Coleman Air
Diversion Controller
Version 3.00

With Extended Diversion Mode

Completed Kit Instructions

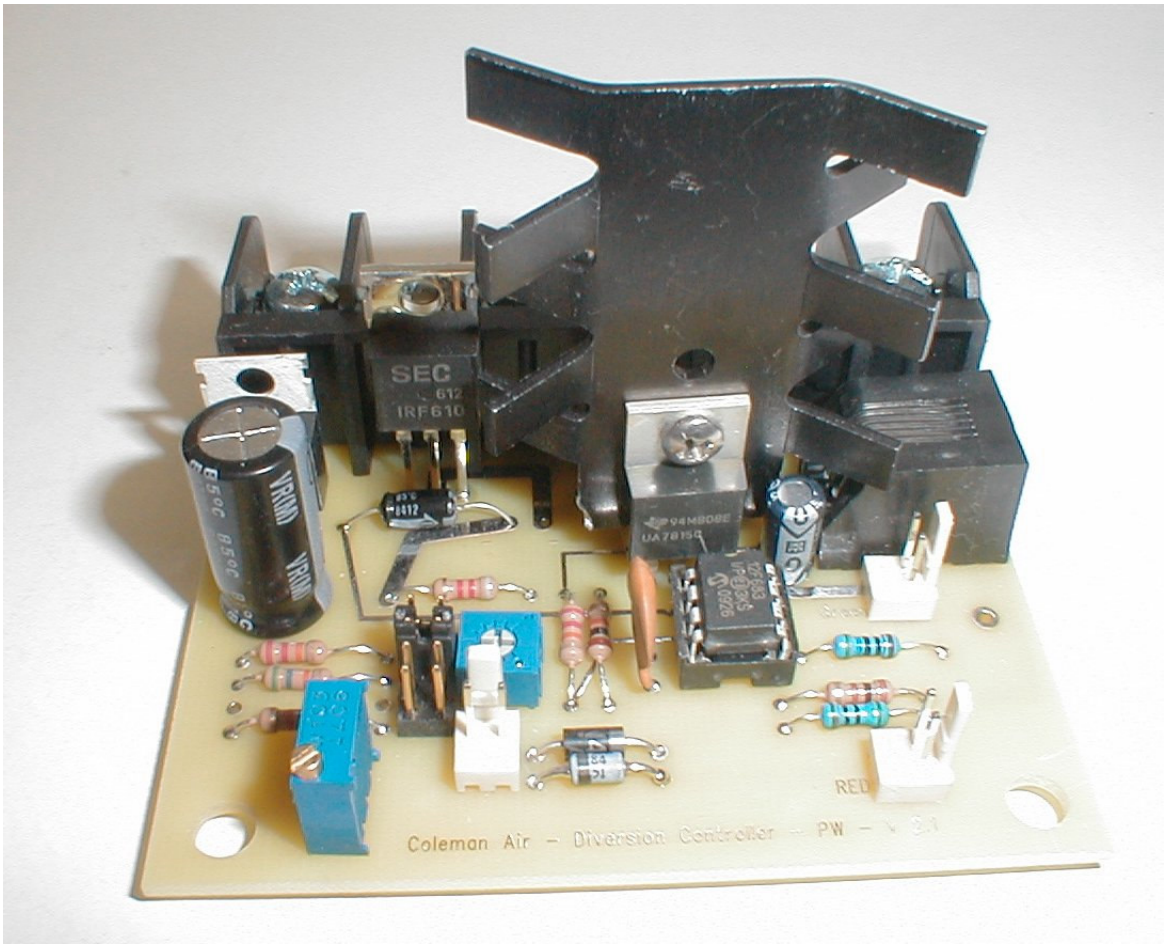
Step 1:

Mount your PCB board into your enclosure or onto a suitable surface. Be sure the underside of the board does not touch your enclosure. The simplest way to achieve this is to use nuts as spacers between the PCB and the enclosure on the 4 mounting screws. Once mounted (or ready to mount), install the heat sink using the small screw and nut provided. You may elect to use a different heat sink or modify the one supplied to fit your exact needs. Please note: **You must use a heat sink if you plan to pull in multiple relays. Thermal paste (Heat sink compound) is highly recommended.**

The following precautions must be taken into account if you wish to add more relays.

The internal regulator can handle 12 relays (40 amp automotive type) in a 12 volt system and 4 relays in a 24 volt system with a **very large heat sink**. The reason for the smaller number of relays in a 24v system is; the regulator must convert the high battery voltage down to 15 volts for the relay coils, this generates heat. So if you want to add more relays than 4 (or 12), then simply use one of the relays to switch on the coils of the other relays. This will allow you to pull in as many relays as your wire can handle.

