



Modiul 8 – Lenas Wakabuk

Sola Opereisin an Meintanans Beisiks

PIJIN LANGUAGE- SOLOMON ISLANDS

Slen fo fanding hem kam from:

KOICA
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Pacific Islands
Development Forum

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“Sola Opereisin an Meintanans Beisiks” training modul hem fo oketa tekikol lenas hu laek fo save moa abaotim sola instoleisin an meintanans.

(Taem lenas finism kos ia, oketa bae save na lo olketa lening out comes ia)

- Diskraebim na difren taeps blo sola PV sistims
- Listim daon na oketa pats yusd lo Sola PV sistims
- Eksplenem na rikwaemens blo pats yused lo Sola PV sistims
- Aedentifaem na tuls wea save yusim lo sola PV sistim instoleisin an meitanans
- Diskraebim na prosijas fo instoleisin an menteining sola PV sistims
- Listim na seifti rikwaemens fo sola PV sistim
- Aedentifaem an risolvim na komon folts lo sola PV sistims
- Som nay us blo Sola PV Sistim meintanans sekaplist

Leson Plan

TEBOL 2: Leson plan

Sapta	Leson Taep
1. Aes Breka - Introdaksin	Teori an Aktiviti 1
2. Komponentis blo Sola Paoa Sistims	Teori
	Aktiviti 2
	Aktiviti 3
	Aktiviti 4
3. Sola PV Komponent Rikwaemens	Teori
	Aktiviti 5
	Aktiviti 6
	Aktiviti 7
	Aktiviti 8
4. Taeps blo Sola PV Sistims	Teori
	Aktiviti 9
	Aktiviti 10
5. Tuls wea save yusim lo Sola PV Sistim	Teori
	Aktiviti 11
6. Instolim Sola PV sistims	Teori
7. Seifti Rikwaemens blo sola PV Sistims	Teori
	Aktiviti 12
8. Aedentifaem an Risolvim na komon folts lo Solar home PV sistims	Teori
	Aktiviti 13
9. Sola PV Meintanans sekaplist	Teori
	Aktiviti 14

Disfala lenas wakabuk ia bin teken from trenas guide (TG) blo hem. Infomaisen insaed disfala LW oketa bin mekem isi an samaraesim, wetem mein tingting lo oketa piksas and oketa activities blo oketa wea bae letem lenas for stap and engage

wetem trena taem blo training. If yu likem ekstra infomeisen lo eni sekson plis luk go lo TG.

Cover photo: Solar demo kit used in Vanuatu pilot community training. Source: GGGI Vanuatu.

Stetment fo diklearem no eni responsibiliti: Global Green Growth Institute hem no promesem, long toktok o mining, o hem no garem eni ligol laeabiliti o responsibiliti long hao stret, kompli o hao eni nara mek tri pati hem iusim, o risalt blong olketa iusim, eni infomeison, tul, prodakt, o proses wea hemi stap insaed long infomison long disfala dokumet o hem representim dat eni yus bae hem no brekem lo blong olketa praevet ona raet.

GLOSARI

AC: Olterneting karent hemi wan taep blo elektrisiti wea hemi sens olowe noma, hem prodius bae oketa invetas, jeneretas an bigfala paoa sitims.

Saj Kontrola: Wanfala pat wea kontrolim na taem bateri hem saj an save stopem for noken ovasaj.

Klam Mita: Wanfala divaes wea save yusim fo mesarim na karent lo eletrik seket, wael mos lo adas save duim na oketa narafala mesament

Karent: hemi flo blo elektrisiti saj insaed lo seket waeas

DC: Daerekt Karent hemi wan taep lo elektrisiti prodius bae sola panols. DC paoa save daerektli ranem laets an smol divaes.

Elektrikol paoa: Hem reit wea eneji hemi yused o prodius insaed lo wan seket, save mesarim lo Wats.

Elektrolaet: Diswan hemi kjemikol likwid wea save faedim na insaed lo asid bateri. Hem ya hem korosiv asid tumas an denjaras.

Inveta: Wan divaes wea konvetim DC Elektrisiti go lo AC eletrisiti.

Lod: Eniting wea tekem ap na paoa or yusim na elektrisiti fo waka osem laet, fan etc

Maonting: samting wea yu save yusim fo holem na oketa pats in ples (tugeda). For eksampol, oketa pats an fitings wea yused fo instol an sikurim na sola panols lo ruf o ontop lo graon

Multi-Mita: Wan divaes wea hemi yused fo duim na tests an mesamens lo elektrikol seket osem mesarim na volteij, kontiniuti tests etc

Ovajaj: Hem taem yu gohet sajim bateri taem hemi ful finis – Diskaen bae save mekem sot na bateri laef o save damejim.

PV Arei: hemi minim staka sola panols konek tugeda

Sot seket: Taem laef waea blo oposit polarity kontak daerekli wetem ij ada, yumi save kolem na lo sot seket. Fo eksampol, taem positive an negative teminols blo bateri tas. Sot seket save spoelem na komponents an kosim na faea an sirias injuris .

Sola Panol: save kolem osem 'PV modiul' or 'PV panol'. Hem divaes wea prodiusim na elektrikol eneji taem eksposim go lo sunlaet.

Teminol: Elektrikol koneksin post wea fo konektim na waeas go lo divaes. Fo eksampol, olketa batri weak am wetem positiv an negative teminols fo alaom na koneksin blo batri go lo nara sekets. Everitaem garew na bolts lo teminols fo taetim na elektrikol karent.

Volteij: Hem na potensol difrens bitwin tufala poents insaed lo seket an hem na wanem kosim na karent fo flo.

1

Aes Breka-
Introdaksin

AKTIVITI 1

Introdusim yu seleva long evriwan taem treina askem yu. Bae askem yu fo talem nem blong yu an talem lelebet save nolej yu garem long sola. Yu mas talem tu wanem yu save duim an sapos yu hapi long veniu o nomoa.

2

Olketa pat blong
Sola PV system

Garem olketa difren pat wea hem yius insaet sola PV system. Taem adem nao olketa difren pat ya hem sensim tu karektaristik blong system ya.

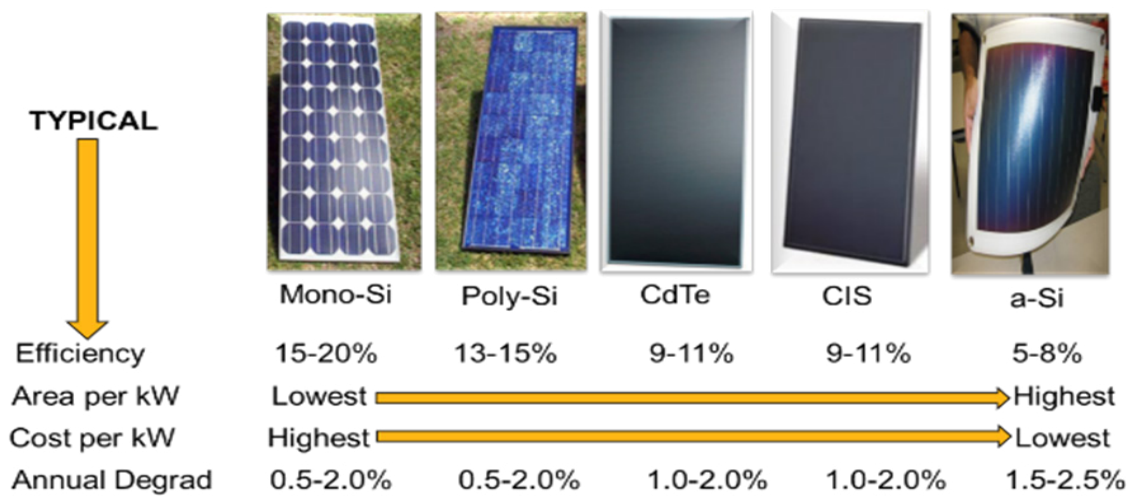
2.1 Sola Panol (PV Modiul)

Solar PV modiul hem produsem nao paoa taem konvetem sanlaet go long eneji. Hem garem olketa difren taep long PV modiul, evriwan long olketa hem garem aplikeisin blong hem karektaristik long hao hem waka.

FIGA 1: Sola panol¹



FIGA 2: Difren taep lo sola panol (PV Modiul)²



Ful nems blo PV modiuls

- Mono-Si: Monocrystalline silicon
- Poly-Si: Polycrystalline silicon
- CdTe: Cadmium telluride (CdTe). This is thin film technology
- CIS: Copper indium gallium selenide solar cell. This is thin film technology
- A-Si: Amorphous silicon. This is thin film technology

2.2 Saj Kontrola

Saj kontrola hem limitem nao reit long hao elektrik karent hem ad kam o tekem nao from olketa elektrik batri. Hem stopem ovasajing an save help aegensim ovavolteij.

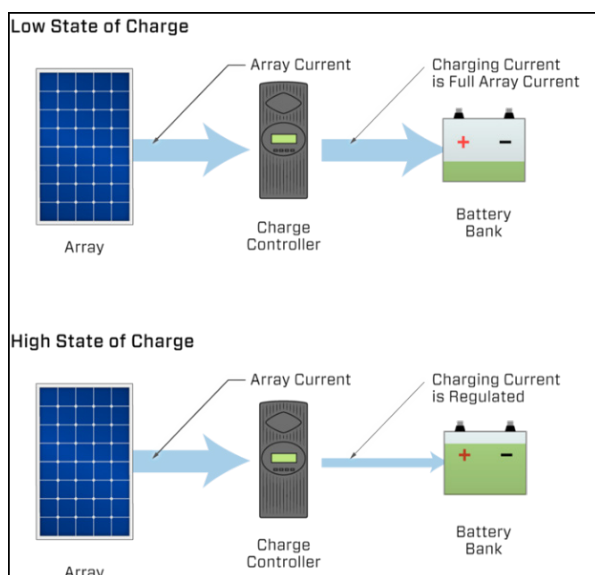
¹ Source: Audio Digital, <http://www.audio-digital.com/tag-produk/sound/>

² Adapted from the System Components- PV Modules, Arizona State University (VOCTEC), <http://vottec.asu.edu>

FIGA 3: Difren taeps blo kontrolas³



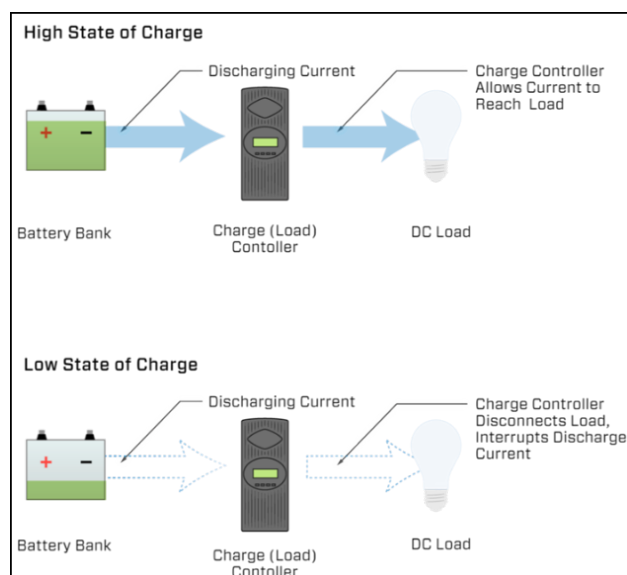
FIGA 4: Ova-saj Proteksin⁴



• Ova-saj proteksin

- Taem volteij blong batri hem lou, saj kontrola bae kontiniu fo konekt PV modiul long batri fo sajem.
- Taem volteij blong batri hem hae, saj kontrola sem taem hem diskonektem nao PV modiul from batri fo stop sajem.

FIGA 5: Ova-dissaj proteksin⁴

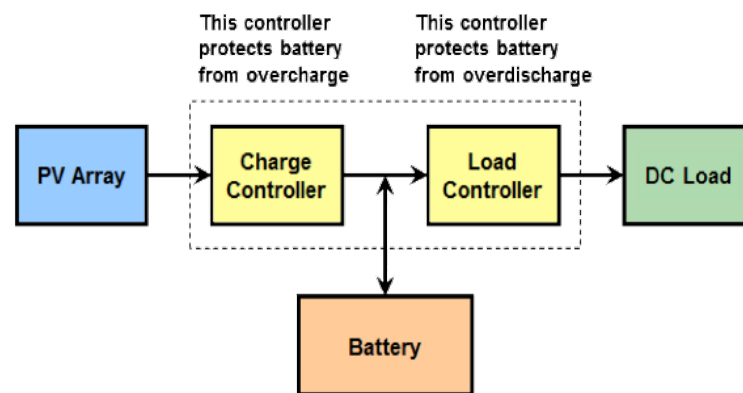


• Ova-disaj proteksin

- Taem batri volteij hem hae, saj kontrola bae hem konekt lod semtaem go long batri.
- Taem batri volteij hem go lou, saj kontrola bae semtaem diskonekt lod from batri fo stopem batri fo hem spoel bikos ova dissaj.
- Disfala seket konfigareisin hem fo stopem ova sajing an ova dissajing blong batri.

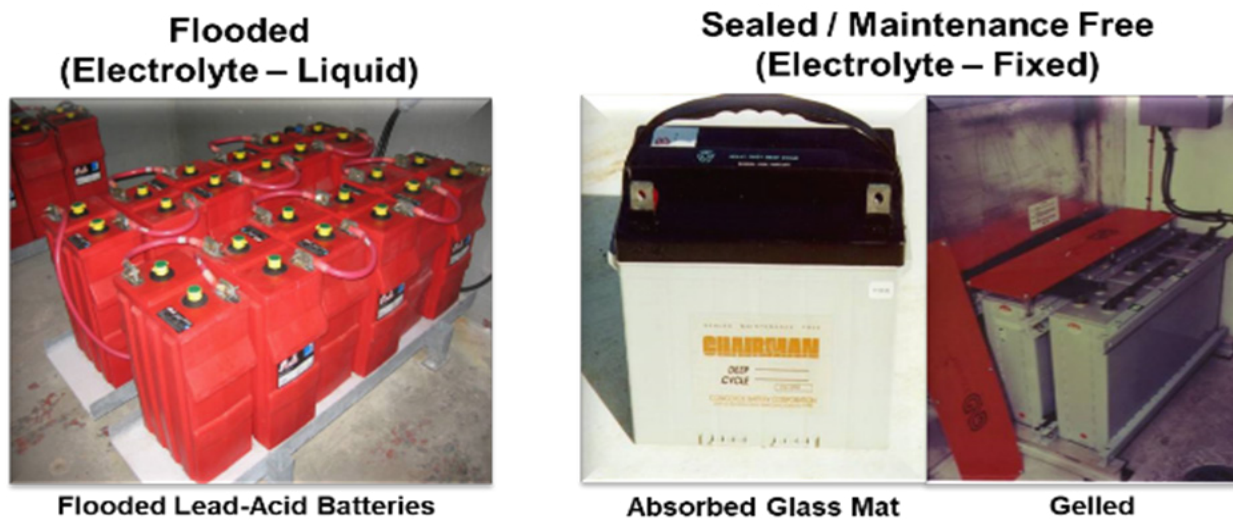
³ Adapted from System Components: Charge Controllers & Inverters, Arizona State University (VOCTEC), <http://vottec.asu.edu>

⁴ Photovoltaic Systems, Dunlop, 2nd Ed.

FIGA 6: Rekomendeisin konfigareisin⁵

2.3 Olketa batri

Batri hem divaes wea bae hem save stoarem elektrikel enei osem kemikel enei an konvetem enei go long elektrisiti o paa.

FIGA 7: Batri⁶FIGA 8: Olketa difren taeps blo batri⁷

⁵ Source: Jim Dunlop Solar.

⁶ Source: JICA.

⁷ Source: Adapted from "System Components- Batteries", Arizona State University, VOCTEC, <http://voctec.asu.edu>

- Olketa batri olketa save wakem yusim nao led an Led Oksaed elektrods an hem garem salfarik asid wea hem no strong.
- Garem olketa narafala taep long batri tu osem Nickel-Cadmium, Lithium an samfala moa.
- Long Sola sistem, olketa batri saj long sola panol long deitaem an disfala batri ya saplaem paoa long naet-taem.
- Olketa Otomativ batri hem no gud fo sola. Olketa wakem olketa fo givim bik amaont long karent long sot team.
- Olketa sola batri hem difren. Olketa wakem fo givim smol amaont long karent long bik amaont long taem.
- Olketa batri wea hem no open yiet hem garem volteij wea hem save kasem 14.1 v, batri wea hem tuweit hem save saj go kasem 14.4 V.
- Batri Kapasiti.
- Kapasiti hem mesa blong elektrik saj wea hem stap o eneji wea hem stoad long batri wea hem save duim waka long taem wea hem garem.
- Ampere-hour (Ah) hem mesamen yunit blong batri eneji stoarej kapasiti, an hem ikol long transfa blong wan ampere fo wan aoa.
- Kapasiti hem dipen long tempresa blong batri, dissaj reit an kat-of volteij.
- Batri hem garem hae feilia reit long evri komponen long DC or Ac lod.
- Olketa led-asid batri wea hem tuweit hem garem elektrolaet likuid, olketa batri wea hem no open hem garem elektrolaet wea hem fiks.

2.3.1 Olketa tuweit batri

Diswan hem ol wei blong ejin fo stat, trakta an dip saekol-stael batri. Likuid elektrolaet hem fri fo muv insaet kopatmen lo sel. Yiusa garem akses long olketa difren sel an save adem wata wea hem disolv taem batri drae aot. Olketa popiula wan nao statem enjin an olketa dip saekol disaen.

2.3.2 Olketa batri wea no open

Disfala wod save yusim fo olketa difren taep konstraksin wea hem inkludem tu lelebet modifikeisin lo stael wea hem tuweit. Wanfala difrens nomoa hem olketa wea wakem mekem dat enaf asid hem stap insaet batri fo save mekem kemikol rikasin long nomol yius blong hem long taem fo yusim batri. Olketa popiula yius long diswan hem fo statem enjin an fo limitim stating/dip saekol apkliekeisin.

2.3.3. Olketa AGM Batri

Absob Glas Mat konstraksin hem alaom elektrolaet fo hem hange wetem aktiv matiriol blong pleit. Long tiori, this wan hem waka fo mekem dis saj an risaj hem waka gud. Popiula yius hem inkludem hae waka long hao enjin hem stat, spot wea yusim paoa, ddp sekol, sola an storej batri.

2.3.4 Olketa GEL batri

(Sel/Gel Batri hem osem nao AGM batri stael bikos elektrolaet hem olsem hange nomoa bat hem difren tu from AGM batri wea hem olsem tuweit sel. Elektrolaet wea hem stap long gel cel batri hem garem silika long hem we hem save mekem fo set ap o stif. Olketa risaj volteij long diskaen taep sel hem lou den olketa narafala stael blong lid asid batri. Olketa Gel batri hem gud fo yusim long barava DIP Saekol apkliekeisin an hem save stap long taem lelebet long hot weda).

2.4 Olketa Kebol

FIGA 9: kebols⁸



Olketa elektrikol kebol save yusim fo konetkem tu or staka divaes wea fo save transfa olketa elektrikol signal o paoa from wan divaes go long narawan.

