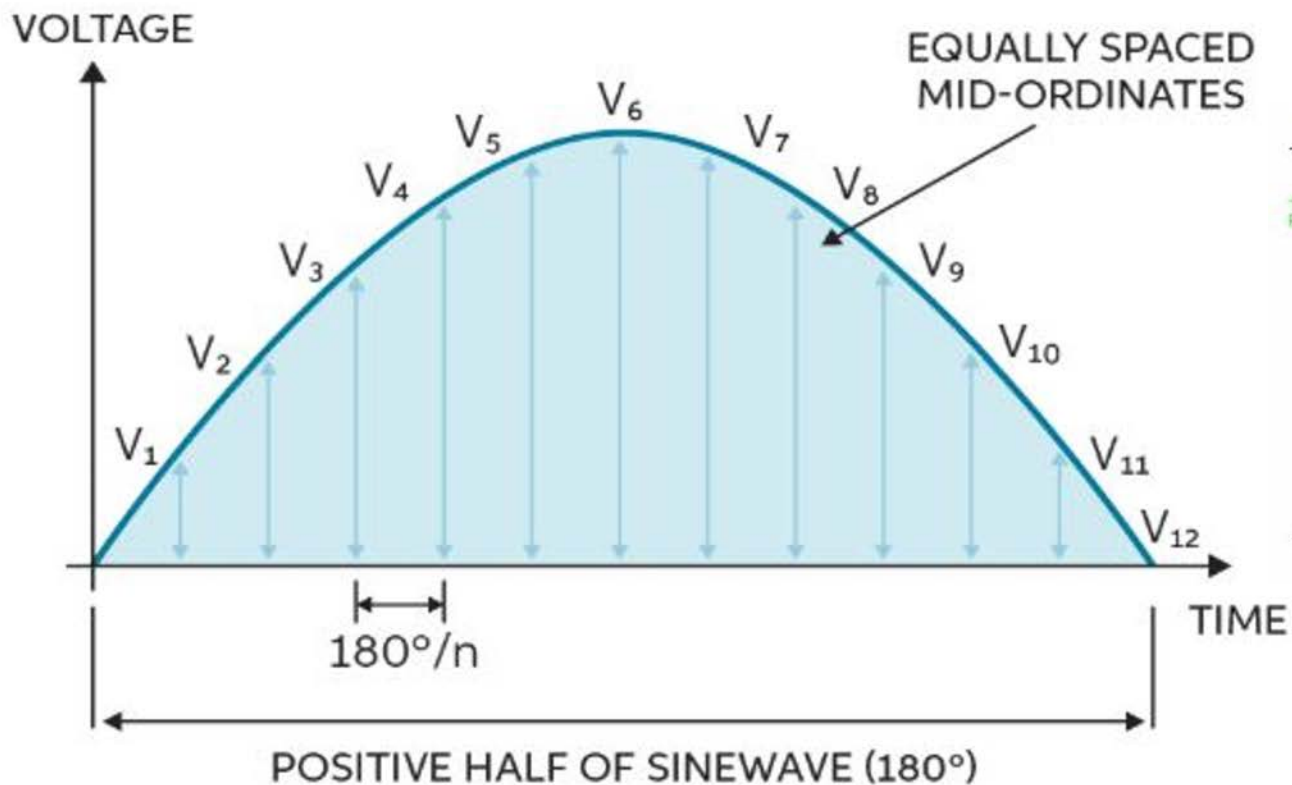


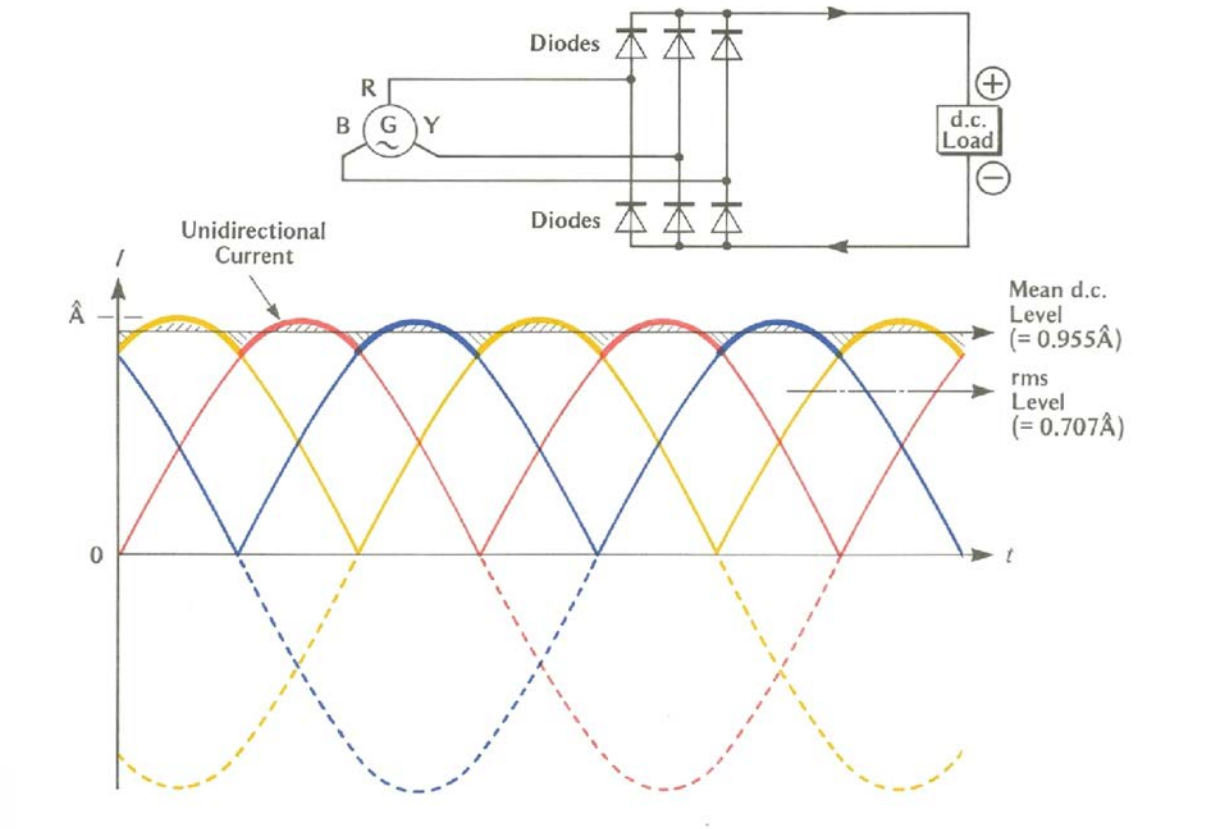