The terminal blocks will handle #6 wire and are better used for switching loads of 60 amps or less. If your system will likely run at the high end, then a better connection is to wire as directly as possible to the relays using wire nuts, or compression lug etc.



Completed board with heat sink properly installed on the regulator. Please note, some components may be in a slightly different position on your PCB. This can very slightly from version to version.

Please note: a LARGE heat sink is required on the 15v regulator (7815) for multiple relays, when configured for 24 volt battery banks.. **The kits are shipped with sufficient heat sink for 2 relays in a 24 volt system, and 4 relays in a 12 volt system.**

Step 2:

Before inserting your relay into the relay harness, take a look at the bottom of the relay and you will notice some numbering. This is the numbering referenced in the hookup drawings that follow:

Hookup the relay coil(s), terminals 85 and 86 on the relay, to the 12v coil and relay sink terminal blocks of the controller – These are the yellow (shown as a brownish color in this manual) and blue wires. Please see the image for the Standard diversion Control wiring diagram (or any of the other hookup drawings.)

Tech note: 12 volts is always available at the +12v coil terminal block. The Relay Sink terminal block is what is switched on and off, basically there is no ground for the 12v coil until the dump is activated.

Step 3:

Hookup the contacts from the relay(s) as required for your system (black, white and red wires). On our factory built controllers we utilize the outer terminal block positions of the circuit board for convenience. These outer positions have no electrical connection to the PCB and therefore can be used if desired as termination points. Please refer to the wiring diagrams that follow for more information on hooking up the relay contacts.

Red wire = Center post (common)

Black wire = Normally open contact (N/O)

White wire = Normal closed contact (N/C)

Important: The wire harness you receive from us has been color coded to match our requirements. Wire harnesses you might purchase from other vendors may not use this same color-coding.

Note: You will not use the white wire for wind only hookups and you will not use the black wire for solar only hookups. Just tape the unused wire and tuck it away.

Maximum continuous input voltage on the Battery sense leads (+/- terminal blocks) is 35vdc

Maximum intermittent input voltage on the Battery sense leads (+/- terminal blocks) is 42vdc

Maximum recommended input voltage on the Relay contacts is 45 volts.

12 or 24 volt systems – 40 Amps, not to exceed 900 watts for the normally open contacts and 30 Amps/720 watts for the Normally closed contacts.

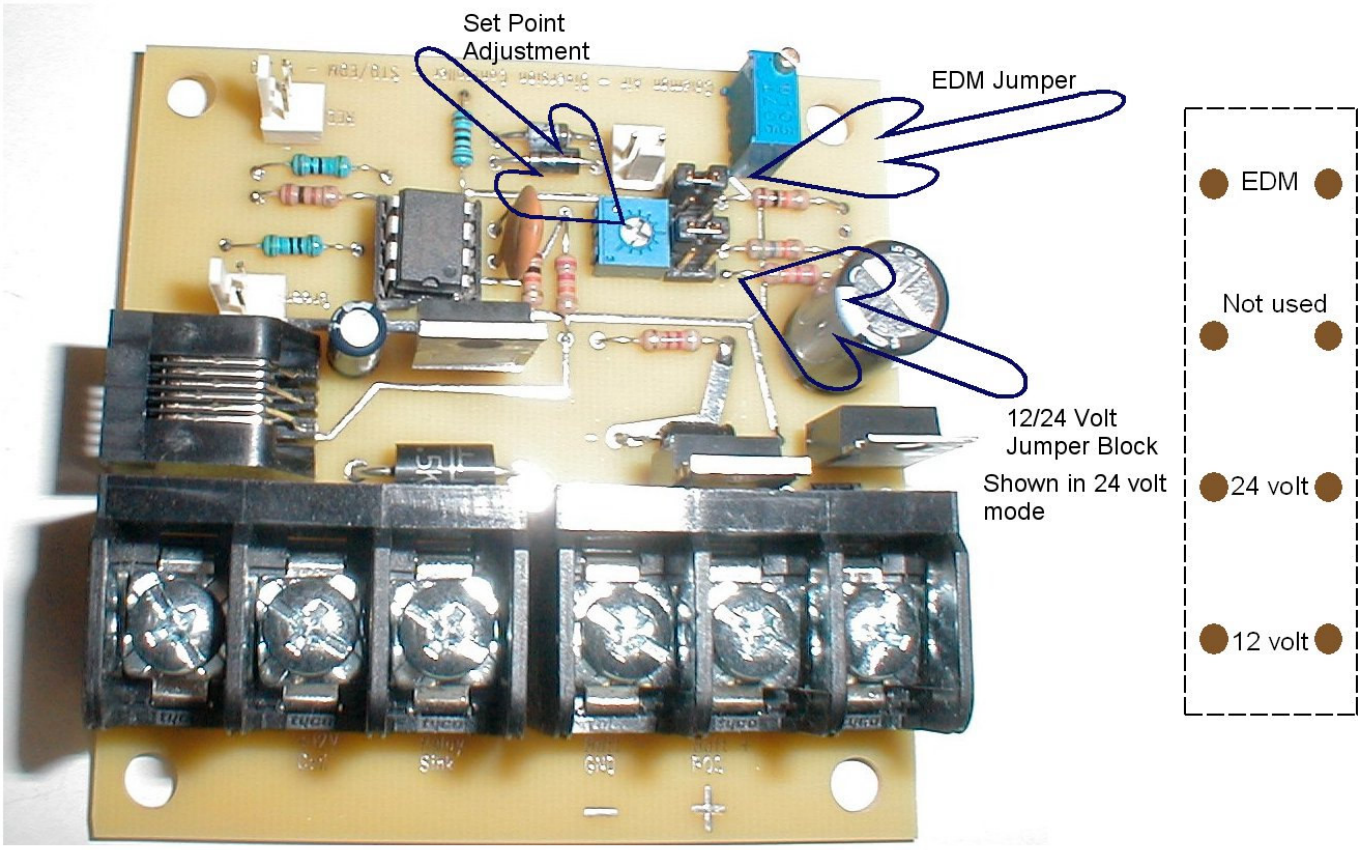
Not recommended for 36 volt systems and higher.