8 Source: Global Market, http://newimg.globalmarket.com/PicLib/group0/5e/73/c477defc613ecc9a0e47b82452f4_1.jpg

2.5 Seket Breka/Aesoleita

Waka blong seket break hem fo stopem na flou blong karent sapos wanfala folt hem hapen. Isoleita hem wanfala mekanikol suis divaes wea long open posisin hem diskonekt divaes an alaom isoleisin blong input an aotput blong wanfala divaes.

Seket breka hem garem difren ampereij reiting olsem 10A, 16A, 32A an samfala moa. Eksampol nao, sapos yu yusim 10A breka an yu konektem 12 Amps lod, breka bae diskonekt (diswan olketa save kolem olsem trip). Diswan hem fo protektim nao ovakarent insaed lo seket fo sefti.

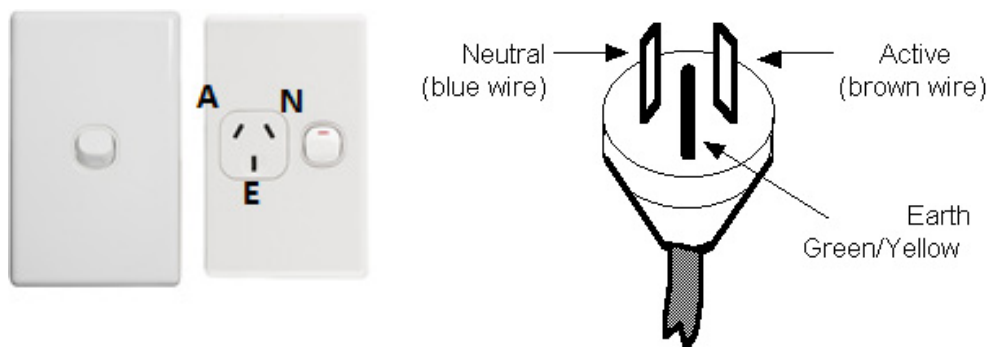
FIGA 10: Seket Breka an Aesoleita⁹



2.6 Suis an Paoa Soket

Suis save sepatem paoa an paoa soket hem fo konektem/ diskonektem olketa samting wea save yusim paoa.

FIGA 11: Suis an paoa soket (ASC)¹⁰



2.7 Inveta

Inveta hem elektronik divaes o skeet wea save sensim darekt karent go long altaneiting karent. Hem garem olketa difren taep long inveta fo difren waka. Selektim nomoa inveta fo sistem wea bae hem save stan ap seleva hem beis nao long olketa samting ya.

- Batri input wea volteij blong hem (12, 24 o 48 V).
- AC aotput volteij (120 o 220V).
- Hae AC paoa nao fo kumiulativ lod (diswan long wats).
- Karent hem hae (e.g., moto/enjin) rikuaemens sapos hem long eni (amps).
- Samfala fisa moa (saja blong batri an osem).

FIGA 12: Inveta¹¹

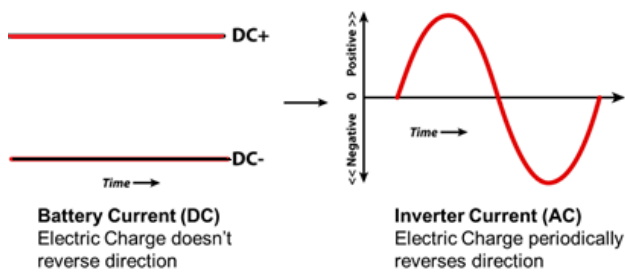


⁹ Source: Wave inverter.co, <https://waveinverter.co.nz/shop/solar/solar-connectors/pv-dc-isolator-switch-mc4/> and POSO.com, <http://poso.com.vn/wp-content/uploads/2020/04/1-2.png>

¹⁰ Source: University of Newcastle Australia, "Electrical General-Purpose Outlets", <https://www-eng.newcastle.edu.au/eecs/ect/oh&s/Hazards/ElectricalGPOs.html>

¹¹ MorningStar, May 2021, <https://www.morningstarcorp.com/products/suresine/>

FIGA 13: Waka blo inveta¹²



FIGA 14: Difren taeps blo inveta¹³

	Stand-Alone Inverter	Operate from batteries and supply power independent of the utility grid
	Interactive Inverter	Operate from PV arrays and supply power in parallel with the utility grid
	Bi-Model Inverter	Transfer PV system operation to a stand-alone mode and provide backup electric power to critical loads when the utility grid is not energized

2.8 Sola panol maonting system

FIGA 15: Maonting brakets¹⁴

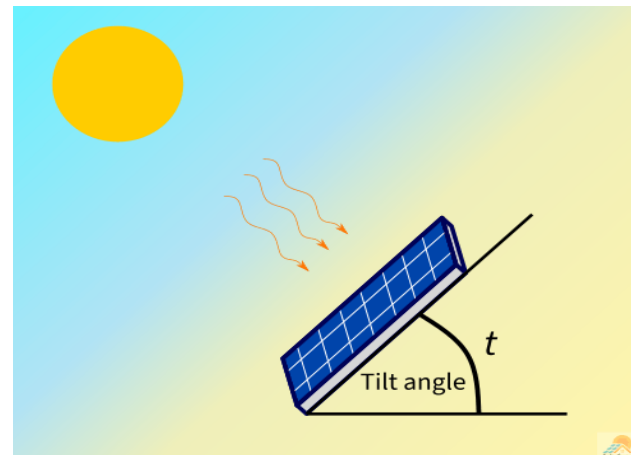


Fotovoltaik maonting sistem hem fo fiksik olketa sola panol long ruf, saed long bilding o long graon. Olketa maonting system ya hem for mekem retrofitting blong olketa sola panol long olketa ruf olsem pat long bilding ya.

2.9 PV Modiol orienteisin

Nomata wanem kaen maonting strakja hem siusim, mein pepos blo maonting na hem fo alaom na seif an sikua fiksa fo maontem nao olketa PV modius antap. Narafala samting moa wea hem impotent tu hem fo muvum lelebet nao sola panol an feisim long daereksin wea bae hem save tekem staka enejji from san bat den avoidem tu seding.

FIGA 16: Sola panol orienteisin¹⁵



Long Solomon Aelan, evri PV modiol mast tanem olsem long 10 digris an feisim long Not daereksin¹⁶, diswan hem fo tekem maksimam PV paoa genereisin from olketa modiol insaet yia.

2.10 Et an Graonding Komponent

Wanfala rikiuamen fo putum olketa PV sistem long graon fo help fo protektim yu from eni sok an fo dae tu wea bae save hapen (taem sej an laeting). Hem save help tu fo stopem faea long sistem taem instolem finis. Fo talem long narafala wei, taem yu duim gud long diswan taem yu instolem PV bae hem save protektem yu.

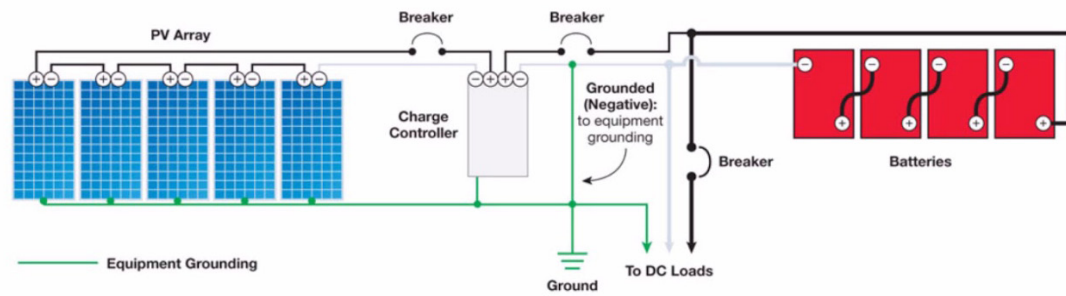
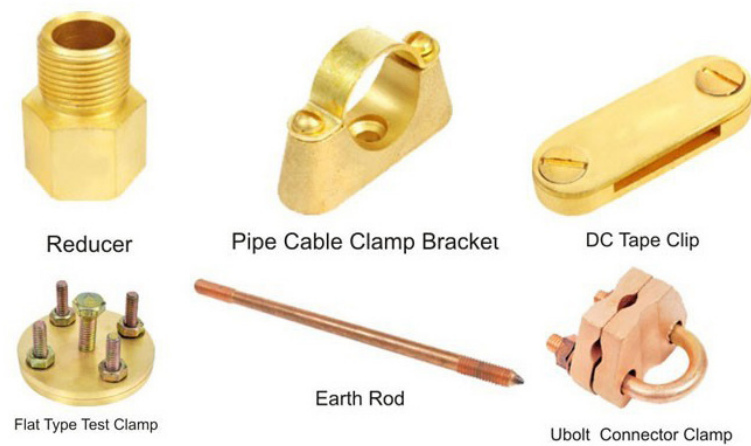
¹² Adapted from System Components: Charge Controllers & Inverters, Arizona State University (VOCTEC), <http://voctec.asu.edu>

¹³ Adapted from System Components: Charge Controllers & Inverters, Arizona State University (VOCTEC), <http://voctec.asu.edu>

¹⁴ Source: Shopping.co, <https://shopee.co.th/Utilizing%E2%9C%BF%E2%9C%B2-Solar-Panel-Mounting-Bracket-End-Mid-Clamp-Kit-Adjustable-For-19Mm-55Mm-Framed-i-188349769.7409094766>

¹⁵ Solar Sena, "Optimal Solar Panel Tilt Angle Calculator", May 2021, <https://solarsena.com/solar-panel-tilt-angle-calculator>

¹⁶ Adapted from the Grid- Connected PV Systems (System Installation Guidelines), by PPA and SEIPI Technical communities, 2019, <https://www.ppa.org.fj/wp-content/uploads/2019/08/Grid-Connected-PV-Systems-Installation-Guidelines-V4-250719.pdf>

FIGA 17: Hao nao fo graonim lkwpimen¹⁷**Equipment Grounding in DC-Only Systems**FIGA 18: Graoning Komponens¹⁸

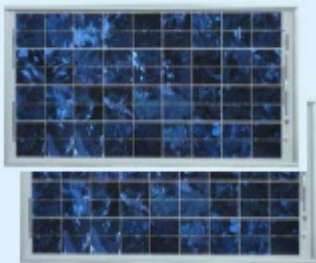
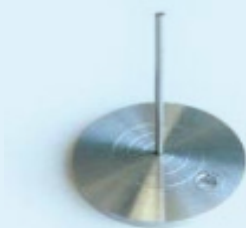
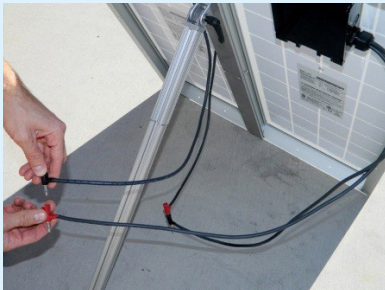
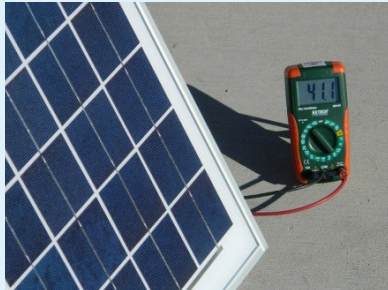
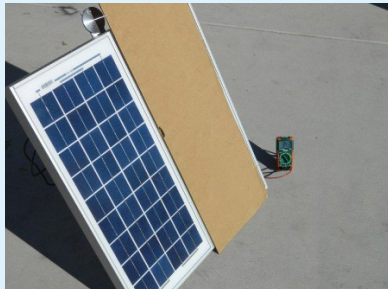
Nots

17 Source: Jim Dunlop Solar.

18 Brass Universe, "The Ultimate Brass Hub", http://www.brassuniverse.in/brass_earthing_accessories.html

AKTIVITI 2

Som hao nao sheding hem afektem nao waka blong wanfala PV Modiul. Mesam Volteij an Karent long difren sheding paten taem konektem olketa PV modiul go long sirias an Paralel koneksins.

Test Set-up		
1. PV modiuls (2x) 	2. PV arei Maonting Rak 	3. Sandael 
4. Dijitol Moltimita 	5. Kadbod fo seding 	6. Putim tugeda arei osem insaed lo MTT kwik Star Gaed 
Test Prosija: Mesamen blo volteij		
1. Konek PV modiuls lo siris 	2. Mesa open skeet voltej (VOC1) wetem no sedinf 	3. Sed wan sel blo PV arei 
4. Mesa open skeet volteij VOC2 	5. Sed wan haf blo PV arei 	6. Mesa open skeet voltej (VOC3) 

Test Procedure: Measurement of Current

7. Repeat measurements 2 - 6 for
Short Circuit Current (I_{SC1})8. Repeat measurements 2 - 6 for
Short Circuit Current (I_{SC2})Repeat measurements 2 - 6 for
Short Circuit Current (I_{SC3})

Recording and Observation of Voltage and Current: (Sample Calculations in black)

Arei no seded
Wan sel seded
Haf arei seded

Open Seket voltej
 $VOC1 = 41.1V$
 $VOC2 = 41.0V$
 $VOC3 = 34.4V$
Obseveisin: Hemi hae winim
ekspekted 20.5V (Voc blong wan
singol modiul) bikos long lelebet
laet wea hum go thru an raonim
na kadbod.

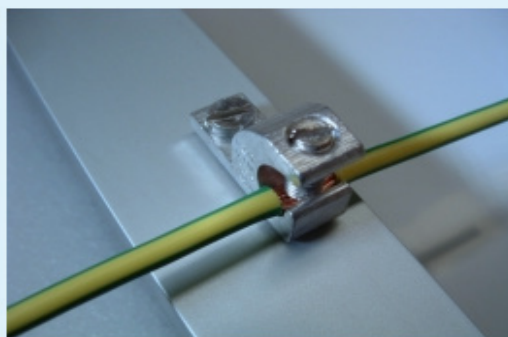
Sot skeet karent (ISC)
 $ISC1 = 1.88$
 $ISC2 = 1.84$
 $ISC3 = 0$
Obseveisin: $ISC3$ hemi 0 bicos
olketa modiuls ia no garem nao
bae-pas diods (seded modiul ia
hem akt osem wanfala big risista
kosim nao modiul ia fo waka long
nia open-seket kondisin).

Praktis: Helpem an letem lenas fo duim na setap insaed lo tims wa hemsud garem trifala membas an letem oketa rekodim/mesam na olketa valius.

AKTIVITI 3

Wae nao yumi shud putum Sola PV sistem long graon?

Duim wanfala graon koneksin long PV modiul olsem long piksa.



AKTIVITI 4

Diskasem wae nao yumi mas yusim gud maonting braket an no livim nomoa panol long ruf?

3

Olketa Rikuaemen
blong Sola PV Pat —————

Bikos yu introdus finis long olketa komponen yius long sola sistem, disfala sapta ya bae givim yu diteil long olketa komponen ya long hao hem opereit an wanem nao olketa rikuamen long opereisin blong hem.

3.1 (PV Modiul) (Sola Panol)

Hem impoten fo mas save abaotem olketa rikuamens blong PV Modiul. Samfala long olketa impoten samting ya nao olsem

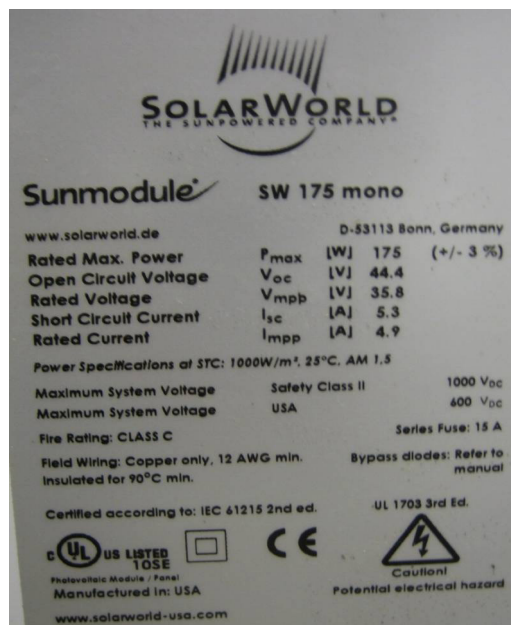
- Wanem nao opereiting volteij.
- Wanem nao maksimam paoa.
- Wanem nao opereiting karent.

Evri PV Modiul (panol) mas garem nao olketa infomeisin ya (sapos nomoa olketa mas kam from sos wea hem no gud tumas)

- Open seket volteij.
- Shot seket karent.
- Opereiting volteij.
- Opereiting karent.
- Maksimam Paoa.
- Polariti blong olketa teminol.
- Maksimam volteij long sistem wea hem alaod.

Mas save olsem dat taem iradians hem go hae, paoa an karent aotput hem hae go tu bat volteij blong PV panol hem kolsap stap semsem nomoa bituin 200-1000 W/m².

FIGA 19: Nemplet data lo Sola PV Modiul¹⁹



3.2 Ifekt blong Tempresa

Sel tempresa pleim kritikol rol long waka blong PV modiul

- Volteij dikris long 1% fo 2°C inkris long tempresa.
- Karent inkris 1% fo 12°C inkris long tempresa.
- Paoa dikris long 1% fo 2.2°C inkris long tempresa.

3.3 Saj kontrola

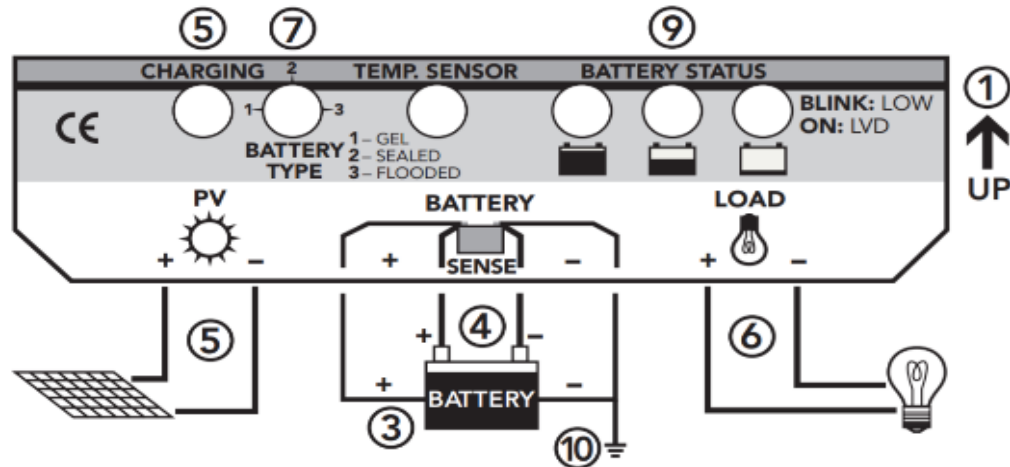
Saj kontrola mas garem

- Garem nakarent kapasiti wea hem fitim fo saj (amperes from sola PV) an fo opereitem nao olketa lod (lod blong karent).
- Akomodeitem nao PV input volteij an batri volteij.
- Garem nao pik DC paoa mas stap nao fo kiumieitev lod.
- Fleksibol fo waka wetem olketa difren taep batri.
- Mas rilaeabol-olketa simpol kontrola nao olketa waka gud ovam nao olketa wea garem staka samting fo folom. avoedem nao olketa wan wea garem LCD skrin, maekro prosesa program control an samfala moa.