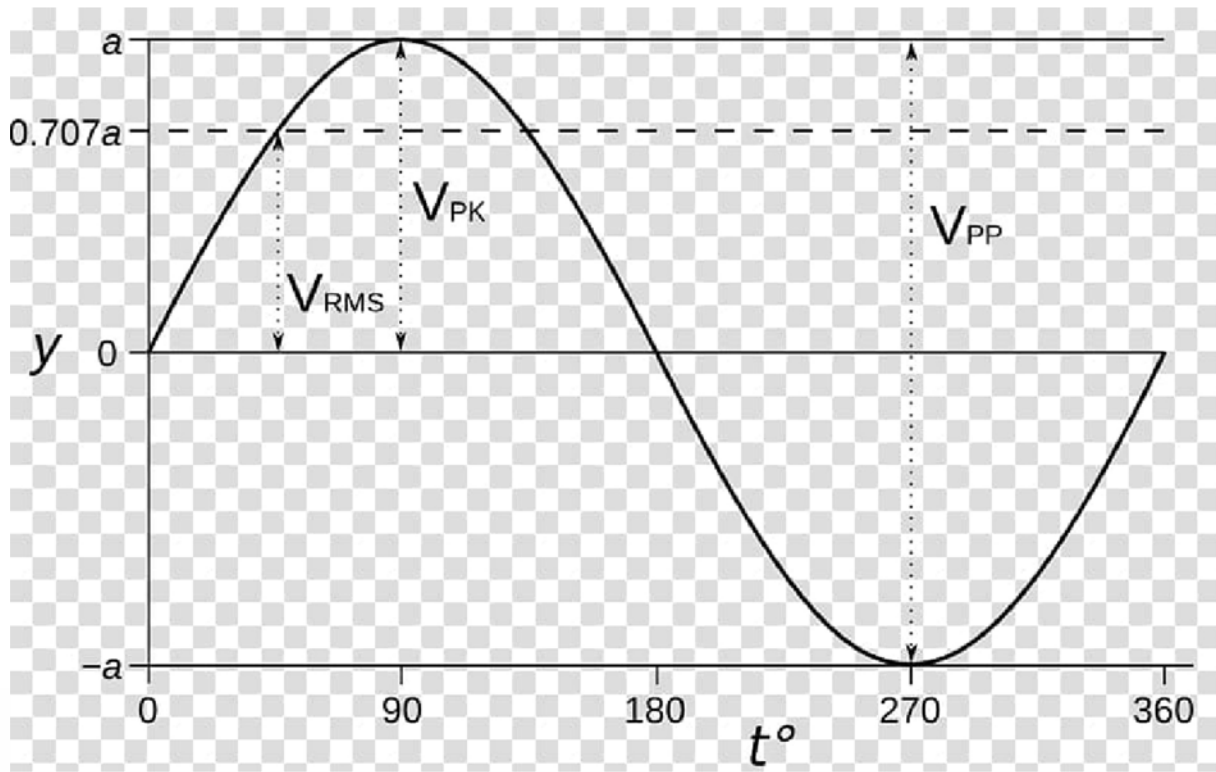