Step 4:

Calibrate the controller if you require a setting other than 14.5v or 29v trip points

Jumper Settings: Changing from 12 volt to 24 volt operation.

To set the controller for use with a 12 volt system, place the jumper in the 1st position, closest to the large terminal block.



For a 24 volt battery bank, set the jumper in the 2nd position. (As shown in the image above.)

Position 3 is not used.

Position 4 enables the EDM mode. This mode can be used with both 12 and 24 volt modes. As shipped, this jumper will be hanging on one terminal only. We have shipped it in this manner so the jumper is available to you but not actually being used. To enable EDM, place the jumper across both of the pins on the end of the jumper. (Farthest from the larger terminal block)

Extended Diversion Mode -- EDM

The basic operating philosophy of a diversion controller is quite simple. Monitor the battery voltage, and if it should rise to a predetermined level, connect a diversion load, of sufficient size, to the battery or energy source to prevent the battery voltage from increasing any further. The amount of time the diversion load is connected is generally only 10 to 30 seconds. In this amount of time, the battery voltage will have dropped enough to be back in the normal region. The controller will continue to engage and disengage the relays as often as necessary to prevent battery overcharge. This is the normal mode of operation. The microprocessor uses several advanced algorithms to prevent rapid relay cycle, yet it is common for the relays to be engaged and disengaged a few times a minute. This constant attention keeps the batteries very close to (or just below) the trip point you have set.

There are however, situations where you would really like the controller to engage the relays for a longer period of time once the batteries get to a "Full" state. This is what we call Extended Diversion Mode. When you enable this mode (see jumper settings below), and the batteries reach the trip point you have set (the same trip point as the normal mode), the controller will engage the relays for approximately five minutes or until our batteries are depleted by 15%, which ever comes first.

The EDM mode is very useful for running such items as water pumps or small grid tie inverters that you do not want turning on and off every few seconds. When you enable the EDM mode, the wiring remains the same; the difference is that the load you connect will be engaged for a longer period of time.

It is very important that the load you choose is 100% dependable if this controller is being used to prevent battery overcharge. If the load is not present, then your batteries will overcharge. Grid-tie inverters are not a load if the grid fails (power outage due to thunderstorm etc.). Such a loss of load can also cause damage to your wind turbine if it depends on this load.

If you will be using the EDM mode with a load that may not be present at all times, then it is important that you have another controller in parallel that is also monitoring the system with a slightly higher trip point. This second, failsafe controller will then divert the excess energy to a diversion load that is 100% dependable should the 1st controller's load not be present or capable of disbursing all of the excess energy.