Samfala samting fo save moa long hem nao.

- 3 posisin batri selekt: gel, no open o tuweit wan.
- Sajing wea yu save yusim tempresa.
- Olketa LED fo soum steitas an olketa folt blong batri.
- Olketa rimout batri volteij sens teminol.

19 Adapted from the System Components- PV Modules, Arizona State University (VOCTEC), <http://vottec.asu.edu>

FIGA 20: Spesifik fijas blo saj kontrola²⁰

3.4 Olketa batri

Olketa batri save stoarem nomoa paoa an no jenereitem nao paoa

- Yunit sel hem 2V.
- 2V hem minim nominal volteij. Volteij reij hem araon 1.85 V go kasem 2.40V.
- 12V batri garem 6 yunit sel long sirias taem konektem.
- 6V batri garem 3 yunit sel long sirias taem konektem.

FIGA 21: Sampol batri spesifikaisin²¹

SPECIFICATIONS

Nominal Voltage		12 Volts	
Amp Hour Capacity		115 (C20)	90(C5)
Reserve Capacity Minutes		170 @ 25 Amperes	
Physical Characteristics	Length	13.13"	334 mm
	Width	6.75"	171 mm
	Height	9.38"	238 mm
	Wet Weight	58 Lbs	26.4 Kgs
Terminal Options		BCI Type M	

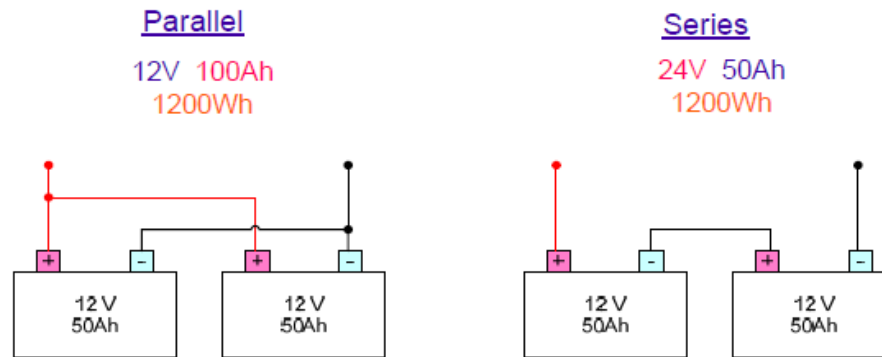
ELECTRICAL SPECIFICATIONS

Amp Hour Capacity	20 Hour Rate	5.75 A	115 Ah
	10 Hour Rate	10.30 A	103 Ah
	5 Hour Rate	18.00 A	90 Ah
	2 Hour Rate	33.50 A	67 Ah
Internal Resistance	80 F	27 C	7.6 mOhm
Capacity affected by Temperature (20 Ah Rate)	104 F	40 C	102%
	80 F	27 C	100%
	32 F	0 C	65%

²⁰ Morning Star, June 2021, <https://www.keoghsmarine.com.au/morningstar-prostar-solar-charge-controller-30a-12-or-24v-pwm-4-stage-charging-led-charge-indicators-sr-ps-30>

²¹ Source: Waveinverter, co.nz, <https://waveinverter.co.nz/wp-content/uploads/2017/12/products-CR325-1.png>

FIGA 22: Tipikol Batri Koneksin²²



Samfala ki poens

- Paralel koneksin givim ful kapasiti (Ah).
- Siris koneksin givim ful volteij (V).
- Totol eneji stoarej hem stap semsem nomoa (wh).
- (No putum long parallel olketa batri sapos hem ovam tufala (diswan save kosem batri sajing an disajing fo hem no ikol) an hem save kosem batri fo nogud kuiктаem an samfala olketa kampani bae no save kipim nao waranti wea olketa givim yu sapos tufa batri waka long sem taem.
- Sapos yu garem moa den fofala batri no mekem olketa waka long semtaem, diswan save kosem batri sajing an disajing fo hem no ikol an save mekem fo batri nogud.
- NO miksim olketa difren taep, modol, eij blong batri, diswan save kosem batri fo nogud kuiктаem taem no kasem taem blong hem fo nogud.
- Olketa batri mas stap nao long ples wea ea hem flou gud long hem an san an ren bae no save kasem. No putum batri insaet haos.
- Olketa ikuipmen fo sajem batri mas had waead nao, no yusim temporary konekesin.
- Olketa batri teminol mas kava nao fo sot seket no hapen karange.
- Mas meksua garem kliarens wea hem fitim bituin olketa batri teminol an olketa metol wol.
- Mas yusim olketa tul wea hem insuleit taem waka wetem batri.

3.5 Inveta

FIGA 23: Wan sua saen 300W stanalon inveta¹¹



TEBOL 3: Sampol spesifikeisin an fija blo wanfala inveta

Specifications & Features (spesifikeisin an olketa fija)	
Paoa reiting wea save kontiniu olowe (300 Wats lo 25°C)	Totol Hamonik Distosin (< 4%)
Pik Paoa Reiting (600 Wats lo 25°C)	Lo Volteij Diskonekt (LVD) (11.5V or 10.5V)
DC Input Volteij (10.0V – 15.5V)	Lo Volteij Rikonekt (12.6V or 11.6 V)
Weivfom (Pua saen weiv)	LVD Woning Treshol (11.8V or 10.8V)
AC Aotput Volteij (220V or 115V +/- 10%)	LVD Dilei Period (4 minit)
(AC Aotput Frikwensi (50 or 60 Hz +/- 10%)	Hae Volteij Diskonekt (15.5V)
Pik Iffisiensi (92%)	Hae Volteij Rikonekt (14.5 V)

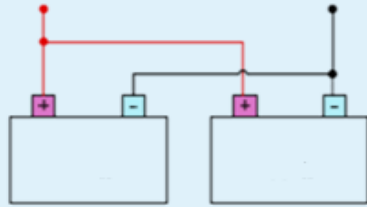
22 Adapted from "System Components, Batteries", Arizona State University (VOCTEC), <http://vottec.asu.edu>

Wanem nao rikuaemen yu luk fo hem taem yu selektem wanfala PV modiul? Diskas wetem olketa narawan. (Yu maet go baek long olkea nout blong yu long antap fo faendem wanem nao fo luk long hem long Sola PV modiul nemplet)

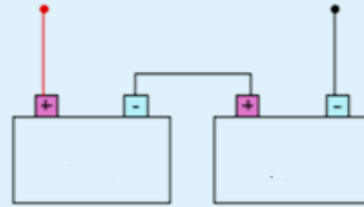
Tekem tufala batri an konektem tufala long sirias an parale. Mesarem total volteij blong wanwan setap ya.

Batri (x2)	Kabel	Multitmita
		

Parallel
12V 70Ah
840Wh



Series
24V 35Ah
840Wh



AKTIVITI 7

Wanem nao bae happen long PV paoa an karent sapos tempresa blong sola hem inkris?

ATIVITI 8

Treina blong yu bae givim yu evri pat fo diskasem (olsem PV modiol, kontrola, batri, inveta an 12 DC laet wetem fiksa. Treina blong yu bae askem yu fo luk save long pleit data (Spesifikeisin an fisa) long wanwan pat ya. Yu mas rid an

luksave evri infomeisin wea hem stap long olketa komponen olsem long olketa nout long antap. Diskasem diswan long olketa tim blong yu an no sem of askem treina.

4

Olketa taep long
sola PV sistem

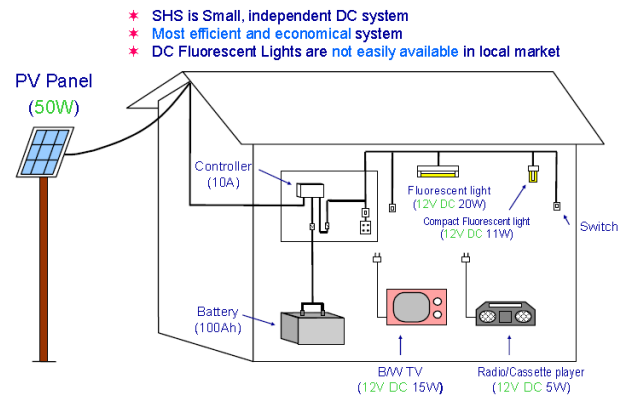
4.1 Sola paoa sistem wea hem stan seleva

Olketa stan-alon sistem no konekt nao long paoa grid an save instolem olketa long imout eria long ples wea paoa grid no kasem or ples wea demand fo paoa hem lou.

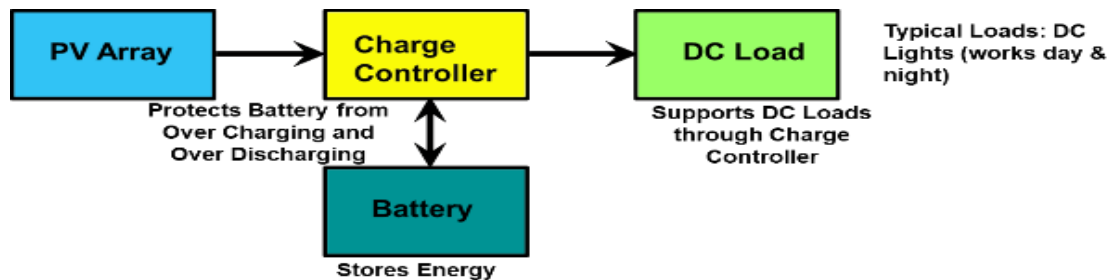
4.1.1. Stan alon sola DC paoa sistem wetem batri

Diswan no olsem nao olketa wea konekt long grid, olketa sistem ya mas garem nao batri fo givim paoa saplae long naet. Aveilabol paoa hem DC 12V bat olketa narafala voltej naet hem 24V, 48V an samfala moa. Save yiusim olketa folom nao saes blong sistem.

FIGA 24: Stanalon DC Paoa sistim²³



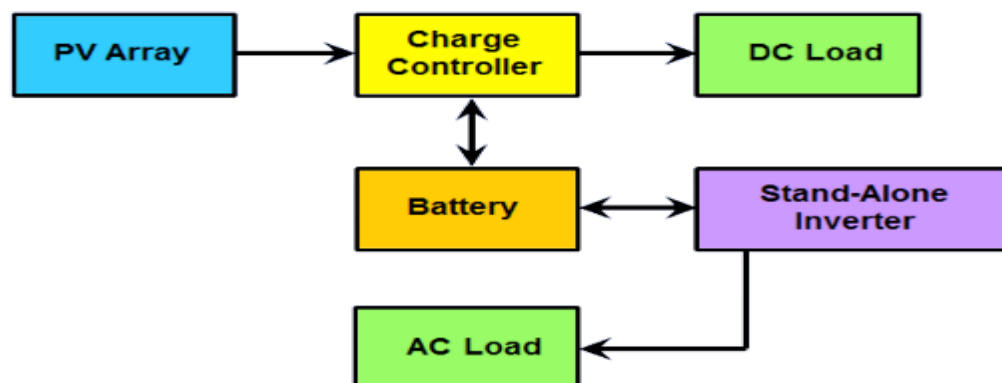
FIGA 25: Tipikol stanalon DC paoa sistim wetem batri²⁴



- No adem ekstra laet o lod go long SHS sistem, diswan bae save kosem sistem fo no waka gud, ovahit, spoel o satdaon bikos eneji no fit.
- Staka taem save yiusim long olketa smol haos wea hem nidim nomoa laet an fo sajem fon.

4.1.2 Stanalon sola (DC+AC) paoa sistim wetem batri

FIGA 26: Stanalon sola (DC+AC) paoa sistim wetem batri²⁵



²³ Source: JICA.

²⁴ Source: Jim Dunlop Solar.

²⁵ Source: Jim Dunlop Solar.

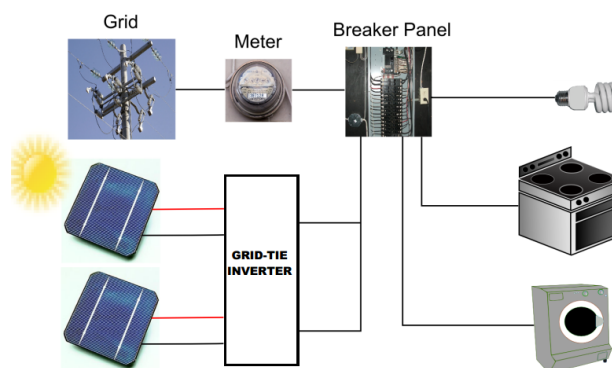
- Waka de an naet bikos batri stap.
- Hem sem sistem olsem “DC lod nomoa” bat hem garem nara inveta fo alaom nao paoaring blong AC lod tu.
- NO eksensim AC an DC lod. Olketa lod blong DC mas tekem paoa nomoa from DC Saplae. NO paoarem DC LOD WETEM AC SAPLAE. **Diswan garem bik risk fo ikuipmen hem spoel, karakil an save dae tu).**
- Staka taem hem fo olketa midiam saes haos wea garem laeting, sajem fon an olketa smol AC aplaens nid.

4.2 Sola Paoa Sistem long Grid

Olketa taep siste ya hem save stap nao long olketa eria wea grid infrastaksa hem fitim.

Inveta hem konvetem nao paoa wea hem kam from sola sistem- Hem save daerekt karent (DC) go nao long AC paoa, diswan hem mekem fo paoa ya save fitim nao grid. Olketa sistem ya no save mekem grid fo olketa seleva bikos olketa save konekt nomoa go long grid wea hem stap finis fo saplaem nao paoa go long grid ya.

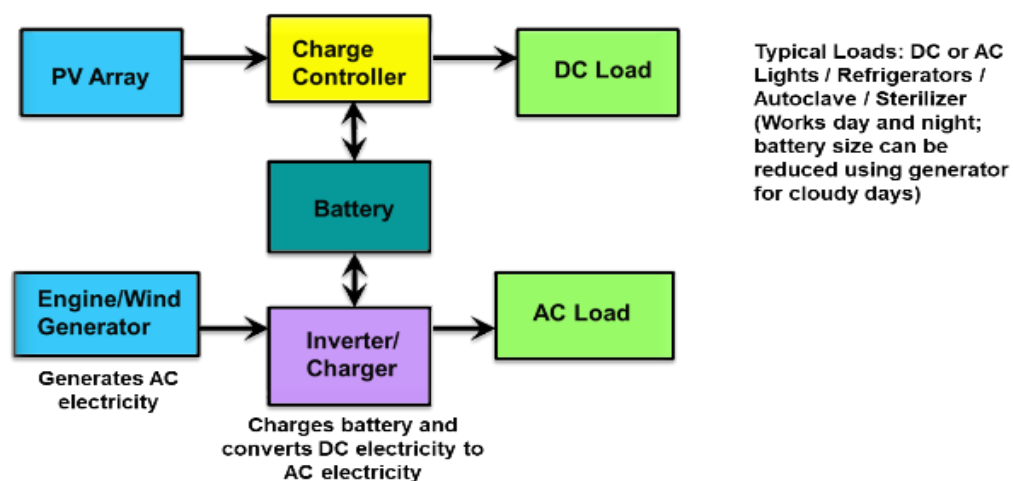
FIGA 27: On-grid setup²⁶



4.3 Haebrid sola paoa sistim

Olketa taep sistem ya hem fitim nao wea fid hem atraktiv long tarif an hem go daon nao long olketa kastoma from olketa paoa kampani.

FIGA 28: Haebrid Setap²⁷

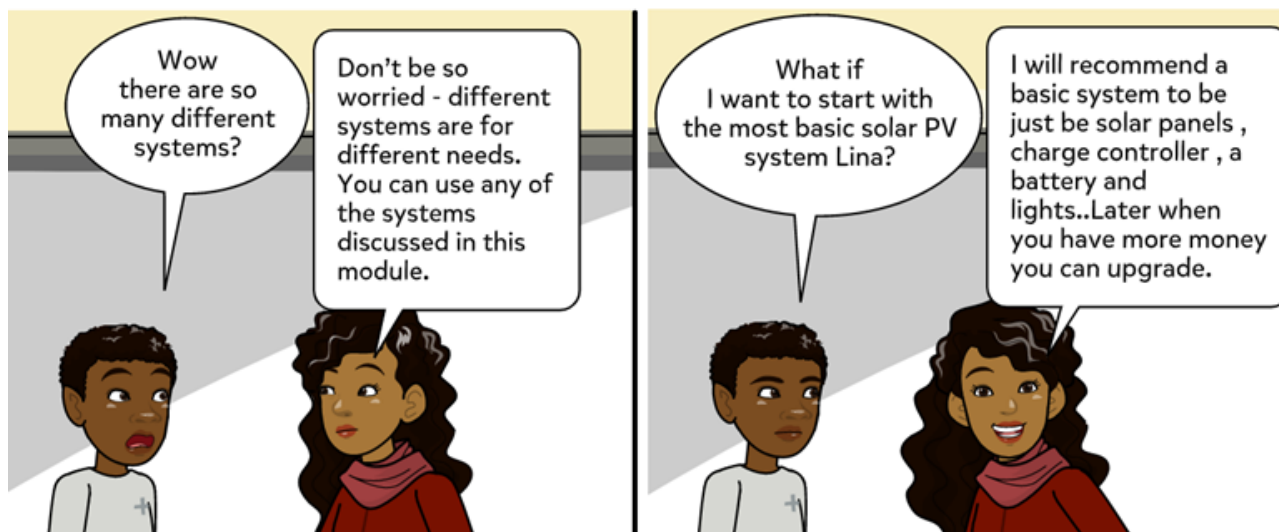


- Hem waka de an naet bikos batri hem stap.
- Sem sistem olsem “DC + AC lod sistem bat hem garem ekstra saj waka long inveta wea hem alaom fo sajem batri wetem disol/ petrol jenereita/ ein tebaen an samfala moa. Diswan hem fo baekap paoa fo avoedem nao ovalod o taem no garem inaf eneji.
- Diswan save yiusim fo olketa bikfala hao wea garem laet, sajem fon an save yiusim nao olketa aplaens olsem (TV, masin fo waswas kaleko, frij an samfala samting moa.

²⁶ Source: Hindawi, "Journal of Renewable Energy", June 2021, <https://www.hindawi.com/journals/jre/2013/785636/fig1/>

²⁷ Source: Jim Dunlop Solar.

Katun Brek



Not:

AKTIVITI 9

Droum eni trifala taep long sola paoa sisten an raetem daon olketa pat blong olketa. Hem gud fo yu diskasem long grup bifo a yu droum.

AKTIVITI 10

Diskasem long klas wat kaen sistem nao yu laekem an wae?

5

Olketa tul fo yiusim
insaet Sola PV Sistem —

Diswan nao samfala tul fo yiusim taem instolem Sola PV sistem.

