

11 / 12-VOLT ELECTRICAL SYSTEM

The trailer 12-volt system includes components that operate on electrical power from the tow vehicle engine alternator, a converter/charger, or the trailer battery(s). “House” electrical components such as the lights and water pump are supplied by the house battery bank. The house battery bank may consist of only one battery or several batteries connected together. The converter/charger charges the batteries when the trailer is connected to 120-volt (“shore”) power or when the generator (if equipped) is running. The tow vehicle engine alternator also charges the trailer battery while the tow vehicle engine is running and the 7-way cord is connected.

Power for the trailer exterior 12-volt DC system is provided by the tow vehicle through the 7-way power cord. This system powers the trailer running lights, brake lights, turn signals, backup lights (if equipped), and brakes. The 7-way power cord also provides a common ground and a 12-volt charge line from the tow vehicle alternator to charge the trailer batteries.

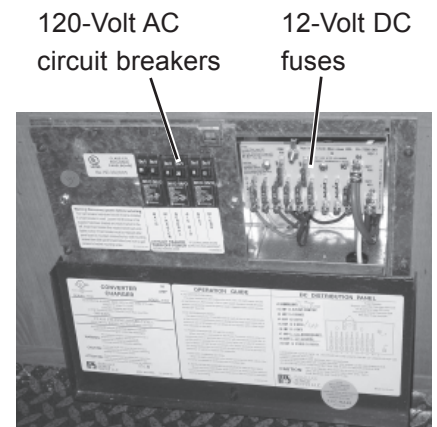
The trailer interior 12-volt DC system operates 12-volt motors, pumps, 12-volt appliances, interior lighting, landing gear, furnace, slide-outs, etc. The batteries also provide power to the breakaway switch to apply the trailer brakes if the trailer ever becomes uncoupled from the tow vehicle.

Power from the batteries, tow vehicle alternator and/or converter is routed to the main fuse panel. From the main fuse panel, power is supplied to the various circuits in the trailer. The circuits are listed on a label attached to the distribution panel door usually located below the refrigerator.

BATTERIES

The batteries and charging system are the heart of the 12-volt DC system. When the trailer is not connected to shore power, or if the generator (if equipped) is not running, most power needs are supplied by the batteries. If the batteries are low, all sorts of problems can occur. It is very important to maintain the batteries in a full state of charge or monitor their charge state. The converter/charger system will help you manage your electrical

NOTE: The 12-volt battery is not supplied with the trailer by MVP RV. You must purchase the battery separately.



*Converter/charger/distribution panel
Location and configuration may differ
according to model/floorplan.*

WARNING

Do not install fuses with amperage ratings greater than that specified on the fuse panel or fuse holder label.

NOTE: Keep the batteries fully charged at all times. Storing a discharged battery will shorten the life of the battery.

MVP

requirements and charging needs. When the trailer is not connected to shore power or you are not running the generator (if equipped), be energy efficient. Turn off lights and appliances when they are not being used. Later in this chapter we'll discuss power management and give you some worksheets and charts to help you manage your 12-volt power needs.

Under low voltage, fuses and circuit breakers can blow without a short circuit condition. The refrigerator control system requires at least 10.5 volts and will shut down even with propane supplied, potentially ruining food in the refrigerator.

Never completely discharge the batteries, and maintain the electrolyte level in each battery cell at the proper level. Permanent damage may occur from using or charging a battery with a low electrolyte level. Add only **distilled water** to the proper level.

Low battery charge or bad batteries are the most common cause of poor performance of slide-out rooms, appliances and other components connected to the 12-volt DC electrical system. Low voltage can also cause the furnace fan to run too slowly to operate an internal switch controlling the furnace gas valve. This will shut the furnace down. Learn to conserve your battery power. The power use chart at the end of this chapter can help you determine your power needs. To help insure that you don't have a battery failure, have your batteries checked and serviced regularly.

Avoid running down the batteries completely. The breakaway braking system depends on the 12-volt power from the trailer battery bank.

If the batteries become discharged quickly (high current use over a short period of time), a high amperage charge rate can be used to quickly recharge them. Disconnect batteries before high-amperage charging.

BATTERY INSTALLATION

Your trailer is designed for dual batteries for extra power. If you connect more than one 12-volt battery, **they must always be connected in parallel. Do not connect the batteries in series.** This will result in 24-volt output and cause damage to equipment designed for 12-volt use.

The way that batteries are installed in your coach is critical. Improperly installed batteries create the potential for serious injury. Although THORCalifornia does not provide batteries, here are guidelines for their proper installation:

Batteries should be installed in a protective “battery box” or tray. This reduces the possibility of accidental contact with the battery terminals and contains any leakage of battery acid.

You can operate your trailer with either single or dual batteries. In either case, we recommend deep cycle batteries, typically **Group 24 or better**.

Always install multiple 12-volt batteries in parallel or 6-volt in series/parallel. Route cables carefully to avoid pinching the cables after installation. Pinching the cables may damage the cable insulation and lead to a short.

Remove the batteries from the trailer before recharging them with an accessory battery charger.

BATTERY MONITOR

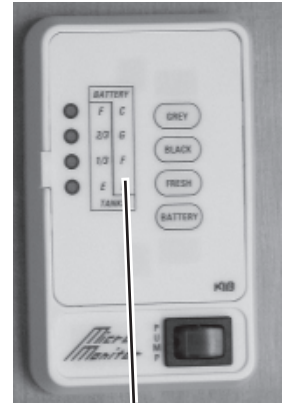
The monitor panel provides a effective way to keep an eye on your battery bank. To check the battery charge, press the **CHARGE** button. Indicators show the charge level in the batteries. Disconnect the shore power source when checking the battery condition. If the batteries become drained over an extended period of time, a low charge rate over a long period of time works best to recharge them. The converter/charger will automatically charge the batteries at the proper rate when you are connected to shore power or running the generator (if equipped).