As in the case with the normal mode, the load you connect cannot exceed the capacity of the relays. Do not attempt to hookup highly inductive loads (motors larger than 10 amps per relay), as the relays will be damaged due to high currents during the motor start.

Important. Pressing the test button with the EDM jumper set, may at times engage the relays for a full 5 minutes. This is especially true if you have pressed the test button for a very short time or have pressed it repeatedly.

Calibrating the Diversion Controller.

If you have purchased the completed controller (not the kit), then the controller has already been calibrated by the factory using the following settings.

The Green LED will be illuminated as follows

- One flash indicates the battery is less than 12 volts (12 volt system - Double for 24 etc)
- Two flashes indicates the battery is 12 to 12.5V
- Three flashes indicates the battery is 12.6 to 13v
- Four flashes indicate the battery is 13.1 to 13.5V
- Five flashes indicates the battery is above 13.5V but less than 13.9V
- Steady green means the battery is 13.9 volts or higher.

The red LED is illuminated when the battery has reached a voltage level of 14.4v or higher

If you would like to change the dump level trip point, please use the following procedure.

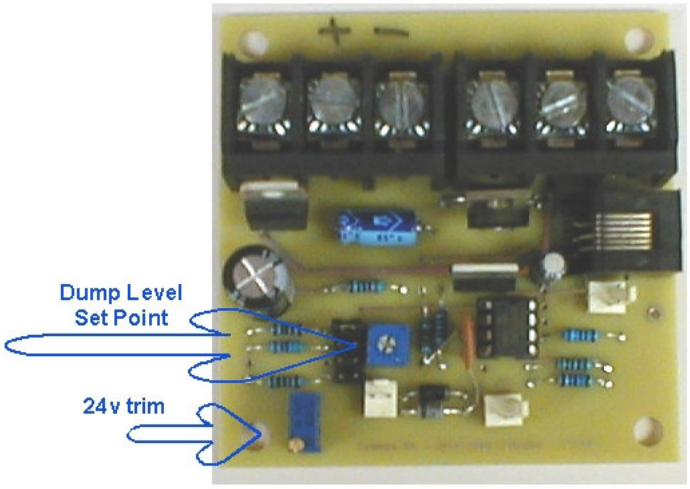
Note: Disable the EDM Jumper, while calibrating.

If you own a variable voltage power supply, then the following procedure is recommended.

1) Turn the dump level potentiometer fully counter clockwise.
2) Set the voltage of the power supply to the desired dump level trip point (for instance 14.2 volts)
3) Slowly turn the dump level potentiometer clockwise until the green LED is illuminated steady.
4) Pause for at least 5 seconds, then slowly continue to turn the dump level potentiometer clockwise until the red LED is illuminated.
5) Lower the voltage of the power supply by at least one volt.
6) Slowly turn the voltage of the power supply up until the red LED is illuminated, checking to see if you achieved your desired setting. Please note; the input level is only checked once every 5 seconds while the green LED is flashing, and only once every second while the green LED is steady, so you must make very slow adjustments during this procedure. If you feel you have passed your set point, then restart the procedure. Turning off the power supply to force all voltages to be dissipated, can be very helpful.

Please note: Changing your dump level set point will also change the voltage levels for which the green LED flashes.

If you do not own a variable voltage power supply, or would rather set the controller while it is installed, then if you have an inverter that is able to set the float or bulk charge voltage of the battery bank to a particular level, use the inverter as your variable voltage supply.

