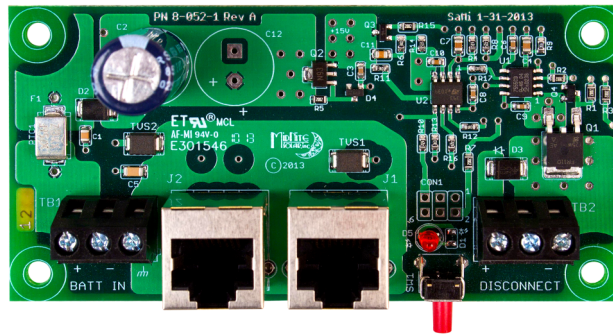




# Battery Disconnect Module Controller Instructions



Accessory for use with most MidNite Disconnecting combiners as part of a Rapid System Shutdown.

The MNBDM Battery Disconnect Module is designed to work in conjunction with the Bird House and the Disconnecting Combiners to provide a complete Emergency System shut down with the single push of a button. The system uses standard CAT5 cable between devices, we do offer a 600 volt Listed CAT5 cable. You can have multiple Combiners, Bird Houses and Battery disconnect modules on a single system. The Battery disconnect module works with 24 and 48 volt battery systems and will interface with any of our remote trip circuit breakers.



# Battery Disconnect Module Controller Instructions

## IMPORTANT SAFETY INSTRUCTIONS

**SAVE THESE INSTRUCTIONS** - THESE INSTRUCTIONS CONTAIN IMPORTANT SAFETY AND OPERATING INSTRUCTIONS FOR THE MNBDM BATTERY DISCONNECT MODULE.

If you do not fully understand any of the concepts, terminology, or hazards outlined in these instructions, please refer installation to a qualified dealer, electrician or installer. These instructions are not meant to be a complete explanation of a renewable energy system. All installations must comply with national and local electrical codes. Professional installation is recommended.

### GENERAL PRECAUTIONS:

WORKING WITH OR IN THE VICINITY OF A LEAD ACID BATTERY, SEALED OR VENTED IS DANGEROUS. VENTED BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL OPERATION. FOR THIS REASON, IT IS VERY IMPORTANT THAT BEFORE SERVICING EQUIPMENT IN THE VICINITY OF LEAD-ACID BATTERIES YOU REVIEW AND FOLLOW THESE INSTRUCTIONS CAREFULLY.

If service or repair should become necessary, contact MidNite Solar Inc. Improper servicing may result in a risk of shock, fire or explosion. To reduce these risks, disconnect all wiring before attempting any maintenance or cleaning. Turning off the inverter will not reduce these risks. Solar modules produce power when exposed to light. When it is not possible to disconnect the power coming from the Photovoltaics by an external means such as a combiner, cover the modules with an opaque material before servicing any connected equipment.

Do Not expose to rain or snow. NEVER attempt to charge a frozen battery. Do not smoke around batteries.

When it is necessary to remove a battery, make sure that the battery bank disconnect breaker is in the off position and that the PV breakers, grid breakers and any other sources of power to the inverter are in the off position. Then **remove the negative terminal from the battery first**.

To reduce risk of battery explosion follow these instructions and those published by the battery manufacturer as well as the manufacturer of any additional equipment used in the vicinity of the batteries.

Avoid producing sparks in the vicinity of the batteries when using vented batteries. Provide ventilation to clear the area of explosive gases. Sealed AGM and Gel batteries do not under normal conditions create explosive gases. Refer to the battery manufacturer's documentation. Be especially cautious when using metal tools. Dropping a metal tool onto batteries can short circuit them. The resulting spark can lead to personal injury or damage to the equipment. Provide ventilation to outdoors from the battery compartment when installing vented batteries such as golf cart T-105 batteries. The addition of a spill tray is also a good idea.

Clean all battery terminals. Very high currents are drawn from the batteries; even a small amount of electrical resistance can result in overheating, poor performance, premature failure or even fire.

Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes. Wear complete eye and clothing protection. Always avoid touching eyes while working near batteries. If battery acid or battery terminal corrosion contacts skin or clothing, wash immediately with soap and water. If acid enters the eyes, immediately flood with cool running water for at least 15 minutes and get medical attention immediately. Baking soda neutralizes battery acid electrolyte. Keep a supply near the batteries

Do not work alone. Someone should be in the range of your voice or close enough to come to your aid when you work with or near electrical equipment. Remove rings, bracelets, necklaces, watches etc. when working with batteries, photovoltaic modules or other electrical equipment. Power from an illuminated photovoltaic array makes a very effective arc welder with dire consequences if one of the welded pieces is on your person.