# RMS graphical calculation

$$V_{\text{TRMS}} = \sqrt{\frac{V_1^2 + V_2^2 + \dots + V_n^2}{n}}$$

## Calculation of RMS voltage by Graphical method





power”



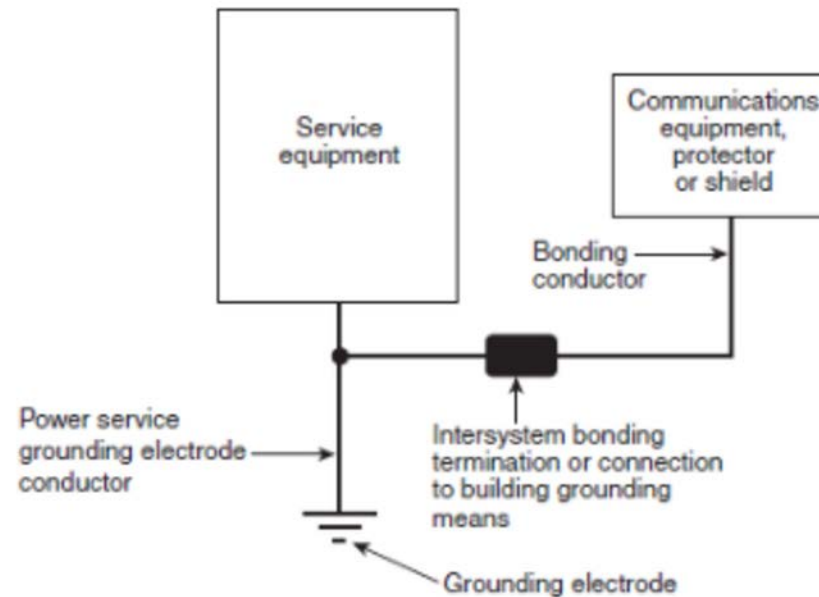
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## 2020 NEC 250.94(A) Bonding of communication systems

An intersystem bonding termination (IBT) for connecting intersystem bonding conductors shall be provided external to enclosures at the service equipment or metering equipment enclosure and at the disconnecting means for any additional buildings or structures.



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