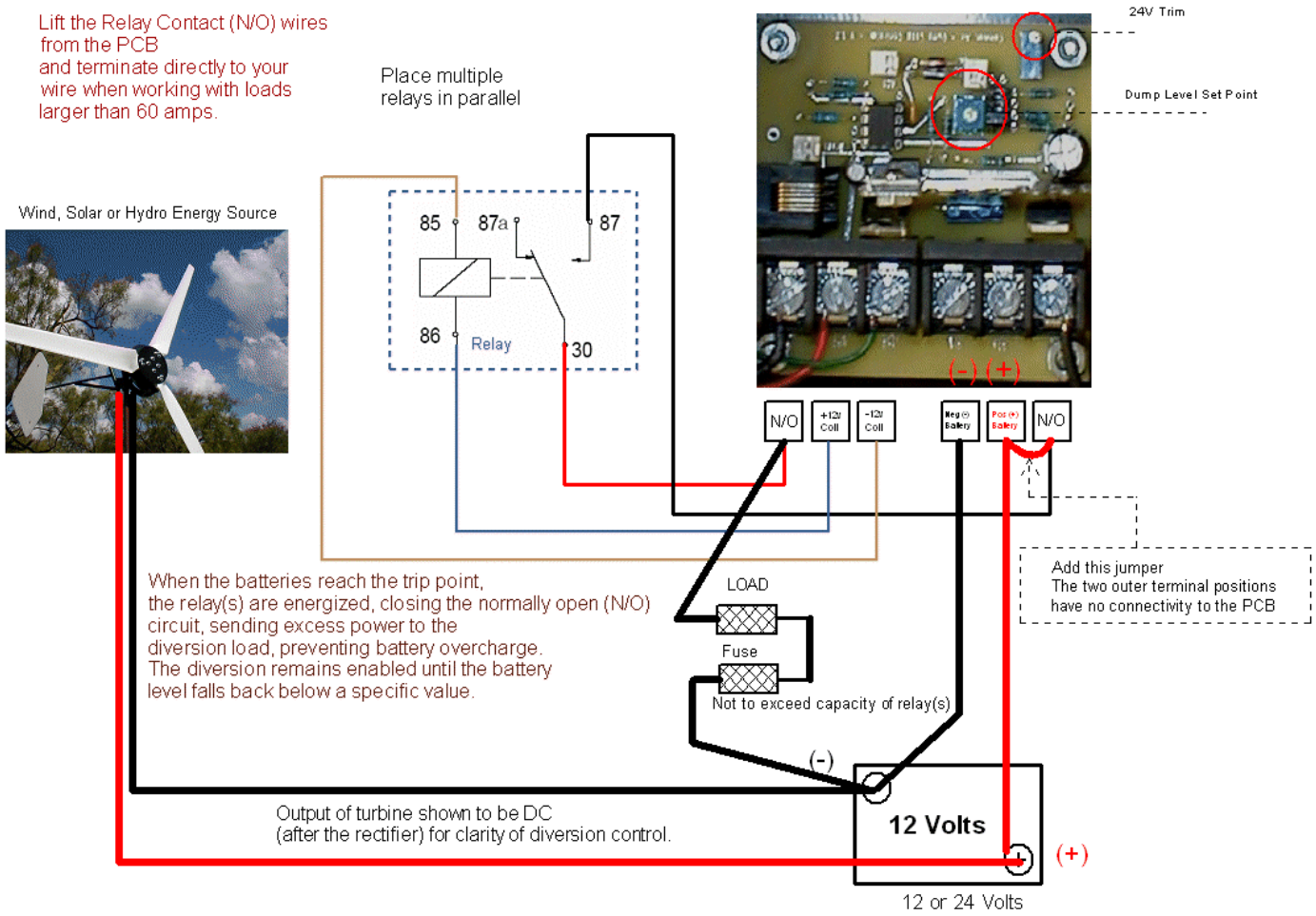


If you do not have an inverter that is capable of this, then you will need to cause your batteries to be brought to the desired dump level trip point via your wind/solar/hydro energy source. Then once they have achieved this set point, turn the dump level set point potentiometer fully counter clockwise. Wait 15 seconds, or until the green LED is flashing no more than 3 times. Then slowly turn the same potentiometer clockwise until the green LED is illuminated steady. Wait 5 seconds, then, slowly turn the same potentiometer until the RED is illuminated.

Note: The 24 volt trim potentiometer is set by the factory in completed controllers to insure both the 12v and 24v settings are the same. This pot does not need to be adjusted by the user due to the fact you are only concerned with the trip point on your specific battery bank, and will not be concerned if it remains correct for other size battery banks.

Please download the Coleman Air Diversion C160 Controller Manual for additional hookup instructions http://www.ccssoftware.com/shared/DiversionController160_V200.PDF as well as information on diversion Loads.