To reduce the risk of injury, connect only deep cycle lead acid type rechargeable batteries. Other types of batteries may leak or burst, causing personal injury or damage.

Wiring methods used shall be in accordance with the Canadian Electrical Code, Part I.

Wiring must be done in accordance with the National Electrical Code Article 690 ANSI/NFPA 70. Use Class 1 wiring methods for field wiring connections to terminals of a Class 2 circuit. Use only 14-10 gauge AWM wire. Select the wire gauge used based on the protection provided by the circuit breakers/fuses. Overcurrent protection must be installed as part of the system installation. Refer to the wiring diagrams provided in this manual for breaker/fuse/GFDI sizes and model numbers.

Use of attachments or accessories not approved by MidNite Solar could result in damage or injury.

Before making any connections verify that the circuit breakers are in the off position including the inverter breaker. Double check all wiring before applying power.



# Battery Disconnect Module Controller Instructions

## MidNite Solar Battery Disconnect Module – MNBDM

The Midnite Solar Battery Disconnect Module (MNBDM) is an optional circuit board which can be installed in most MidNite Solar E-Panels. It is used in conjunction with one or more MNBH Disconnect switches and MidNite Solar disconnecting combiners to remotely shutdown the system in emergencies. The MNBDM is controlled by the (MNBH) Birdhouse Disconnect switch and disconnects the main batteries from the system in a similar manner as the disconnecting combiner disconnects the PV array from the rest of the system. The trip signal for the MNBDMs and combiners is generated by the MNBH Disconnect Panel. Control signals are provided to the target devices via a ruggedized 600V CAT-5 cable, which connects all components in the system.

## Installation

Select a dry protected location for the MNBDM, such as inside an E-Panel or other enclosed panel. The MNBDM must be mounted on standoffs to provide open space behind the board to prevent shorting it to the enclosure.

## Power and Circuit Breaker Connections

The MNBDM is powered from the main batteries (24 to 48 volt) and has terminals for connection to the E-Panel circuit breaker, other MNBDMs, the disconnecting combiners and the MNBH Disconnect Panel. Connect the switched battery positive (after the battery breaker) to TB1 pin 1 (+). Connect the battery negative to TB1 pin2 (-). Connect chassis ground to the TB1 pin 3 (GND symbol).

Connect the red circuit breaker trip wire to TB2 pin 1 (+) and the black to TB2 pin 3 (-). Leave TB2 pin 2 open (middle).

## System Connections

There can be up to four MNBDMs in the system. All system components are connected together with CAT-5 cable which plugs into the two RJ-45 (Ethernet-style) connectors, J1 and J2. There is no difference between the two connectors. A typical installation consisting of one MNBH Disconnect switch, one MNBDM and one disconnecting combiner would use one of the RJ-45 jacks for connection to the MNBH switch and the other for connection to the combiner. Connect one to the MNBH Disconnect switch, or to another MNBDM that connects to the MNBH Disconnect switch. Connect the other to any downstream MNBDM units or combiners. A terminating connector is not required on the last MNBDM.