FIGA 29: Komon Tuls²⁸



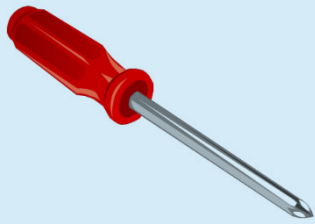
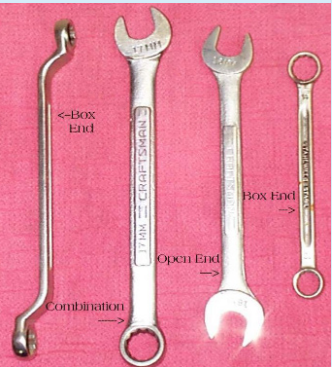
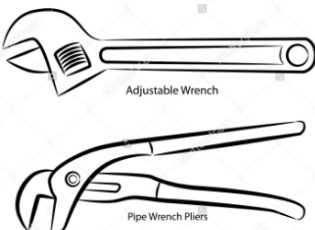
5.1 Spesifik Tuls an waka blong olketa

Piksa blong olketa tuls ia	Nems blong olketa tuls ia	Yius an waka blong olketa tuls ia
FIGA 30: Klam mita 	Klam mita	Klam mita hem save mesarem nao olketa ya, volteij blong AC an DC, risistens, wea hem barava fitim nao taem waka wetem elektrik. Gud fo hae an isi fo mesare karent.
FIGA 31: Moltimita²⁹ 	Moltimita	Wanfala moltimita save mesam nao volteij, karent an risistens. Hem garem hae resolutin. Save mesam nomoa karent sapos mita hem konekt long sirias taem mesam komponen.
FIGA 32: Flat skrudraeva³⁰ 	Flat skrudraeva	Openem olketa skru.

28 Quora, "What type of tools and fasteners are required to install a solar panel", <https://www.quora.com/What-type-of-tools-and-fasteners-are-required-to-install-a-solar-panel/#n=12>

29 Jim Dunlop Solar.

30 Source: Galco, www.galco.com

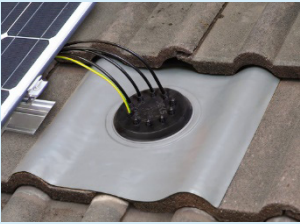
FIGA 33: Filips Skruedraeva³¹ 	Filips Skruedraeva	Openem olketa skru.
FIGA 34: Solar Iradiens Mita³² 	Sola Iradiens Mita	(Fo mesarim strong blong sola o iradiens blong hem).
FIGA 35: Ofset boks renj³³ 	Ofset boks renj, kombaenasin renj, open en renj an nomol boks renj	Diswan olketa tul fo help fo hol strong an hem garem mekanikol adventeij taem aplaem fo tanem olketa object- olketa rotary fastena olsem olketa nat an bolt o fo stopem olketa fo no tane.
FIGA 36: Ajstabol renj³⁴ 	Ajstabol renj Paep renj plaees	Diswan olketa tul fo help fo hol strong an hem garem mekanikol adventeij taem aplaem fo tanem olketa object- olketa rotary fastena olsem olketa nat an bolt o fo stopem olketa fo no tane.

31 Source: Conceptdraw.com, "Manufacturing and Maintenance", <https://www.conceptdraw.com/examples/diagram-of-screwdriver-and-its-specific-use-in-maintenance>

32 Solar Panel Store Blog, June 2021, <https://www.solarpanelstore.com/products/daystar-ds-05-solar-irradiance-meter>

33 Mechanical Engineering, <https://mechanical-engg.com/gallery/image/2209-wrench-typesjpg/>

34 Source: Pinterest.com, "Different types of wrenches", <https://www.pinterest.com/pin/147352219031480866/>

FIGA 37: Laenman plaes³⁵ 	Laenman plaes	Olketa laensman plaes hem taep long plaes wea olketa elektrisian an samfala olketa tredsma save yusim fo grip, tuist, ben an katem waea an kebol.
FIGA 38: Nidol nos plaes³⁶ 	Nidol nos plaes	Is wan save yusim fo kat an holem samting wea olketa elektrisian an tredsman save yusim fo ben, riposisin an snipem waea.
FIGA 39: Flashings³⁷ 	Save yusim diswan fo avoidem fo stopem wata fo lik long opening.	
FIGA 40: Module connectors³⁸ 	Olketa konekta save yusim fo konektem olketa sola panol long sirias wetem narafala sola panol.	

35 Source: AmPro, <https://ampro.fr/en/shop/pliers/wire-cutting-pliers/71-2-high-leverage-diagonal-pliers/>

36 Source: DORNO, Rubber Grip Long-Nose Pliers, <https://www.olo-7.top/products.aspx?cname=rubber+needle+nose+pliers&cid=40>

37 Source: Alternergy Solar Pv and Storage solutions, <https://www.alternergy.co.uk/dektite-lead-multicable-solar-flashing-tiled-or-slate>

38 Source: CED Greentech, <https://www.cedgreentech.com/article/pv-connectors-what-you-need-know>

Oketa ya oketa difren taeps blo skrudraeva heds wea sola teknisians save kam akros. Ij hed garem na spesifik skrudraeva

FIGA 41: Skrus wetem difren heds³⁹



Fo handolem an karem olketa tul hem impoten tumas taem waka wetem sola PV sistem. olketa metod ya nao yu save yiusim fo karem olketa tul.

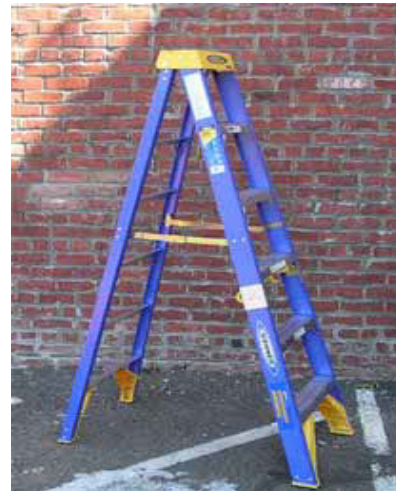
FIGA 42: Weis fo karem na tuls lo tul belt seifti⁴⁰



Garem trifala taep lada.

Step lada hem no disaen fo yiusim fo garem akses long narafala levol olsem olketa ruf an mas no yiusim fo disfala rison.

FIGA 43: A-freim lada⁴¹



Hem olsem A-frem step lada, bat hem provaedem nao seif envaeromen fo waka. Hem provaedem wanfala gud platform stanap an waka. Hem olsem garem reil o baria wea hem help fo stope yu fo foldaon.

39 Source: UU-99, <https://www.hindawi.com/journals/jre/2013/785636/fig1/>

40 Source: Pinterest.com, <https://www.pinterest.com/bambulancemania/work-apparal/>

41 Source: Pinterest.com, <https://www.pinterest.com/bambulancemania/work-apparal/>

FIGA 44: Platfom lada⁴²

Ekstensin lada hem olketa stret lad wea yu save yiusim fo kasem olketa hae eria, save waka from o garem akses go long olkea level o olketa ruf.

FIGA 45: Ekstensin lada⁴³

Not

Fo siusim lada hem impoten tumas. Siusim long blong lada beis nao long kontak poent wea lada blong yu sae tasem ruf o wol.



SEFTI TOKTOK: Taem yu siusim nao stret o ekstensin lada, siusim na lada wea long blo hem at lis 3 ft go antap long plesyu nid fo stanap long hem fo waka. Taem yiusim nao ekstensin an stret lada, fot step from antap nao hemi hae step wea yu save klæ go kasem o yiu save waka from.



SEFTI TOKTOK: Yu mas no yiusim nao metol lada kosap long elektrikel laen o ikwipmen. Yu mas olowe luk ap fastaem bifo yu apum na lada fo meksua na no garem eni ovahed paoalaen lo dea.

⁴² Source: Total Tools, <https://www.totaltools.com.au/2-4-4-0m-extension-ladder>

⁴³ Source: Swallow Tail Inn, <http://www.swallowtailinn.com/when-should-replace-your-siding/>

AKTIVITI 11

Wanem nao bik difrens bituin klam mita an multi-mita?

6

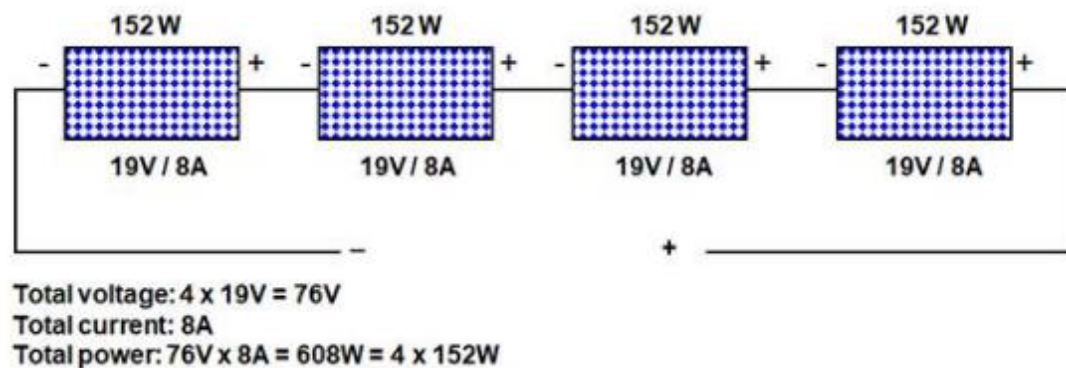
Instolem Sola
PV sistim

Taem instolem Sola PV sistem, stret elektrisian nao mas duim. Hem garem samfala disaen an instoleisin standad fo folom fo meksua korekt an instoleisin hem seif an hem folom nao gud praktis blong indastri.

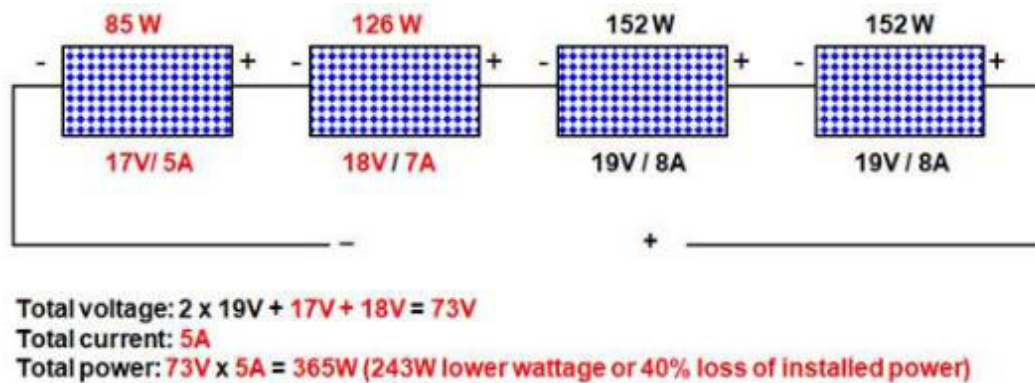
6.1 Siris koneksin

Olketa PV modul olketa konekt elektrikoli long sirias fo inkrisim nao volteij aotput (aotput blong karent hem stap semsem nomoa). Insaet long sirias koneksin, positive teminol blong wanfala sola modul hem konektem go long negative teminol blong narafala modul. Lod wea hem konekt go long positiv en an go long negative en blong disfala string. Fo hem barava waka gud tumas, evri modul long olketa string ya mas semsem.

FIGA 46: Siris koneksin⁴⁴



FIGA 47: Siris wetem miks saez⁴⁴

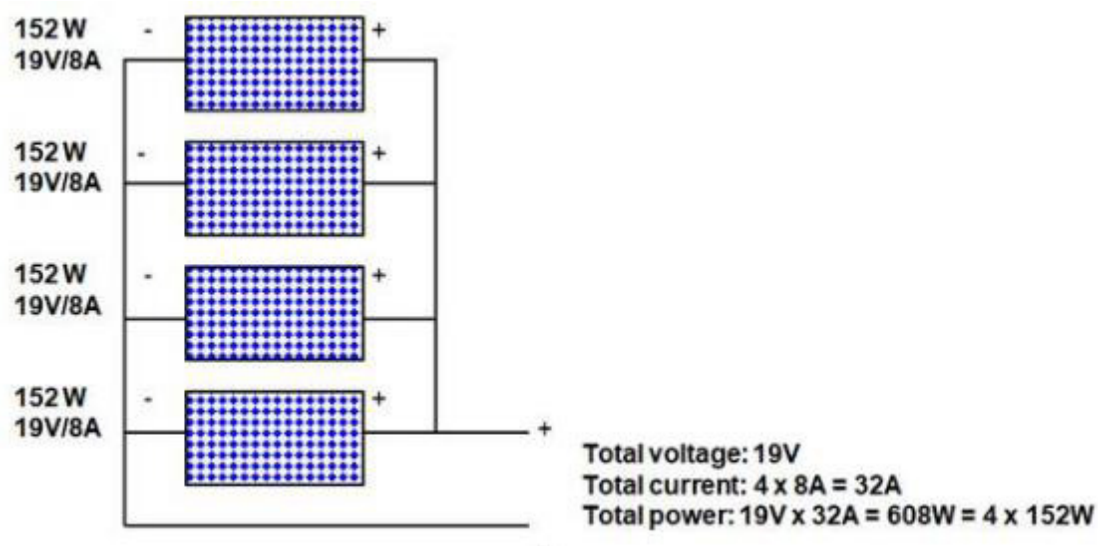
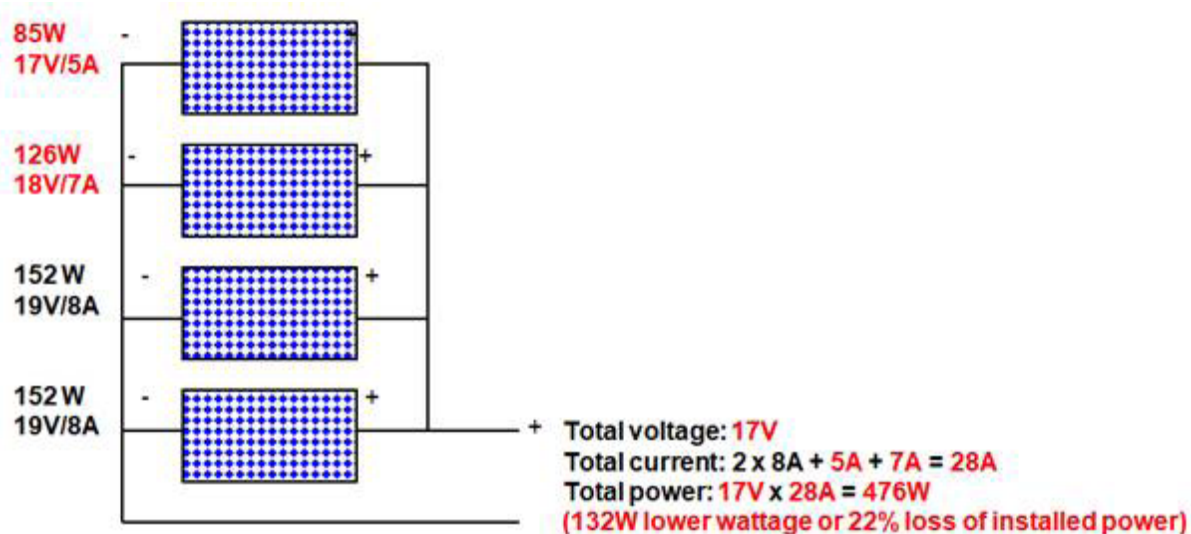


6.2 Paralel Koneksin

Olketa PV modul konekt elektrikoli long paralel fo inkrisim nao aotput blong karent (volteij hem stap semsem).

Long paralel koneksin, positiv teminol blong wan modul hem konekt go long positiv teminol blong narafala panol an negativ teminol blong wan modul hem go nao long negativ teminol blong narafala panol.

44 Photo credit: <https://solarpanelsvenue.com/>

FIGA 48: Paralel Koneksin⁴⁴FIGA 49: Paralel wetem olketa miks saez⁴⁴

6.3 Pripea fo instoleisin

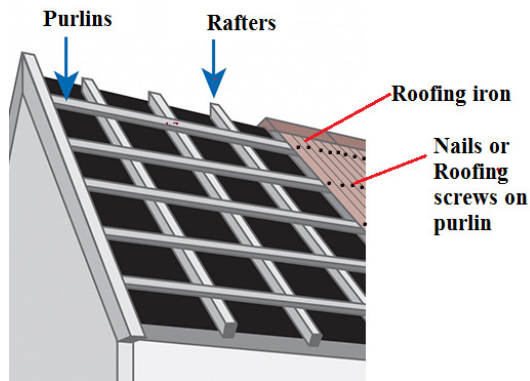
Bifoa yu stat fo instoleisin, yu mas planem nao instoleisin an tekem nao evri matiriol wea yu nidim fo stat. Yu mas save gud an disaed sapos hem sirias or parallel koneksin wea bae yu duim an luksave fest nao long eni seifti isu wea maet kam ap. Mas mek sua garem PPE (pesonol protektiv ikiupmen) bifoa yu statem sola instoleisin). Yu mas meksua tu korekt saes an namba long olketa pat hem kasem nao ples yu bae duim instoleisin.

6.4 Sola PV modiul maonting

No mata watkaen taep maonting nao yumi siusim, taem instol mas meksua dat maonting ya hem strog, seif an hem no afektem nao propa opereisin blong olketa sola panol.

6.5 Ruf maonting PV modiuks

FIGA 50 : Wud Stakja lo ruf⁴⁵



Fest ting fo duim nao hem fo setem ap nao maonting beis (samtaem olketa kolem long L-fit) wea hem shud stap nao long pelin long ru yiusim nao olketa skru blong ruf).

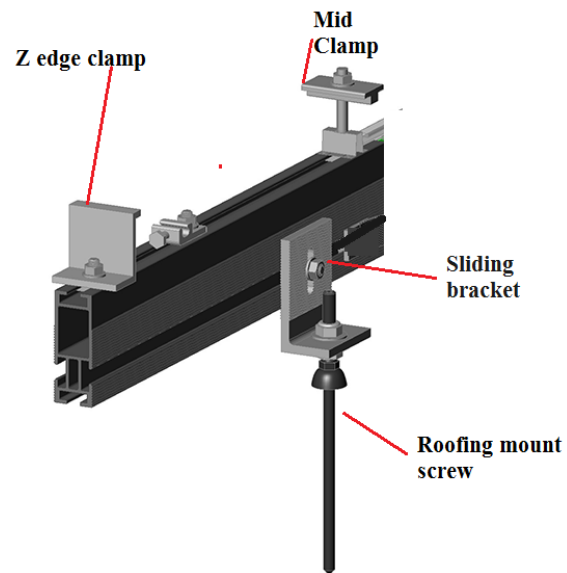
FIGA 51: Sola Reils lo korugeisin⁴⁶



Neks, olketa sola reil konekt go long L-fit. Oolketa sola reil ya hem gud an hem praktis wea mas duim taem putum ap staka sola panol long ruf.

Fo hem waka gud long Solomon Aelan, tilt (hao fo benem) hem mas 10 digri an kolsap long latitud agol araon 8 go long 13 digri.

FIGA 52: Eij an mid klam fo sola maonting⁴⁷



Taem olketa reil ya hem stap strong, instolem nao sola panol an putum antap long olketa reil yiusim nao difren taep long klam.