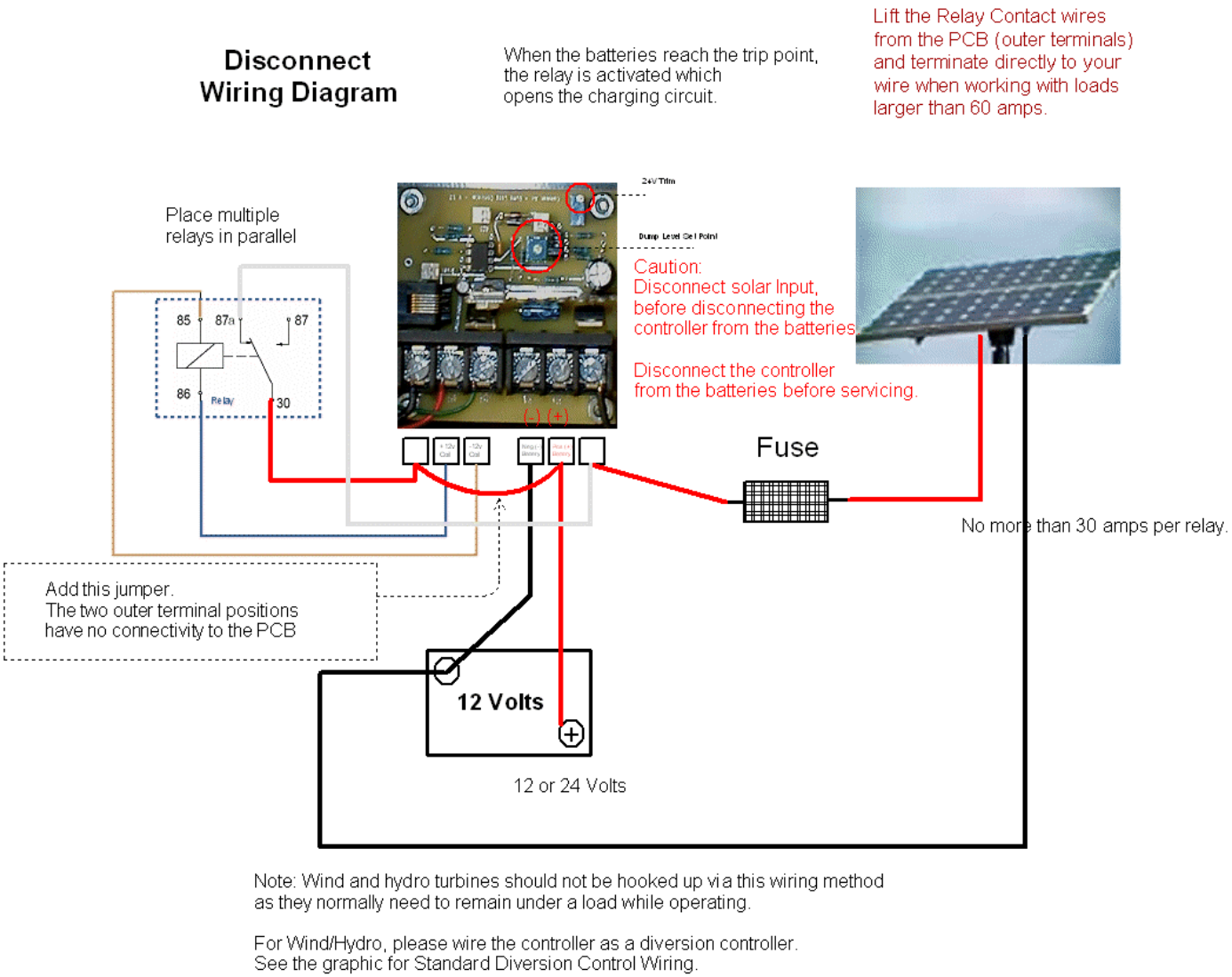
Standard Diversion Control Wiring Diagram



This is the most used hookup method, particularly for wind and hydro units. This wiring method is also suitable for solar.

Note: Your turbine hooks up to your battery directly – not to the controller. (You may need a rectifier or blocking diode). Please see the note at end of the manual.

Note: The black wire is used for this hookup; the white wire is not used. The yellow wire is shown as a brownish color in the drawing above.