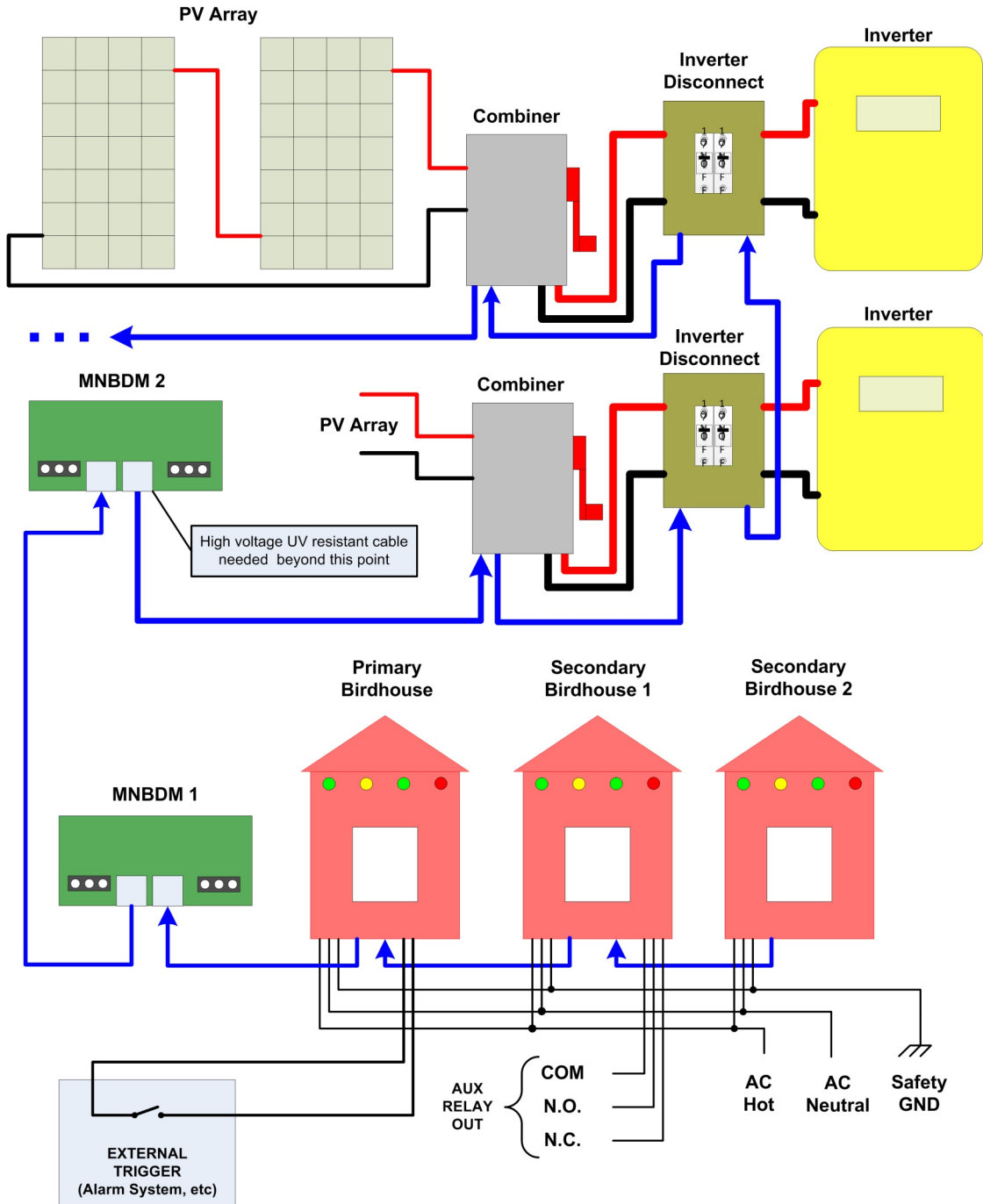
## Operation

The MNBH Disconnect Panel must be energized and connected to an MNBDM before closing the battery circuit breaker on the E-Panel. If you attempt to close the breaker without the MNBH on and the cable installed, the MNBDM will detect a problem and trip the breaker within about 5 - 7 seconds. This is a fail-safe feature that requires the system to be intact and working before energizing.

If the cable is properly installed the power will remain on and the system is now ready for operation. The MNBDM LED will briefly blink (off) three times when power is first applied. This is normal and indicates that the board is working properly.

The system may be tested by pressing the button on the MNBH Disconnect Panel, but doing that will trip every combiner and MNBDM in the system. To avoid this, a small test button is located on the front edge of the MNBDM board. Pressing the test button only trips the one breaker in that panel. Note that there is 2 second delay after pressing the button before the breaker trips.