FIGA 53: Sola panols wea oketa maontim lo reils⁴⁸



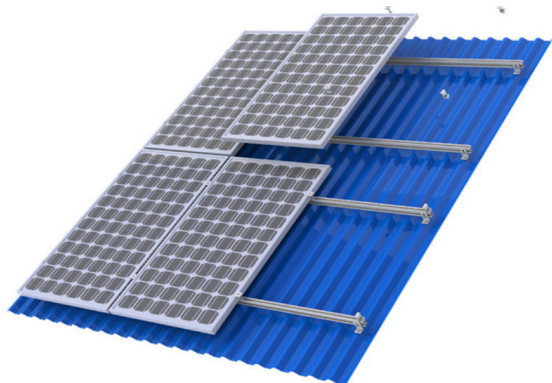
45 Source: Pinterest.com, March 2021, <https://www.pinterest.co.uk/pin/539446861598727570/>

46 Source: Sun for Son, <http://www.solar-mount.com/solar-mounts/high-quality-tile-roof-aluminum-alloy-pv.html>

47 Source: Solar Gain, June 2021, <https://www.solargain.ca/product/fast-rack-10-panel-mounting-kit/>

48 Source: ClayEnergy, Fiji.

FIGA 54: Maontim Sola lo olketa Pasifik Aelan ruf yusim na z klams an timba⁴⁹

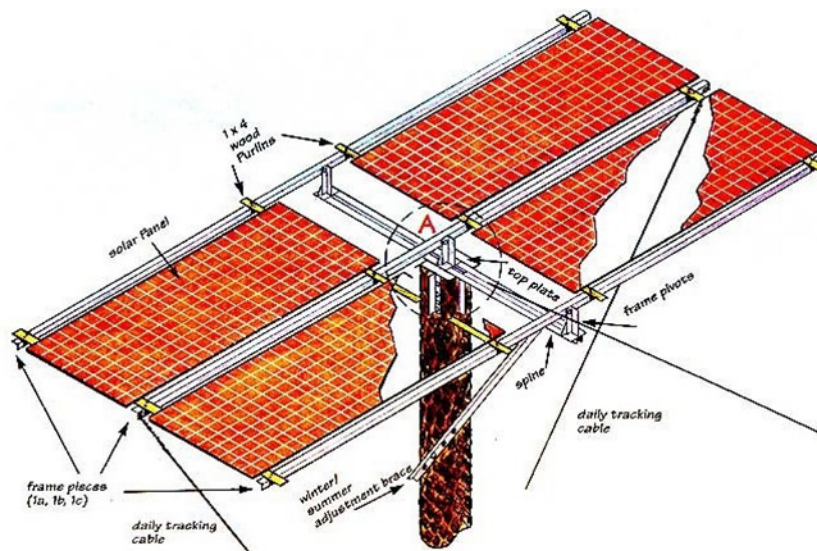


Staka rimout komiuniti olketa rurol eria garem nao ruf from lif. Hem garem samfala isu taem instolem sola panol long olketa lif ruf an hem no strong gud. So, fo olketa smol sola panol, yu mas maontem nao modiul long separeit frem wea joen go long separeit frem o long stik.

FIGA 55: Pol maont sola hemi wan gudfala opsin bikos lo ruf strakja wea hemi no fitim⁵⁰



FIGA 57: Pol maonting oketa save fabrikeitim lokoli⁵²



6.6 Graon/ PV modiul long pol

Sapos ruf maonting long sola panol hem no posibol den graon sistem hem narafala gud wei fo yusim, diswan hem fitim olketa rimout komiuniti long rurol eria.

FIGA 56: Eksampol lo pol maont lo sola PV maonting sistim⁵¹



Olketa gudfala samting abaotem pol maont fo instolem wan o tu panol hem inkludem nao.

- Mas putum nao long ples wea hem no seid.
- Mas tiltem gud an daareksin blong hem mas set.
- Kala fo panol long bottom long panol hem klia fo ventileisin.
- No warim nao olketa lif an rabis wea hem stap bituin olketa panol an ruf.
- Hem na isi fo aksesim fo mentenens.
- No problem wetem bae hem lik wea save kam nao from olketa maonting panol long metol ruf.

49 Source: Able Solar, "Tin Roof Mounting System", <https://www.ablesolar.co.nz/shop/Solar+Panel+Array+Frame/Roof+Mounting+Frames/Tin+Roof+Mounting+System.html>

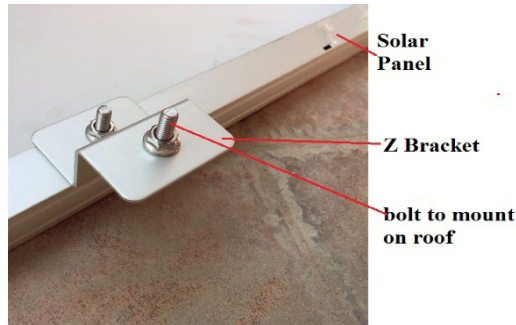
50 Source: Fiji Department of Energy.

51 Source: Mibet Energy, May 2021, <https://www.mibetsolar.com/>.

52 Source: Mother Earths News, "How to Build a Manual Solar Tracker", <https://www.motherearthnews.com/diy/manual-solar-tracker-zmaz97amzgoe>

Long samfala keis, olketa standad reil bae hem no aveilabol. Sapos olsem den yu mas nid fo improvaes an yiusim braket.

FIGA 58: Z klam maonting ditels⁵³



6.7 Installing Batteries (Instolem olketa batri)

FIGA 59: Taeps blo olketa batri⁵⁴



Samfala ki poen fo save taem yu instolem batri nao hem:⁵⁵

- Batri/olketa batri mas instolem nao long rum wea yu mekem fo batri.
- Lokeisin o rum ya hem mas protektid an samfala man nomoa fo go long rum ya an no evriwan.
- Speis o rum hem gareni isi akses taem instolem batri an fo duim mentenens, no eni metol object mas stap kolsap nogud hem mekem man fo foldaon antap olketa batri teminol an save kosem sot seket.
- Sapos ples fo putum batri hem wanfala rum seleva an hem pat long bilding, den akses mas from aotsaed an fo olketa batri wea save kosem faea fo stat (eksampol olketa open-sel-led –asid taep batri) olketa wol mas no gareni hol o penetreit go insaet haos an mas gareni hol o diswan wea hem go aotsaed.
- No putum eni elektrikol ikuipmen antop olketa batri wea bae hem save bosta o givim aot poisen gas.
- Ples fo instolem olketa batri mas drae.

⁵³ Source: Engineer Solar, June 2021, <http://engineer-solar.com/Products/solar-panel-z-bracket.html>

⁵⁴ Source: Adapted from "System Components- Batteries", Arizona State University, VOCTEC, <http://voctec.asu.edu>

⁵⁵ Off Grid PV Power Systems – System Installation Guidelines, SEI/API, 2019.

- Olketa batri mas no stap long graon o siment floa sapos hem stap long graon, bae bottom pat long hem bae get yius nao long tempresa blong graon wea hem lou den ambient tempresa wea antap pat long batri hem shud laek. Wetem kemikol beis batri sistem, diswan save lid nao long stratifikeisin blong elektrolaet an hem save nogud kuiktaem tu.
- Ples fo putum batri hem mas no stap long ples wea san bae sut daerekt long hem an hem mas long lokeisin wea olketa batri save stap kol.
- Ea wea hem stap mas fitim fo helpem nao fo kontrolem tempresa an sapos nesesari trae fo avoidem nao bildap blong haedrojin o olketa narafal gas wea save kam wetem taem saj.

Olketa batri olketa hevi ya an eria adanit olketa batri ya hem mas save holem nap bearing blong weit blong olketa batri ya.

6.8 Instolem Saj Kontrola an olketa narafala pat

Olketa narafala pat blong sola hom sistem nao hem olsem, saj kontrola, olketa lod, inveta (sapos sistem hem AC taep), olketa kebol an ikuipmen fo proteksin an olketa diswan ya save stap nao long maonting bod wea hem stak go long wol olsem bae yu lukim long piksa ya.

FIGA 60: Injinia som na SHS sistim wea hem maont na lo wol⁵⁶



Not

(Olketa jenrol gaedlaen fo taem instolem olketa pat ya na):

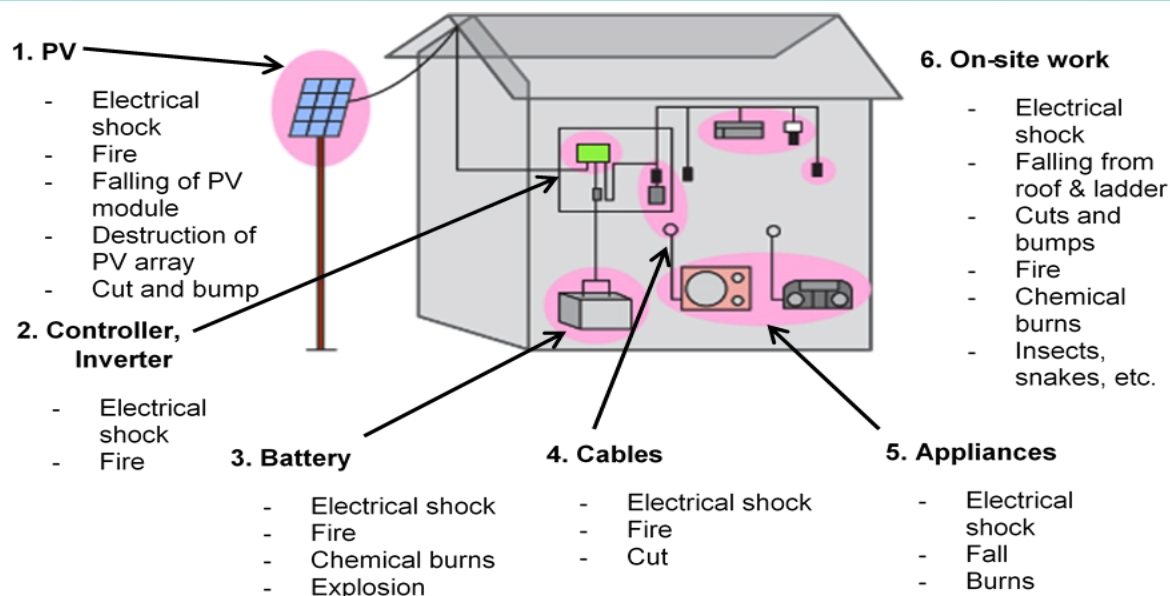
- Olketa pat fo instolem mas folom nao instraksin from kampani.
- Evri rikiuamen blong spies araonem wanwan pat mas folom gud fo aloaem fo propa kliarens an ea flou blong pat ya.
- Taem instolem saj kontrola an inveta (sapos present) hem shud kolsap go long batri fo no yiusim tumas nao an fo ridiusem nao drop long volteij.
- Olketa pat mas no putum nao long ples wea san save sut daerekt kam an mas stap nao long ples wea dast bae no save kasem.
- Olketa difren pat ya, olsem inveta ya save hevi tumas ya so hem impoten fo meksua dat maonting bod hem mas strong fitim nao fo karem nao weit ya.
- (Evri DC (an AC kebol sapos inveta hem stap) mas rutim gud an mas garem strong sapot. Olketa AC kebol hem mas stap separeit from olketa DC kebol an mas garem mekanikol proteksin fo avoidem eni eksposa long olketa narafala kebol).
- Evri kebol mas garem bik volteij an karent reiting den maksimam volteij an karent wea ekspektem insaet seket.
- Evri proteksin n olketa pat wea bae save suisim mas reitem gud fo hem seif taem opereitem taem laekem.

7

Olketa seifti rikueamen
blong Sola PV sistem —

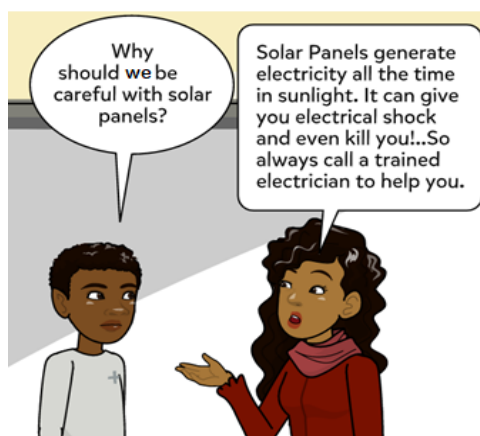
Hem garem samfala helt hazad wea save stap nao long Sola PV sistem. Samfala long olketa seifti risk bae yu save lukim nao long piksa ya.

FIGA 61: Sefti Risk lo Sola PV sistim⁵⁷



7.1 Olketa seifti rul fo folom

FIGA 62: Olweis sikim help from sola teknisian⁵⁸



1. Mas olowe talem ona blong haos fo ofum nao paoa bifo mekem eni koneksin o ajasmen.

FIGA 63: Woning saens⁵⁹



2. Mas meksua olowe dat taem yu kondaktem instoleisin o ripea long olketa seket long olketa wea yu trein long hem nomoa. Yu mas no modifaem nao sola PV sistem anles yu barava adastadem nao sistem ya.

⁵⁷ Source: JICA.

⁵⁸ GGGI, Fiji.

⁵⁹ Source: AviationPros, <https://www.aviationpros.com/tools-equipment/safety-equipment/article/11148860/ground-handling-safety-signs>

FIGURE 64: Only repair circuits for which you have training⁶⁰



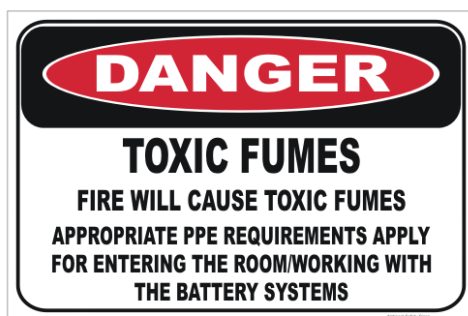
3. Mas werem olowe PPE (pesenol proteksiv ikuipmen) olsem olketa glav, aegal n su. No tasim eni waea wea hem open no mata yu werem glav.
4. Yu mas no ripearem eni batri yuseleva. Olketa batri garem olketa kemikol wea hem denjaras wea save kosim sirias ham.

FIGA 65: Asid Woning⁶¹



5. Yu mas no putum olketa batri kolsap long faea o insaet olketa living rum-samfala batri save givim of olketa gas wea save kosem faea o olketa poesen gas no mata yumi no lukim.

FIGA 66: Fiums woning⁶²



6. No storem olketa batri long olketa speis wea hem smol tumas or kolsap olketa fiul bikos olketa save statem faea. Mas putum olketa batri olowe long ples wea rum hem bik an ea hem flou gud.

FIGA 67: Batri Woning⁶³



7. Yu mas werem olowe hanes(rop) wea hem konekt go long ruf long haos blong yu taem yu waka fo instolem olketa sola panol long ruf. Sapos taem yu waka antap ruf, hem gud sapos yu waka wetem narawan.

FIGA 68: Konek hanes tgo lo ruf olweis⁶⁴



8. Yu mas meksua no fo tasim eni waea long eni taem o trae fo konektem olketa laev waea. Yu mas askem help olowe taem yu laek karem olketa hevi panol, no mata olketa laetfala panol save bik win.

60 Source: Safety workblog.com, <https://safetyworkblog.com/assets/understanding-the-2015-edition-of-nfpa-70e-the-arc-flash-hazard.jpg>

61 MSDS online, <https://www.msdsdonline.com/2014/07/22/sulfuric-acid-safety-tips-sulfuric-acid-msds-information/>

62 Source: National Safety Signs, <https://nationalsafety signs.com.au/wp-content/uploads/2020/02/D10332-Toxic-Fumes-sign.png>

63 We Need Signs.com, "Ansi Battery Charging Safety Signs", <http://www.weneedsigns.com/home.php?cat=403>

64 Source: Solar Power World, <https://www.solarpowerworldonline.com/2016/01/how-to-stay-safe-on-top-of-metal-roofs-when-installing-solar/>

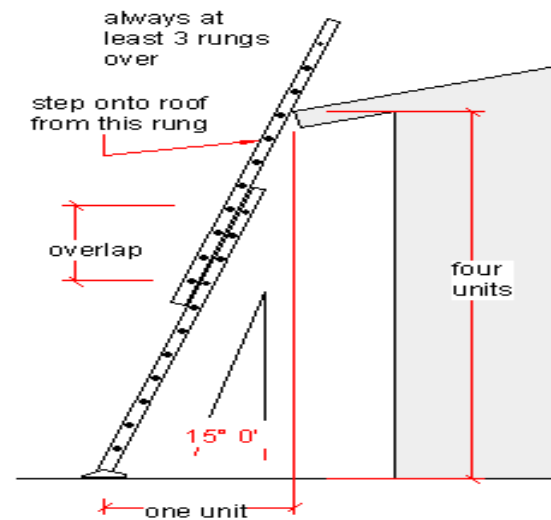
FIGA 69: Yu mas keaful taem karem na panels taem hot⁶⁵

9. Yu mas meksua yu save abaotem olketa raet prikousin taem yu yusim olketa elektrikol ikuipmen olsem olketa dril an samfala moa taem yu laek duim maonting an mas werem aeglas fo proteketem ae taem yusim olketa dril an hama.

FIGA 70: Werem PPE an konek hanes lo ruf⁶⁶

Not

10. Yu mas meksua olowe yu praktisem olketa lada seifti rul taem yu yusim wanfala lada fo kasem nao ruff o dil wetem olketa sola PV sistem.

FIGA 71: Lada fo mekem at list digri angol wetem graon⁶⁷

⁶⁵ Adapted from Barefoot college Annual Report (2016-2017), https://www.barefootcollege.org/wp-content/uploads/2018/10/Barefoot_annualreport_2016-17_v7_online.pdf

⁶⁶ Source: Pacific Prime Singapore, <https://www.pacificprime.sg/blog/covid-19-lockdown-singapores-quarantine-measures-for-foreign-workers/>

⁶⁷ Source: Builder Bill, <https://builder-bill.com/diy-help>

AKTIVITI 12 0 MANDETRI

Pat A: Diskasin long olketa seifti prekosin

Olketa lena mas go insaet grup an imajinem olsem bae olketa instolem tufala 50 wat panol wetem trifala 30Ah batri inkludem nao 20A saj kontrola, tufala DC laet an wanfala 100W inveta wetem wanfala sigol AC laet balb olsem wanfala lod.

Fes samting fo duim hem fo olketa lena fo diskasem nao olketa seifti prikousin wea olketa nid fo mekem taem duim instoleisin. Olketa mas stori stori abaotem den olketa save raetem daon tu.