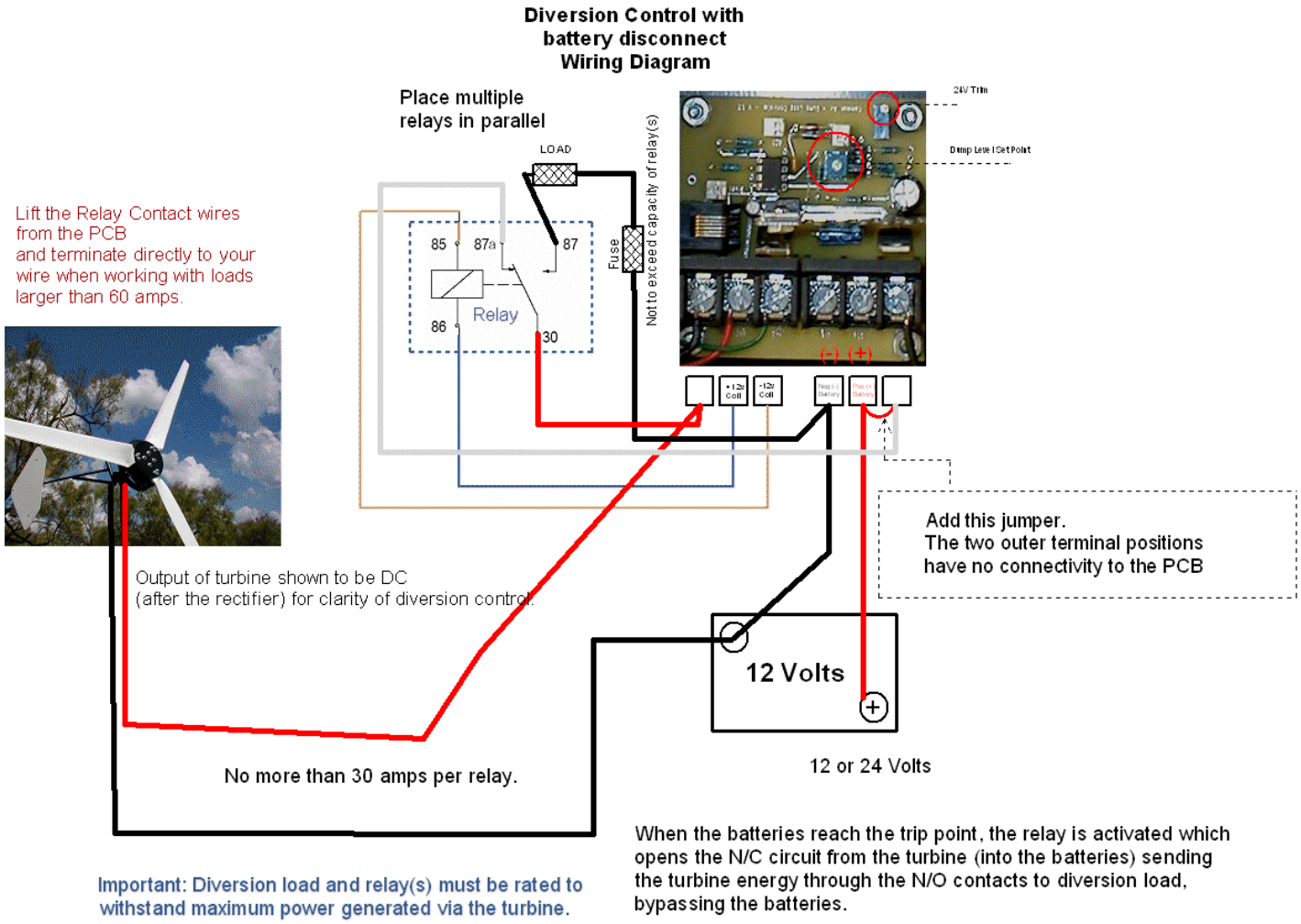


For solar systems.

In this mode, the charge source is disconnected from the batteries and no diversion load is used. This wiring method is not suitable for wind/hydro units since they need to remain under a load during normal operation to prevent over-speed.

Note: The white wire is used for this hookup; the black wire is not used. The yellow wire is shown as a brownish color in the drawing above. The white wire may be hard to see on some printers, it is coming from the relay terminal 87a.

