**Solar Electric Technician (Level 2)**

**Module 5: Installation and assembly**

**E13: Assignment – Connecting charge controller to the batteries**

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| **E13: ASSIGNMENT MEMO** | |
| **Date** | …. |
| **To** | Participants |
| **From** | Trainers |
| **Subject** | Connecting charge controller to the batteries. |
| **What** | Connecting charge controller to the batteries. |
| **Why** | To enable participants to connect charge controller to the batteries. |
| **How** | 1. Group of 2 or 4. 2. Gather the required tools/equipment. 3. As per the given instruction, perform the connection of charge controller to the batteries. 4. Answer the questions and discuss the results. |
| **Time** | 90’ |

**Connect the charge controller to the batteries (xx Ah, xy V, xy Nos.)**

**Required tools/equipment**

* Solar PV modules
* Charge controller (48V compatible)
* 48V battery bank (4 x 12V batteries connected in series)
* DC circuit breakers (suitable size for the charge controller and battery bank)
* Cables and connectors for 48V system
* Multimeter (for voltage and continuity testing)
* Insulation tape, cable ties
* Cable lugs, wire cutters, and crimping tools
* Safety gloves, goggles, and other protective equipment

**Instructions**

Follow each step to conclude the practice session.

**Step 1: Safely connect the 12V batteries in series to form a 48V battery bank.**

* Connect the positive terminal of one 12V battery to the negative terminal of the next battery.
* Continue until four batteries are connected in series.
* Check that the total voltage across the battery bank is 48V using a multimeter.
* Ensure all connections are tight, and there is no risk of loose cables.

**Step 2: Install appropriate switchgears to protect the charge controller and battery bank.**

* Install a DC circuit breaker between the battery bank and charge controller (on the positive side).
* Verify that the circuit breaker is correctly rated for the voltage and current of the system.
* Connect the charge controller’s battery terminals to the battery bank, passing through the circuit breaker.
* Ensure that the breaker is switched off during the installation.

**Step 3: Follow the proper sequence of connecting the charge controller to the battery bank.**

**Connection sequence**

* First, connect the charge controller to the battery bank: This ensures the charge controller recognizes the battery voltage before connecting to the solar PV system.
* Then, connect the charge controller to the solar array.
* Finally, connect any DC loads or auxiliary devices if applicable.
* Use appropriate cable lugs and crimping tools to terminate cables securely.
* Ensure cables are properly sized for the current and voltage rating of the system.
* Perform a visual check to ensure all connections are secure, and wires are correctly routed to avoid short circuits.

**Step 4: Testing and verification**

**Multimeter testing**

* Test the voltage at the charge controller’s battery terminals to confirm proper battery connection (should read around 48V).
* Ensure there are no loose connections or improper polarity.
* Switch on the circuit breakers.
* Gradually switch on the DC circuit breaker between the charge controller and battery bank.
* Observe the charge controller's display to confirm it has recognized the battery bank and is functioning correctly.

**Troubleshooting**

* If any abnormalities (such as incorrect voltage readings or no power) are detected, shut off the system and troubleshoot.

**Verify**

* The system is ready for charging once all connections are confirmed safe and operational.

**Step 5: Group review and discussion (Instructor-led discussion)**

* Review the process of connecting the charge controller and battery bank.
* Discuss the importance of proper switchgear placement for system protection.
* Highlight common mistakes and troubleshooting tips.
* Ask questions about system design and installation practices.

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| **Summary of findings** |
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