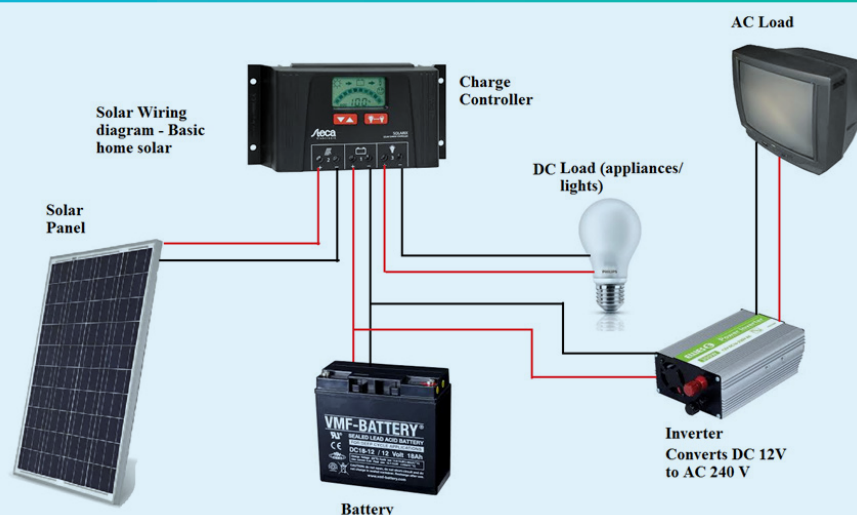
Part B : Instolem wanfala sola wea hem save stanap seleva (stan alon) DC + AC sistem

Givim fo olketa lena wanfala sola PV sistem wea hem garem nao olketa saming ya:

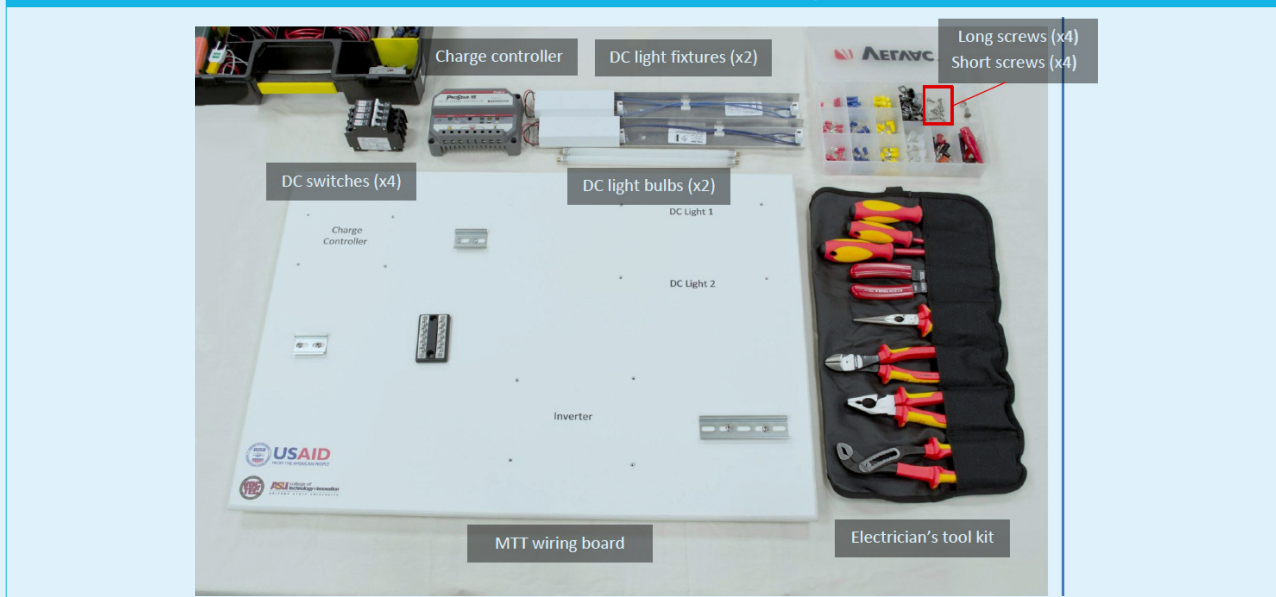
- Olketa sola panol
- Olketa batri
- Saj kontrola
- Inveta
- Olketa DC laet balb (10W) wetem wanfala suis olsem AC lod
- AC laet balb (10W) wetem suis
- Sola panol maonting kit
- Elektrik waea
- Olketa plae, skru draeva, maltimita
- PPE-olketa glav wea hem insuleit, aeglas, olketa tul wea hem insuleit, olketa helmet an hanes fo ruf)
- Olketa wea konekta an DC seket break

Insaet long disfala aktiviti ya, olketa lena bae traem nao hao fo instolem wanfala ril sola PV sistem wetem seket daegram:

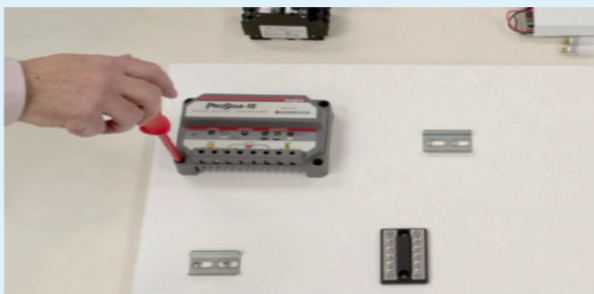
FIGA 72: Koneksin daegram blo DC+AC sola PV sistim⁶⁸



Olketa matiriol bae nidim fo setem ap DC



1. Attach charge controller with long screws to four threaded screw inserts on upper left corner of the wiring board.



2. Snap on four DC switches to DIN rails by pushing in yellow tabs at the bottom of the switch.



3. Attach DC light fixtures with small screws to threaded screw inputs on upper right corner of wiring board (DC light fixture with wires labeled 1 should go above DC light labeled 2).

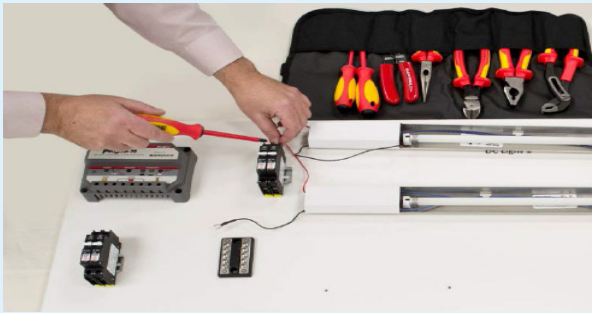


4. Snap in DC light bulbs to fixtures by gripping the metal ends of the bulb. (Insert bulbs into fixtures and gently rotate bulbs until they snap into place).

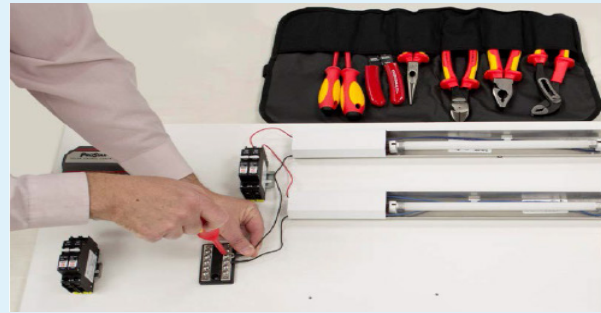


Distaem bae waearem nao olketa difren pat blong DC sistem.

STEP 1



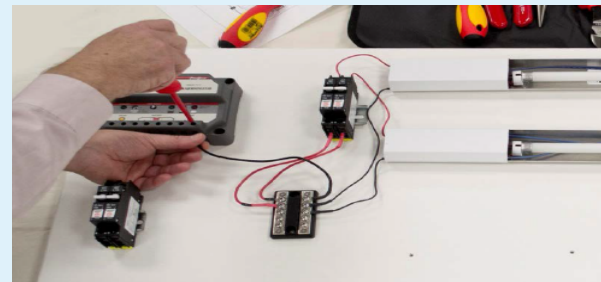
STEP 2



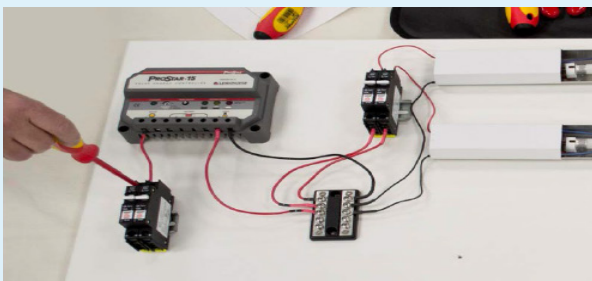
STEP 3



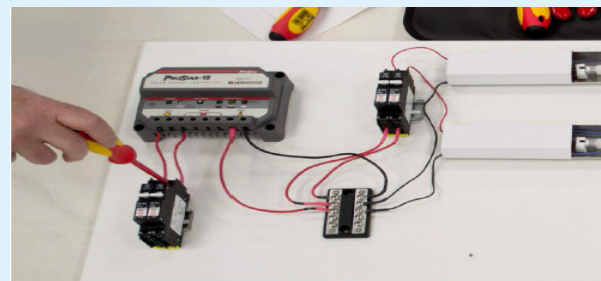
STEP 4



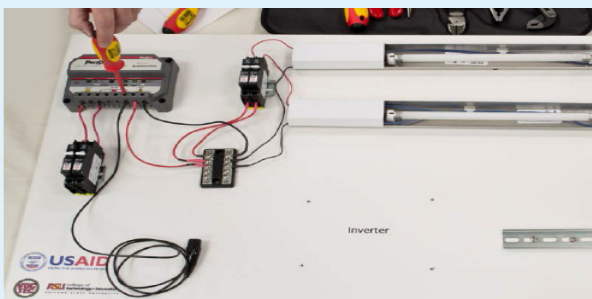
STEP 5



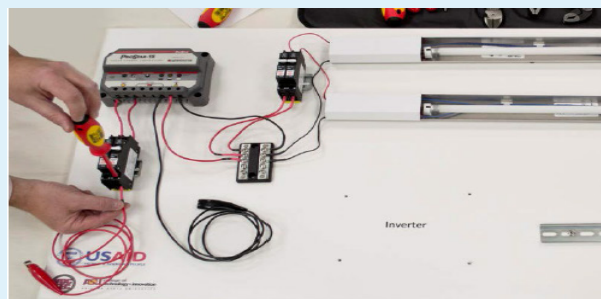
STEP 6



STEP 7



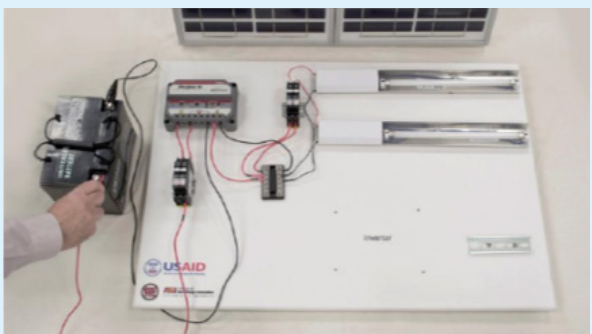
STEP 8



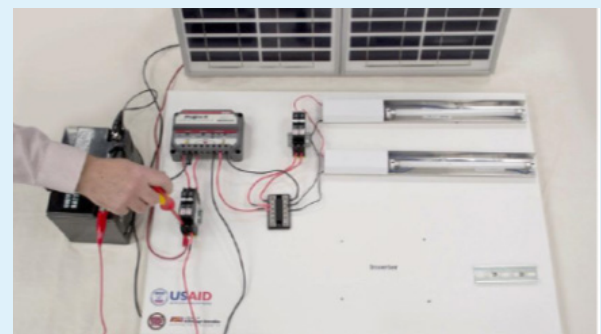
Long neks step, bae yumi koneketem batri an panol

FAENOL ASEMBLI BLONG SISTEM

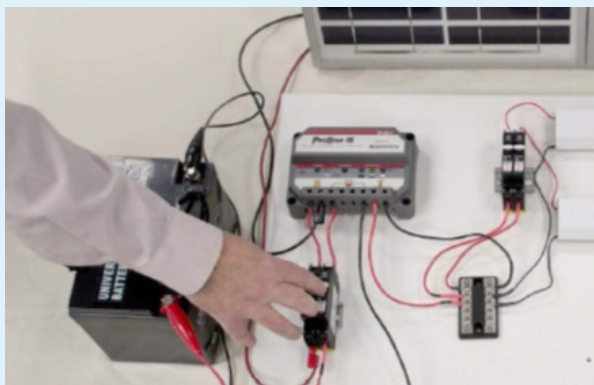
STEP 1



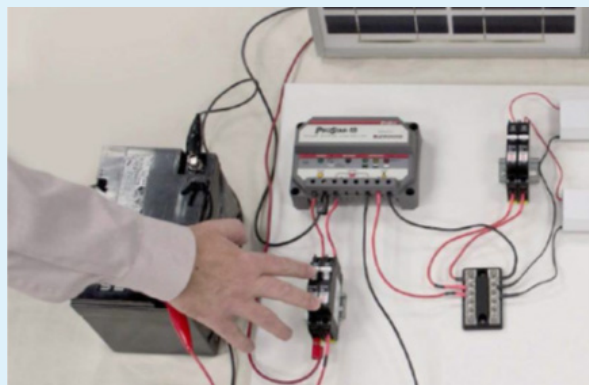
STEP 2



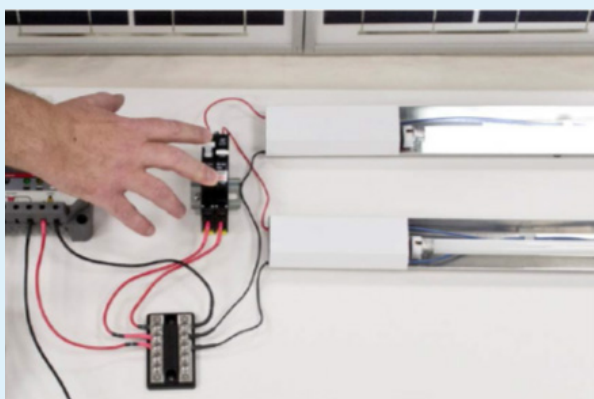
STEP 3



STEP 4



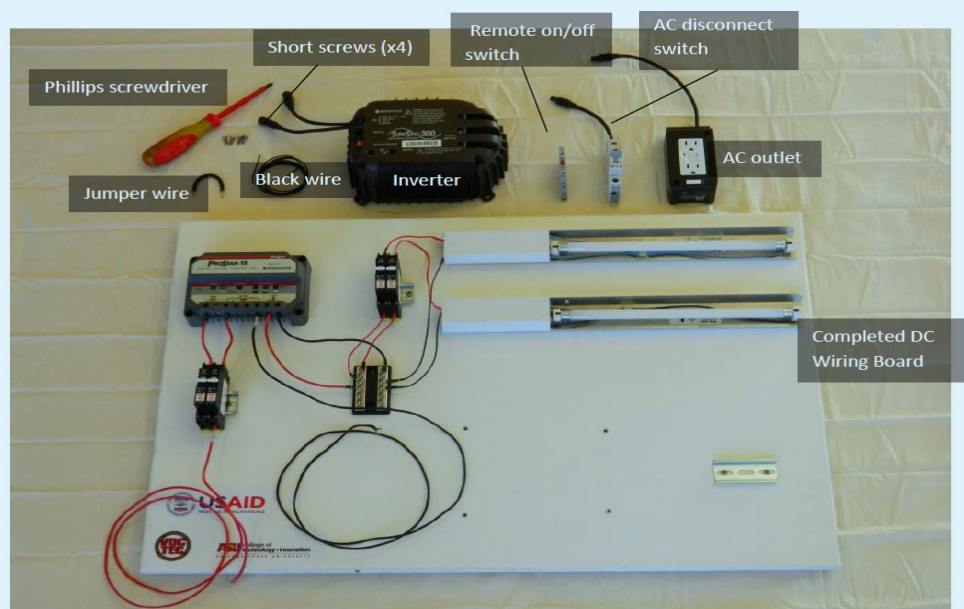
STEP 5



STEP 6

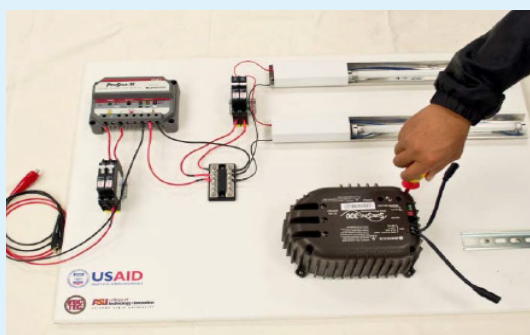


Nao dat yumi garem DC sistem, yumi muv moa long AC sistem. Long hia garem samfala pat wea bae yu nidim