# Battery Disconnect Module Controller Instructions



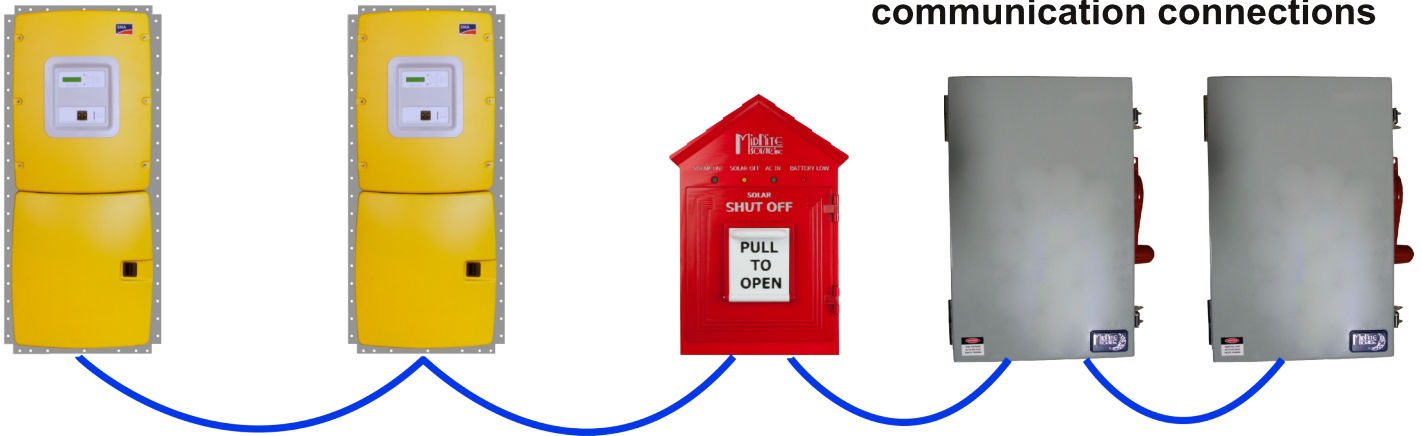
## Typical system layout

Battery and remote trip breaker connections not shown. See page 5.



# Battery Disconnect Module Controller Instructions

## Typical system communication connections



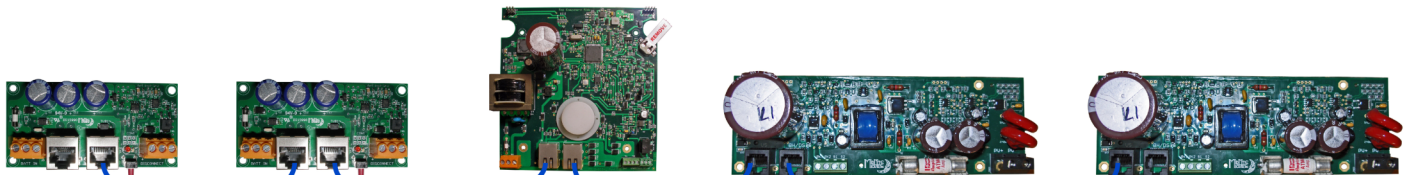
SMA E-Panel  
MNBDM Inside  
E-Panel

SMA E-Panel  
MNBDM Inside  
E-Panel

Birdhouse

Disco Combiner

Disco Combiner



MNBDM

MNBDM

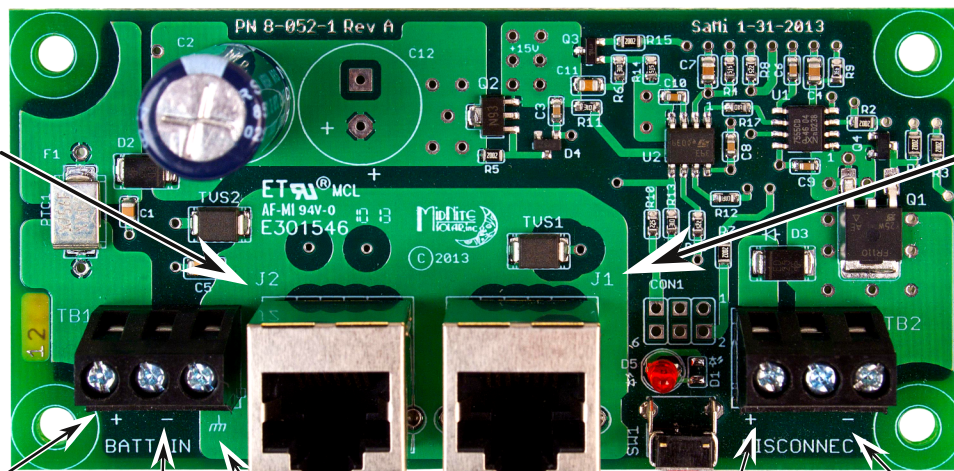
MNBirdhouse

MNBN

MNBN

J2:  
Communications

J1:  
Communications



TB1:  
To Battery Positive

TB1:  
To Battery Negative

TB1:  
To Ground

TB2:  
To Remote Disconnect  
Switch Positive

TB2:  
To Remote Disconnect  
Switch Negative