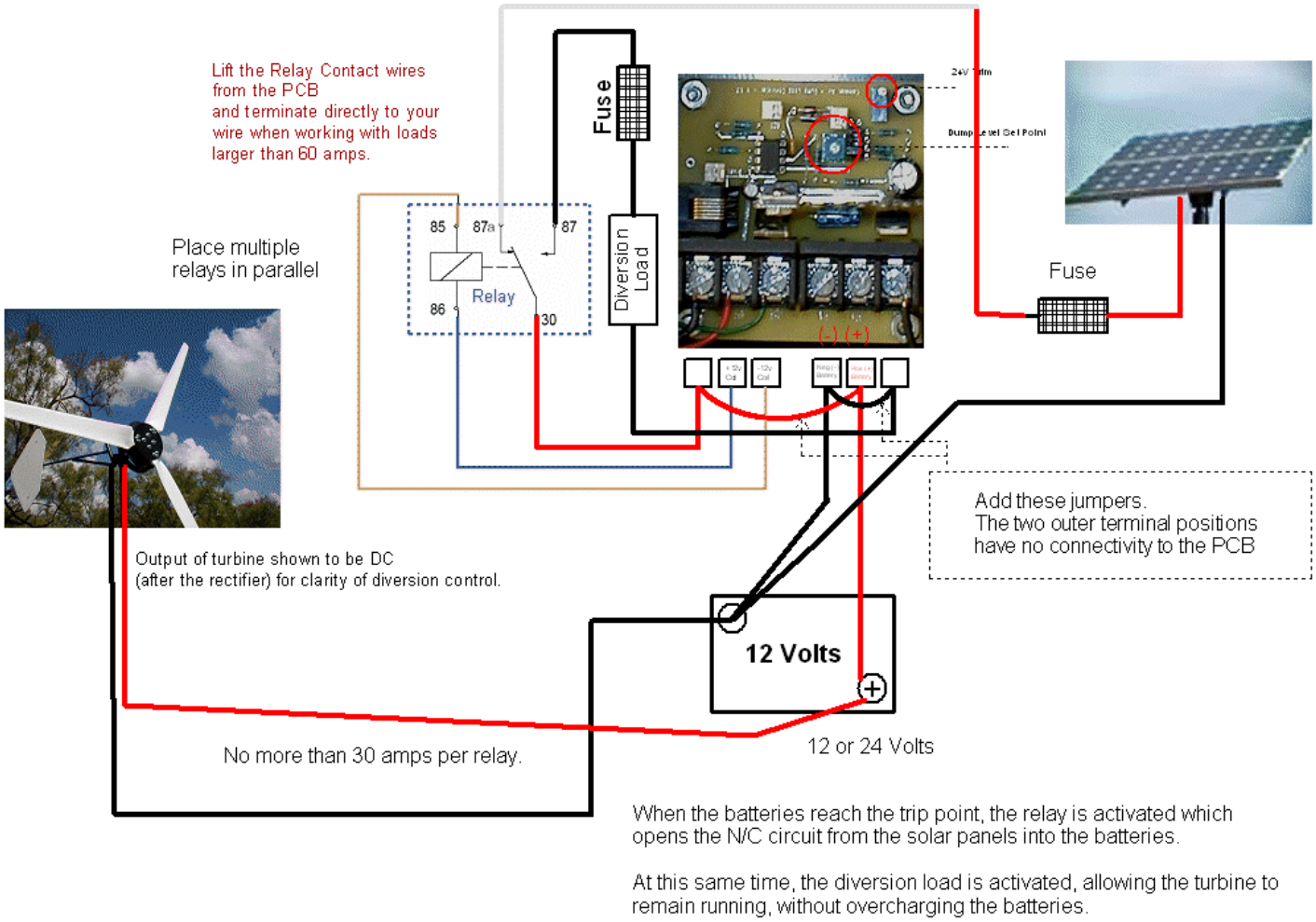
You will need to add one or more blocking diodes to prevent battery discharge at night though your solar panels. These diodes are most often mounted in the junction box of each panel. Please see our website www.ColemanAir.us for further information.



This wiring method is similar to the standard diversion control wiring, except that when the trip point is reached, power from the charge source (wind/solar etc) is no longer allowed to reach the batteries, but instead is sent directly to the diversion load. Use this method if you want your turbine to see a larger load when the batteries are full, possibly causing a slow down in your turbine RPM. Please see the notes about diversion philosophy in the earlier portions of this manual.

The yellow wire is shown as a brownish color in the drawing above. The white wire may be hard to see on some printers, it is coming from the relay terminal 87a.

Dual Control
Diversion Control for Wind
Disconnect Control for Solar
Wiring Diagram



Perfect if you have both Solar and Wind (or Solar and Hydro), and want to control both of them with a single controller.

The yellow wire is shown as a brownish color in the drawing above. The white wire may be hard to see on some printers, it is coming from the relay terminal 87a.

Note: Your turbine hooks up to your battery directly – not to the controller. (You may need a rectifier or blocking diode). Please see the note at end of the manual.

Parts list for Coleman Air - Diversion Controller v 2.1 — Completed Kit

(1) PCB Circuit Board assembled, tested and calibrated.

Switches etc.
(1) Test Switch with Holder
(1) LED – RED with Holder
(1) LED – GREEN with Holder
(1) 12V – 40A Relay

Connectors
(1) Relay Harness
(1) 4-40 x 3/16 Screw
(1) 4-40 Nut
(1) Heat Sink

Please note: this controller does not include a blocking diode or an A/C to D/C rectifier, as these are specific to your application. If you are using the controller with a DC turbine or solar panels, you may need to purchase a blocking diode. A/C turbines require rectification from A/C to D/C.

Diversion Controller 3.00
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