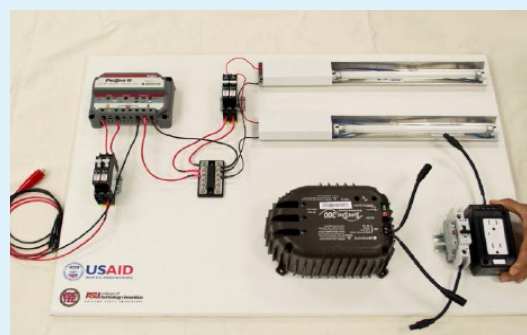


DISTAEM YUMI INSTOLEM INVETA

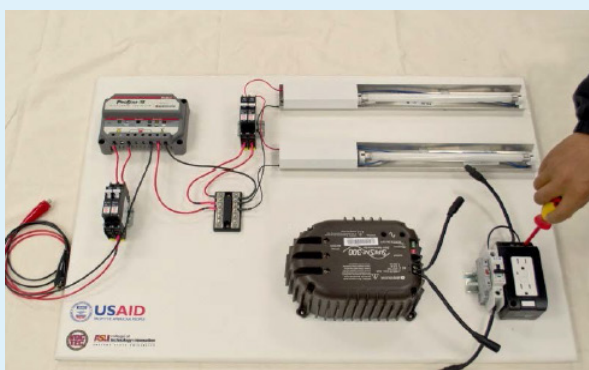
STEP 1



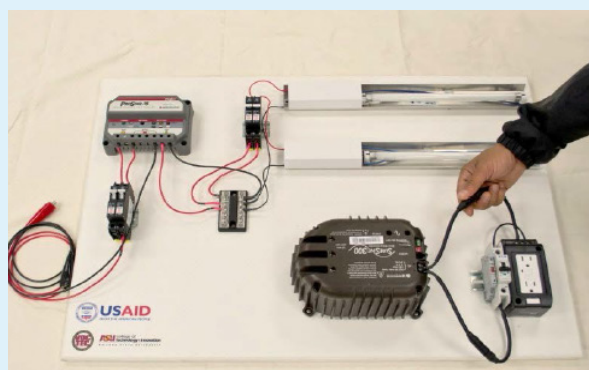
STEP 2



STEP 3



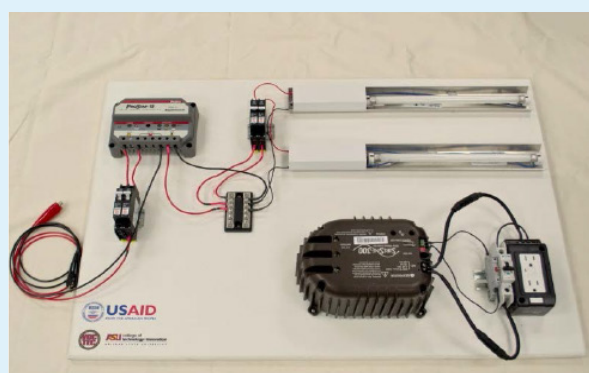
STEP 4



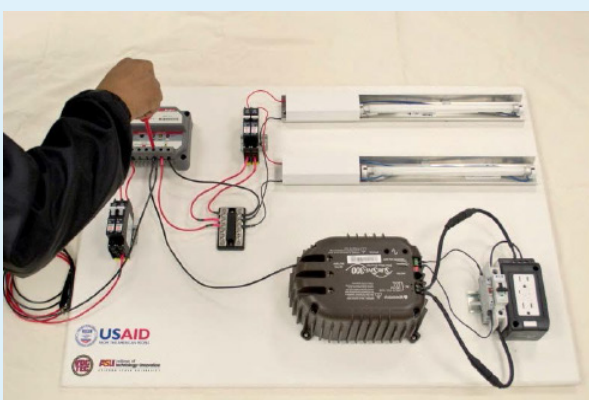
STEP 5



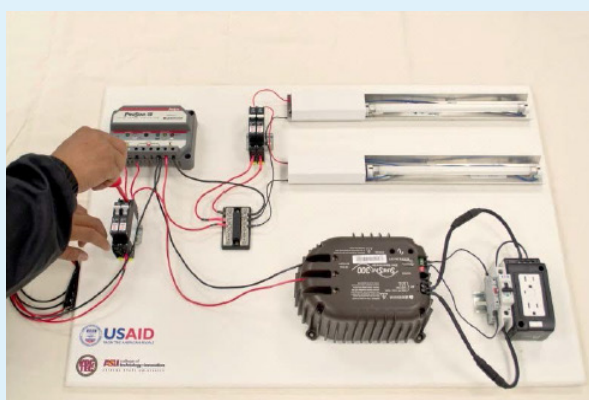
STEP 6



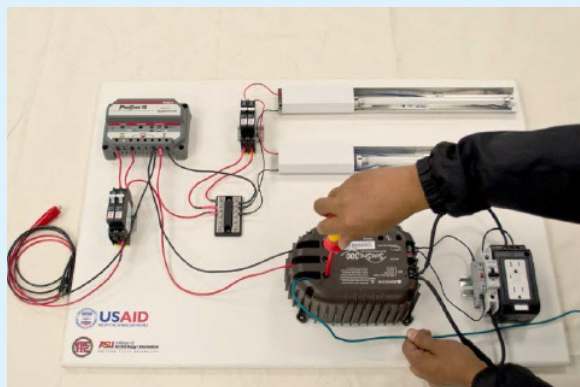
STEP 7



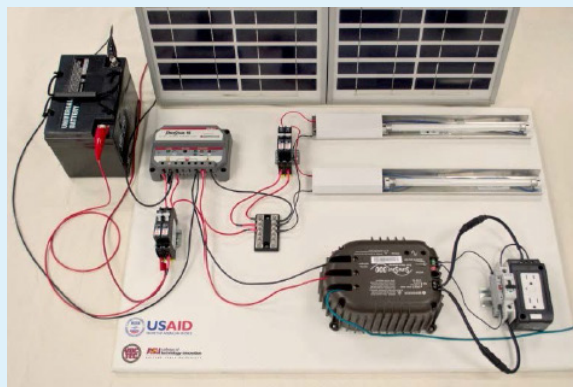
STEP 8



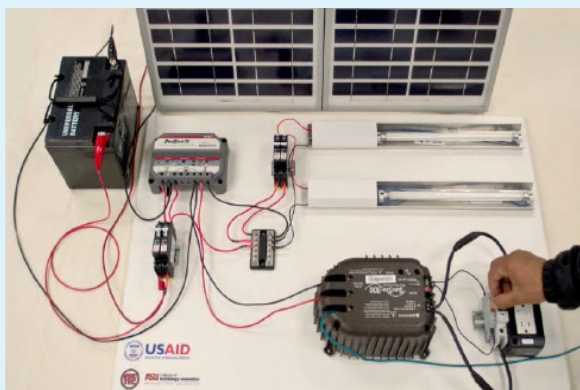
STEP 9



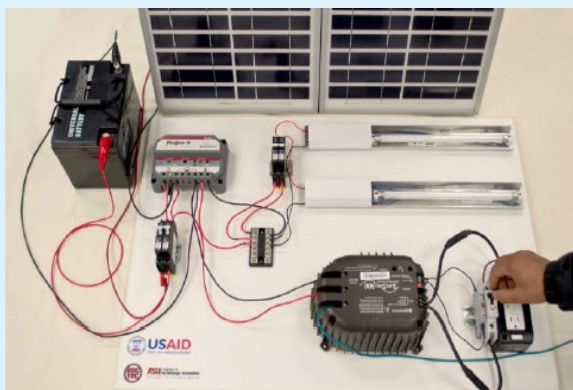
STEP 10



STEP 11



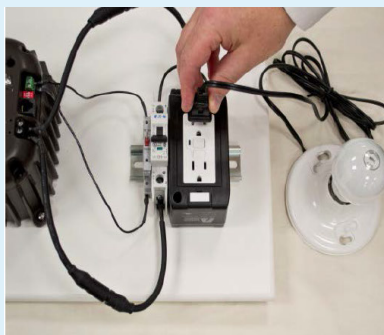
STEP 12



STEP 1



STEP 2



STEP 3

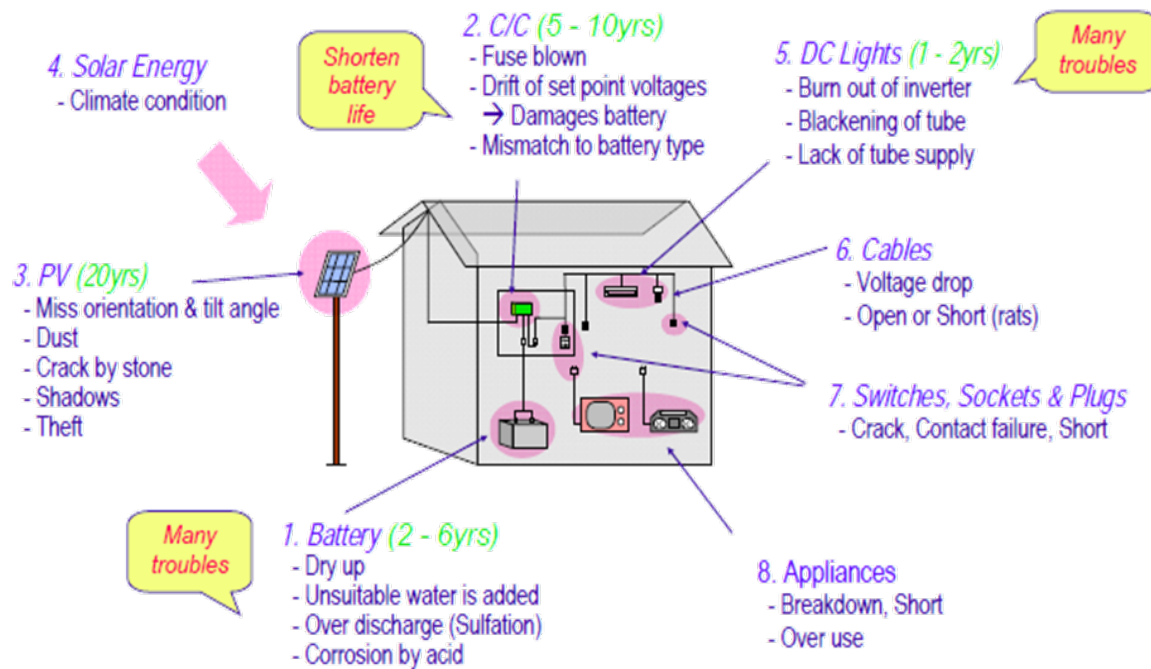


8

Hao fo luksave an fo
risolvem olketa folt wea bae
yu faendem long sola hom
PV sistem

Olketa piksa wea bae yu lukim ya bae hem soum nao olketa taep long folt wea bae yu save eksperiensem long sola hom sistem.

FIGA 73: Komon komponent folt⁶⁹



8.1 Olketa folt wea bae yu save faendem long Saj Kontrola

Insaet long sola PV sistem, saj kontrola nao brein blong ful sistem ya an hem nao fes ples yu mas luk long hem sapos eniting rong.) Diswan nao samfala komon folt wea bae yu lukim long saj kontrola

Folt 1: (Saj kontrola hem no soum nao ful steit blong batri long en lo de).

Rison: Aksidentol ovayius (klod tumas, ren, spesol TV program)

Remedi/wanem nao fo duim

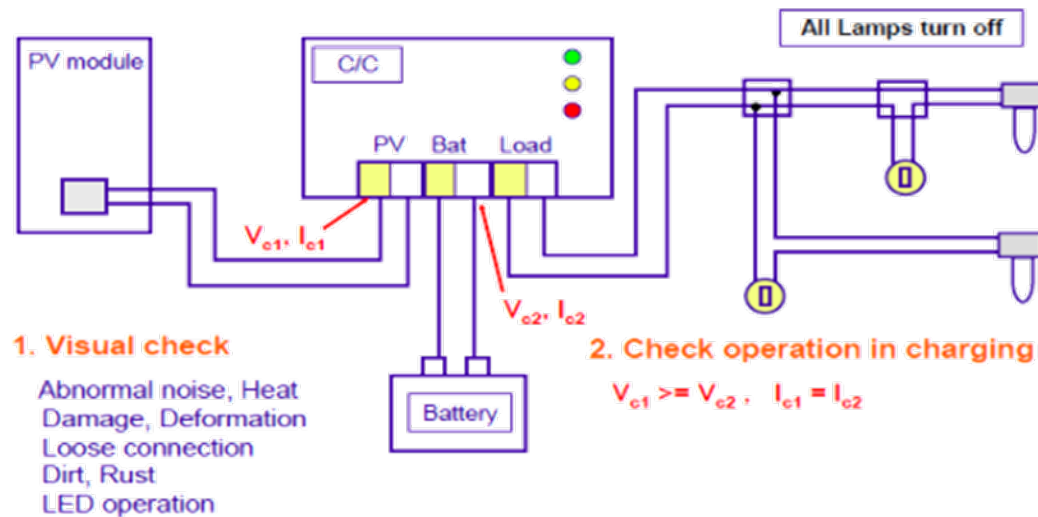
Ridiusim yius taem blong lod long insaet wan de fo alaoem olketa batri fo saj gud moa.

Folt 2: Saj kontrola katem of olketa lod an laet

Rison: Ovayius tumas insaet long de (batri hem disaj naya

Remedi/wanem nao fo duim: Ridiusim yius taem blong lod long haf gogo C/C hem soum ful steit (duim diswan fo wan wik) fo letem batri fo hem saj gud. ⁶⁹

FIGA 74: Kontrola Folt Faending⁷⁰



Folt 3: No eni karent hem flou go long batri o eni signal hem sou fo talem batri hem ful saj no mata batri hem jas saj o go hed saj no mata taem batri hem ful.

Olketa rison:

Fius hem blouap, lus koneksin long olketa waea o intenol kontrola seket hem no waka gud

Remedi/wanem nao fo duim: Taetem olketa lus koneksin, ripleisim nao fius wea hem blouap, sekem LVD an HVD seting.

Folt 4: Lou o no paoa aotput from sola panol)

Rison: Rong orienteisin (tilt agol hem rong/daareksin), staka dast, krak long glas lamineisin, sado ovam panil, pua sanlaet/staka klaod tumas), sot seket long bypas, lus o olketa waea koneksin wea hem brek, olketa stilim olketa panol.

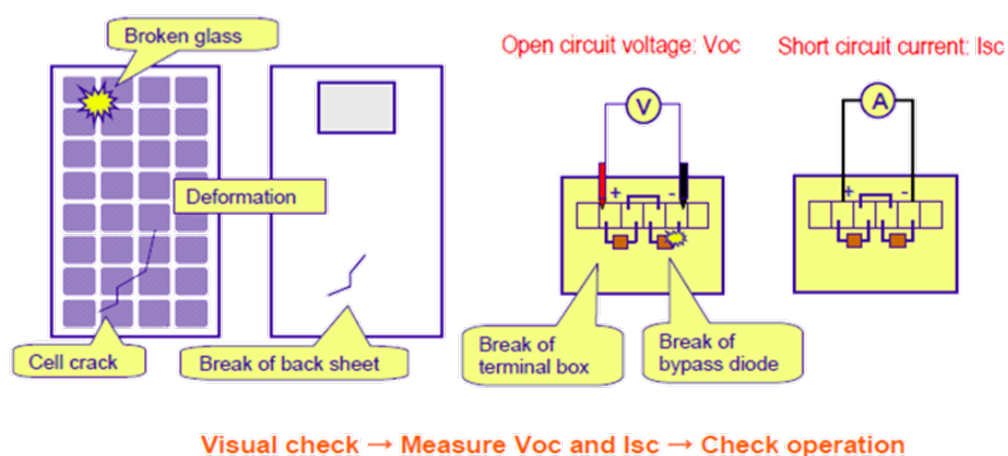
Remedi o wanem fo duim: Stretem nao orienteisin an agol fo tilt (agol ya hem mas araon 10 digri an mas feisem not

- Sekem olketa krak an dast sapos hem stap.
- Klin pV wetem wata, no nid fo yiusim olketa ditejen.
- Taetem olketa koneksin weal us long teminol boks.
- Aotem nao olketa blokeij an stopem shadoing blong PV modiol bituin 9am-3pm.
- Ripleisim Bypass diod.

8.2 Olketa folt long Sola Panol

Olketa folt long sola panol save lukim nao taem paoa hem lus o taem yu mekem mesamen. Displei long sola panol volteij save lukim nao long olketa saj kontrola.

FIGA 75: Panol Folt⁷¹



70 Source: JICA..

71 Source: JICA..

Olketa narafala komon rison blong lus blong paoa nao:

Delamineisin: diswan hem taem lamineit matiriol hem antap long sola panol hem stat fo aot. Delamineisin save koseim elektrikol sok an save kosim dramatic paoa los.

FIGA 76: Panol Sefeis dameij



Braoning blong sistem: Diswan hem taem sanlaet an kemikol riaksin blong olketa leia long panol hem kosim fo sens kala go long yialo o braon.

8.3 Olketa komon Folt blong batri

Folt 5: Batri hem save kuiptaem saj o bae no save saj gud bikos olkea sel garew olketa voltej wea hem no semsem.

Olketa rison: Salfeisin (kemikol sens long led elektrod), elektrolaet hem lus, stratifikeisin (taem elektrolaet long solusin hem konsentreit long botom) los blong teminol koneksin, tempresa blong batri hem hae o paoa hem lik bikos garew asid long aotsaed safeis bituin olketa batri teminol.

Remedi/wanem nao fo duim:

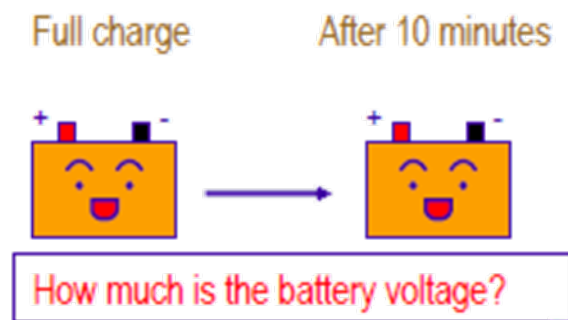
- Slakem olketa koneksin long olketa teminol.
- Klinim teminol wetem olketa stil bras, ripleisim olketa teminol an aplaem gris(e.g vasesaen, litiam gris) fo aotem nao rast long teminol).

- Levul long batri elektrolaet hem lou, top ap sapos yu nid fo top ap.
- Yiusim raet teminol lag/klam nomoa.
- Aotem olketa rast long olketa teminol wetem waea bras).
- Stratification (Lelebet sekem batri (araon 10 digri from floa long saed) fo kliarem nao stratifikeisin).
- (Kodisin taem instol hem nogud (hot tumas, no inaf gud ea an samfala samting moa), muvum go long narafala ples sapos hem necesari.

8.4 Sekem olketa voltej blong batri

Hem impoten fo ripleisem olketa batri wea olketa barava no waka gud fo no spoilem olketa narafala batri long batri bank sapos staka batri konekt tugeda.

FIGA 77: Batri Jajing – olweismonita voltej⁷²



8.5 Jenrol balans blong olketa folt long ikuipmen

Olketa folt

- Olketa kebol, suis, laet an samfala moa
- No laet taem batri hem ful saj
- Ada voltej long en long lod
- No paoa long en long lod

Olketa rison:

- Open o sot seket o graonding
- Olketa kebol hem adasaes an no stret wan fo yiusim (bik drop long voltej)
- Ben aot DC laet/inveta
- Slak koneksin long olketa teminol
- Hae risistens long suis kontak

Remedi/wanem nao fo duim:

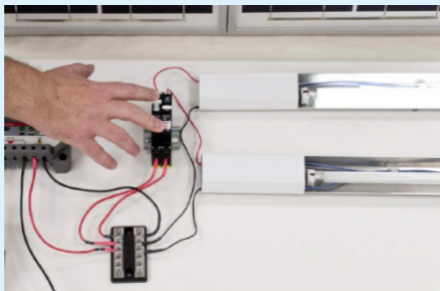
- Sekem voltej levon long en long lod an drop long voltej wetem laet taem onem.
- Taetem olketa lus koneksin long olketa teminol.
- Sekem saes long kebol sapos kebol wea hem instol hem raet saes, sensim sapos hem nesarari.
- Sekem kontinuiti blong olketa kebol, taem open seket, treisem laen an korektem nao open seket).
- (Sekem an stretem nao olketa posibol so seket an graonding wea hem no stret long laen, ri-insuleitem sot seket/graon laen).
- (Sekem opereisin blong suis an drop blong voltej bituin input go long suis an aoput from suis taem tanem fo onem).

Not

AKTIVITI 13- KONTINIUITI TESTING

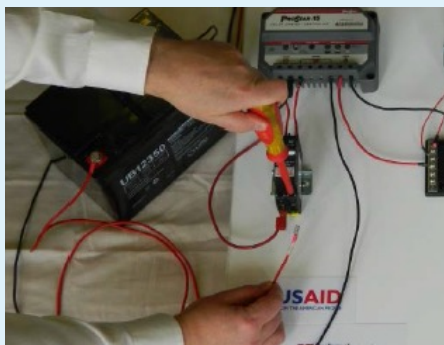
Fo disfala aktiviti, wanfala waea hem garem folt wea hem konekt nao bituin batri an saj kontrola. Treina nao duim diswan fo olketa lena save hao fo ditek an yiusim kontinuiti test.

Setem ap nao DC Sola PV sistem an soum dat hem waka



Sapos lena ya hem lukim hem waka-sensim wan gud waea wetem wanfala nogud waea.

2. Turn off disconnects and replace positive (**red**) wire between battery and charge controller with supplied "faulty" **red** (labeled with 0)



3. Turn disconnects back on - DC lights will not turn on



Yu save demonstretem nao folt faending ya n koreksin aktiviti yiusim nao olketa instraksin ya

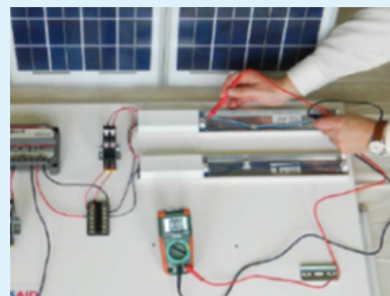
1. Conduct visual inspection of system.



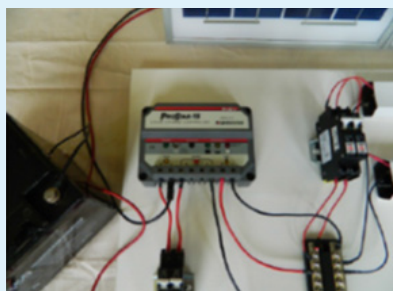
2. Remove DC light bulb(s).



3. Measure voltage at light fixture terminals (voltage should be 0V).



4. Check indication lights at charge controller (all light should be off).



5. Measure voltage at charge controller's load output (voltage should be 0V).



6. Measure voltage at charge controller's battery input (voltage should be 0V).



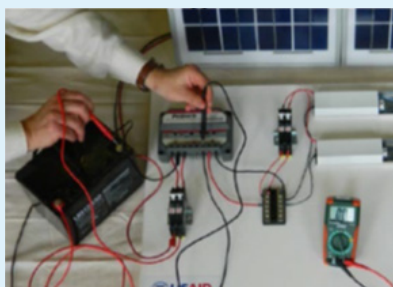
7. Measure voltage directly at battery terminals (voltage should be above low voltage reconnect LVR).



8. Problem is identified as "broken continuity" between battery and charge controller.



1. Switch multimeter to continuity setting and check connection between negative battery terminal and negative charge controller battery input.



2. If multimeter beeps, the circuit is continuous. Measure continuity between positive charge controller battery input and disconnect switch (DMM should beep).



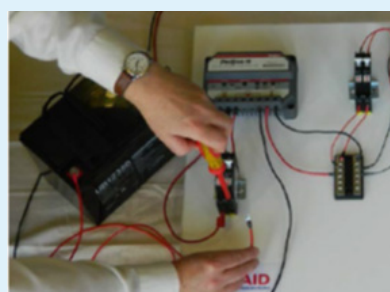
3. Measure continuity between input and output terminals of disconnect switch (DMM should beep when switch is on).



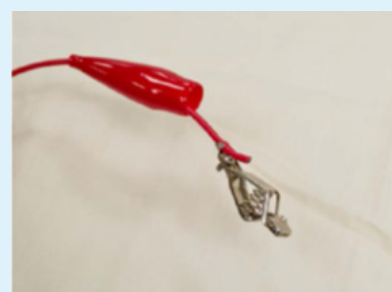
4. Measure continuity between disconnect switch and positive (red) battery terminal (DMM will NOT beep).



5. Problem is detected as discontinuity between battery positive terminal (red) and disconnect switch.



6. Check connecting cable for faultiness. Cause is identified as wire insulations not stripped at battery connector.



9

Mantenens seklis
blong Sola PV

9.1 Mentenens Plan

Fo sek olowe hem wanfala best wei fo inkrisim nao laef blong sola PV sistem blong yu an olketa pat blong hem) Rutim mentenens hem wat save duim olsem wanfala sek wea hem garem nao lis long olketa aetem blong olketa difren pat wea mas tikim. Seklis ya hem fo meksua dat olketa difren pat ya hem yu inspektem, klinem, ivalueitem an sevesem tu mekem olketa save stap longtaem.

9.2 Mentenens blong sola panol

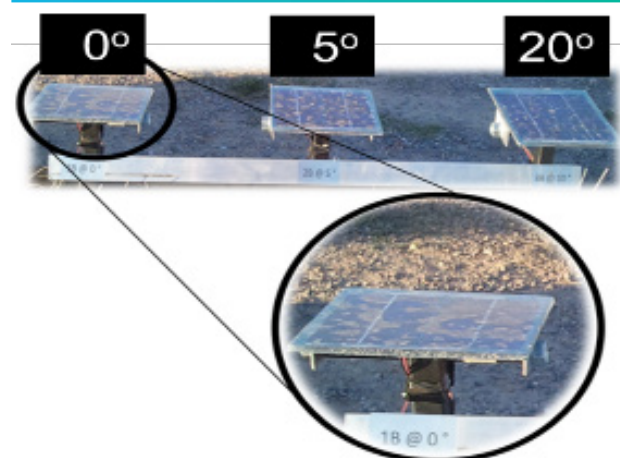
- Inspektem olketa PV arei fo eni saen long eni fisikol dameij olsem impact o olketa fraksa.
- Sefeis hem mas kiln, no eni dameij, klinim eni deti o rabis long antap long panol an adanit long panol sapos hem stap long antap ruf.

FIGA 78: Dameij panols⁷³



Graon hem lus hem inkris taem tilt agol ya hem dikris. Meksua olketa panol ya no flat an lelebet tilt

FIGA 79: Ifekt lo doti panols⁷⁴



9.3 Mentenens blong batri

Mentenens long batri hem involvem nao olketa difren waka wea hem dipen nao long olketa taep batri an rikuaemen blong kampani wea wakem an hem inkludem:

- Inspektem an klinim olketa batri rak, trei keis an olketa teminol.
- Inspektem batri wea hem diskonekt, olketa ovakarent divaes an waearing sistem.
- Mesarem volteij.
- Batri lod testing hem aplae long barava hae disaj reit fo samfala sek, taem mesarem dikris long batri volteij.
- Batri testing kapasiti hem involvem disajing long batri long nominal disaj reit go nao long dept long disaj wea hem priskraeb.
- Riplesim nao olketa batri wea hem no gud tumas long sirias string. Pefomans blong sirias string batri bank bae hem domineit from olketa batri wea no waka gud.
- Mas diskarejem nao ova-disaj blong sistem wea hem happen olowe-Ovayius an ova disajing save ridiusem nao laeftaem blong batri bikos hem garem hae dept long disaj (DOD).
- Mesarem nao spesifik gravati an adem distil wata taem hem lou (fo olketa batri wea hem led asid bat tuweit wan!
- Piriodic batri mentenens mas inkluedem olketa sek blong olketa teminol fo rast an fo taetem gud.
- Yiusim stil bras fo klinim oksaed long koneksin. Werem olketa insuleisin glav evritaem.

⁷³ Jim Dunlop Solar.

⁷⁴ Source: ASU PV/ Reliability Laboratory.

FIGA 80: Batri kea⁷⁵

Seifti Tip: Yiusim olketa aeglas an raba glav taem sevesem batri. Werem olketa ol kaleko bikos asid save poa long yu (sapos olketa batri ya tuweit wan)

Kipim wanfala boks blong beiking soda insaet wata, stearem a yiusim nao miksa fo kuiktaem niutrolaesem eni asid wea hempo.

Lou volteij hem no sok hasad ya bat hae karent nao sok hasad. Sapos yu dropem rens akros long teminol bae hem save bonem kuiktaem nao han blong yu an batri bae save bosta tu.

9.4 Mesarem nao steit blong batri taem hem saj

Steit long batri taem hem saj hem mesa long helt an kapasiti blong batri. Hem garem tufala wei fo mesarem diswan-open seket volteij an taem mesarem spesifik gravati (SGO blong elektrolaet (hem waka nomoa fo olketa batri wea tuweit taep.

9.5 Metod long Volteij

Batri spesifik gravati (tuweit taep batri nomoa) an open seket volteij save mesarem taem duim mentenens fo ivalueitem nao helt blong batri an estimeit steit of saj blong batri.

FIGA 81: Steit blo saj⁷⁶

State-of-Charge	Specific Gravity	Open-Circuit Voltage (V)
100%	1.265	12.6
75%	1.225	12.4
50%	1.190	12.2
25%	1.155	12.0
0	1.120	11.8

For typical lead-acid battery at 25°C

9.6 Haedro mita metod (fo olketa batri wea tuweit)

Olketa haedromita mesarem nao elektrolaet spesifik gravati (SG) taem ekstratem no olketa elektrolaet from batri sel go insaet samba.

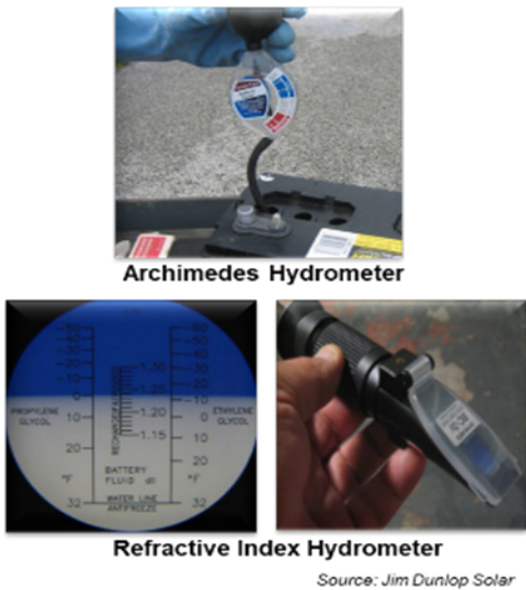


Safety Tip: Inveta hem givim nao hae denjares AC volteij blong 220-240 V. Wearem elektrikel insuleisin glav an folom evri seifti prosija.

⁷⁵ Source: Jim Dunlop Solar.

⁷⁶ Source, Pinterest.com, <https://www.pinterest.com/bambulancemania/work-apparal/>

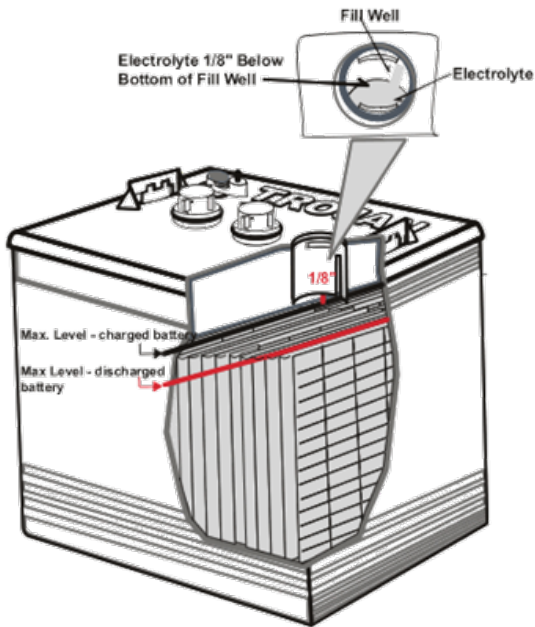
FIGA 82: Haedro Mita Yusage⁷⁷



9.7 Adem distil wata go long batri (tuweit batri nomoa)

- Olketa open vent batri wea tuweit lusim wata nao long elektrolaesis an gasing taem saj.
- Wata hem lus hem inkris wetem tempresa, sajreit an eij blong batri.
- Yiusim distil wata fo stopem nao kontamineisin blong batri an no ova rifil.

FIGA 83: Batri Stakja⁷⁸



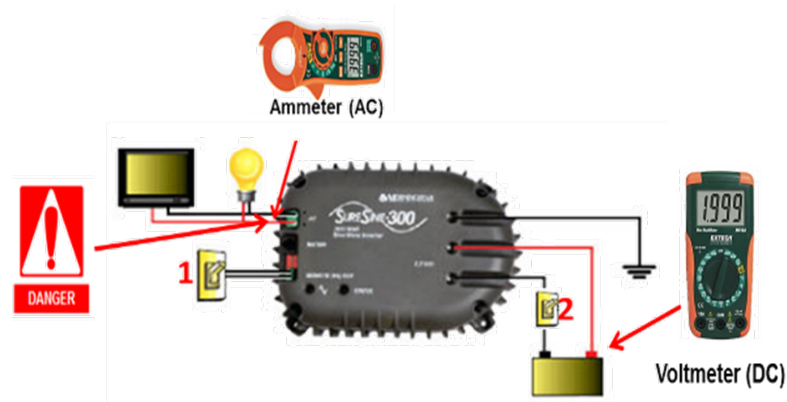
Yu mas yiusim nao batri seklis ya fo karem aot sek long olketa batri

Olketa batri (hem pat long baekap system)	
Sekem elektrikol koneksin	Evri wik
Sek fo rast an klinem teminol	Evri wik
Sekem wata level an top ap fo led asid batri	Evri wik
Mek sua olketa batri hem ful saj long regiula beisis	Evri wik
Ripleisim batri bank	Evri 3-5 yias (led asid) an 5-10 yias (gel wea no open) sapos menteinem gud.
Manejem stoareij blong olketa matiriol wea hem olsem hasad an ples fo torowe: risaekolem olketa spent batri, maneijem elektrolaet spil fo olketa led asid batri.	Taem nid fo duim

9.8 Mentenens blong inveta

- Save gud sapos inveta hem risivem DC volteij from batri yiusim nao volteij mita wea hem set fo mesarem DC volteij.
- Save gud sapos inveta hem produsem AC volteij go long AC lod yiusim nao volteij mita wea hem set fo mesarem AC volteij.

77 Source: Jim Dunlop Solar.
78 Source: Jim Dunlop Solar.

FIGA 84: Inveta Waering⁷⁹

No rimuvem eni waearing, duim monitoring long folom nao sikuens ya:

- Tanem of an diskonektem suis 1 an 2 (lukim piksa).
- Yiusim klam-long ammita (AC) long AC saed.
- Konektem nao voltmita (NO ammita) go long batri teminol (rimebarem ammita bae sot seketem batri an save bloom nao fuis long mita!
- Tanem on nao suis 1 an 2 wea hem diskonekt ya.
- Luk folom sapos volteij hem stap an karent hem flou go long lod. Sapos yies, inveta hem waka naya.

9.9 Mentenens blong Saj Kontrola

Olketa Saj kontrola hem waka gud an bae no givim trabol long yu anles olketa ovalod.

- Sekem olketa koneksin wea lus.
- Sekem olketa displei volteij an sekem eni meseij wea hem era.
- Sekem dat fuis hem no blouap.
- Sek fo maonting blong kontrola.

FIGA 85: Saj Kontrola



9.10 Krietem an yiusim seklis

Wanfala sampol long masta seklis blong wanfala mans nao hem long hia, yu save adem samfala samting moa o aotem olketa samting wea yu no save aplaem.

⁷⁹ Adapted from "Operations & Maintenance of Stand-Alone PV Systems, Arizona State University, VOCTEC, <http://voctec.asu.edu>

TEBOL 4: Sekaplis

Olketa aetem long sekaplis	OK	komen
General Visual Inspection		
Inspektem olketa PV modiul fo eni difekt wea bae save apia long fom blong benmak, kala no klia, delamineisin o glas wea hem brek.		
Sekem olketa modiul fo staka soel from deti wea hem bildap o from dropping blong olketa animol.		
Mas meksua dat waearing long modiul hem sikiua an no res nao long ruf, hem hang lus an ekspous nao long potensol dameij, hem folom nao redias wea hem no aprov o hem lei akros long sap o sefeis wea hem abreisiv.		
Inspektem PV maonting sistem fo eni difekt inkludem rast, hem hang lus an eni klip o bolt wea hem mis o brek.		
Inspektem eni conduit fo strong sapot wea hem stret, busing an ekspanson long olketa joint sapos nidim.		
Insaet ruf-sistem wea hem maont, sekem nao integrity blong olketa penetreisin (hem taet gud tu fo wata.)		
Long graon sistem wea hem maont ya, luk fo eni saen blong rast kolsap long olketa sapot.		
Sapos hem stap) penetreisin(hol/opening) hem sate an mas garem evidens dat no eni ingris long wata hem stap.		
Mekem wanfala inspeksin long interia an eksteria blong inveta. Luk fo eni saen long wata, rodent o dast hem no go long inveta.		
Inveta sek		
Klinem eni filta.		
Klinem insaet blong cabinet.		
Testem eni fan fo propa opereisi.		
Sekem olketa fuis.		
Konfemem eni olketa woning leibol hem stap in plei.		
Luk fo eni diskalareisin (kala hem aot) from taem hit hem blidap.		
Sekem kontiniuiti blong graon sistem an graoding blong ikuipmen.		
Sekem olketa mekanikol koneksin blong inveta go log wol o grao.		
Rekodem evri volteij an karent riding from frant long displei panol (sapos hem stap).		
Sekem apiarens klinlines blong cabinet, ventileisin sistem an olkete sefeis wea hem insuleit.		
Sekem korousin/ovahiting long oleta teminol an olketa keibol.		
Taetem olketa konekta an/o olketa bolt sapos nidim fo duim olsem.		
Rekodem olketa ambient kondisin blong weda, inkludem nao tempresa an sapos de ya hem klaodi o hem san.		
Sekem opereisin blong evri divaes (olketa seket break, sej aresta an samfala samting moa.		
Batri Sek		
Sapos olketa batri hem tuweit taep, sek fo eni saen long elektrolaet insaet long olketa seifti trei (sapos hem stap) o long floa, wea hem traе fo soum dat batri mas lik o ova ful.		
Containers (Sekem kondisin blong konteina blong batri.		

Not

[illegible]

AKTIVITI 14

Werem PPE blog yu an karem aot nao rutin sek long olketa sola sistem wea yu just setem ap long las aktiviti. Yiusim nao seklis wea yu givim long antap. Waka long grup an mas askem treina fo help.

Wanfala Rol Plei moa

Tufala grandma from wanfala vilij long rurol eria jas kam baek nomoa from wanfala Sola O & M beisik an tufala stori nao.

Tima: Mi barava hapi tumas nao mi save go atendem nao dat fala treining ya- Mi tinges kasem eij blong mi bae mi no save lanem eniting-bat mi rong.

Anna: Ya, mi fil olsem tuya-barava staka samting nao fo lanem an mi barava sapraes nao mi save folom nao no mata infomeisin hem teknikol.

Tima: Maen hem save tumas- sapos yumi openem maen blong yumi fo lanem niu samting-yumi save duim nao. MI hav to talem mi seleva dat mi save duim an olketa pikinini an grani blong enkarejem mi tu.)

Anna: Mi save dat bae mi no save duim sapos family blong mi no sapotem mi-distaem yumitufala sola teknisian nao.

Tima: Sapos yumitufala laek fo rimebarem olketa samting ya, yumi mas mit wantaem insaet long wik fo go tru wanem yumi lanem. Wanem tingting blong yu?

Anna: Ya, mi agri. No mata yumi garek kas paoa sistem from EFL, staka long olketa haos insaet vilij yiusim sola an long dea nao yumi save help.

Tima: En wetem paoa kat olowe distaem, mi ting staka famili bae siusim nao sola sistem ya. Olketa sola sistem ya bae hem popiula ya.

Anna: Ya, yu raet. Sola paoa sistem long batri ae hem mekem olketa haos fo save stoarem paoa long detaem from san an yiusim long ivining fo paoarem haos an olketa aplaens.

Tima: Mi hapi tumas yumi duim diswan tugeda fo sapotem olketa pikinini blong yumi, olketa grani blong yumi an ful vilij wetem yumi sapotem tu envaeromen.



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