BATTERY DISCONNECT

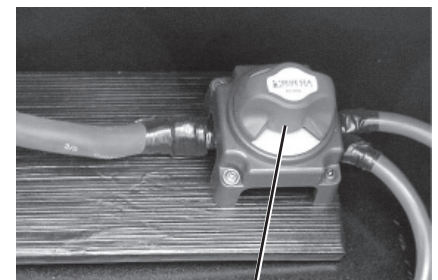
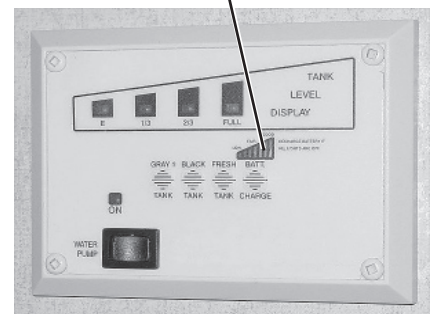
Some accessories or equipment in the trailer may draw small amounts of current even when turned OFF. A battery disconnect (or “load disconnect”) system allows you to disconnect the house batteries. Disconnecting the batteries will help reduce the possibility of battery discharge over long storage periods.

The battery disconnect switch (optional on some models) may be either a rotary or push-pull type. Push-pull types will be located near the 12-volt fuse panel/converter, or near the battery in an exterior compartment. The rotary type will be mounted near the battery. If you expect to store the trailer for more than 10 days, turn the knob to **OPEN** or push the switch knob in. Remember to turn the knob to **CLOSE** or pull the switch out when you take the trailer out of storage.

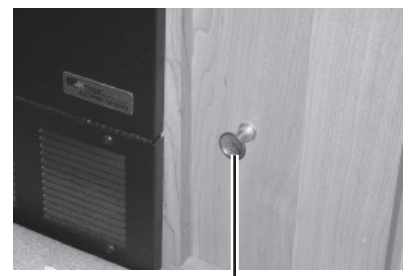
BATTERY SPECIFICATION: GROUP 24 OR BETTER



Battery charge indicator on monitor panel (*style and location varies depending on model*)



Rotary battery disconnect switch
(Location varies depending on model)



Push-pull battery disconnect switch

When servicing batteries, always observe the following:



WARNING

Disconnect all electrical power, both 120-volt AC and 12-volt DC systems, before working on the electrical systems. Make sure all accessories are off so you don't cause a spark.

When checking or filling the electrolyte level in the batteries, do not allow battery electrolyte to contact skin, eyes, fabrics or painted surfaces. The electrolyte is a sulfuric acid solution, which could cause serious personal injury or damage to the trailer. Wear complete eye protection and clothing protection when working with batteries. Avoid touching your eyes while working near batteries.

Do not smoke, have an open flame, or generate sparks near batteries that are being charged or that have recently been charged. Gases from the battery could explode.

When working around a battery, remove rings, metal watchbands, and other metal jewelry. Be careful when using tools. A short circuit across the battery terminals could cause injury, explosion or fire. Lead-acid batteries produce a short circuit current high enough to weld metal to skin, causing a severe burn.

BATTERY INSPECTION AND CARE

Check the condition of the batteries at least monthly. Check for cracks in the cover and case. Check vent plugs and replace them if they are cracked or broken. Make sure the hold-down hardware is tight to prevent the batteries from shaking. Make sure the battery tray or compartment is clean and free of corrosion. Do not store anything in the compartment or tray which could cause a short circuit across the terminals of the batteries.

To clean the batteries:

1. Be sure the vent caps are installed and tight.
2. Wash the batteries with a diluted solution of baking soda and water to neutralize any acid present. Gently rinse the batteries with clean water.

NOTE: Foaming around the terminals or on top of the batteries is normal acid neutralization. Avoid getting the solution in the battery.

3. Dry the cables and terminals before reinstalling them
4. Clean the terminals and the the cable ends with a brush.
5. Reinstall the cables and use a plastic ignition protective spray to protect the terminals. Do not use grease on the terminal or cable bare metal. Grease is an insulator.

BATTERIES AND BATTERY CHARGING

Most of the time you will use your trailer under three different conditions: dry camping, driving, or connected to shore power.

Dry Camping

You will be using power from the batteries to operate lights, fans and other DC components as listed on the power use charts. You will be discharging the batteries.

While Driving

Under driving conditions, or with the tow vehicle engine running, your batteries will be charged by the tow vehicle engine alternator.

Connected to Shore Power

When you are connected to shore power or when the generator (if equipped) is running, all batteries will be charged automatically by the converter/charger.

The 120-volt AC is the power input source to the converter/charger. The converter/charger changes the 120-volt AC power to 12volts DC to operate the DC appliances and accessories in the trailer.

*It is very important to understand that **the difference between a fully charged battery and a fully discharged one is only about 1 volt.** A fully charged battery at rest, in which no discharging or recharging has occurred for 24 hours has a voltage of 12.63 volts (at 77 degrees F.). A completely discharged battery has a voltage of 11.82 volts. Don't be fooled by voltage readings — **a battery that measures 12 volts is already 75% discharged.***

If you experience dead batteries:

1. Plug in to shore power if available, or start and run the generator (if equipped).
2. Reduce the loads on the batteries by turning off any lights, fans, or other 12-volt DC powered equipment that is not absolutely necessary. Avoid turning off the refrigerator. You must reduce loads as much as possible for charging to take place. Run the generator while monitoring the battery charge status indicator on the monitor panel. Running the generator will supply AC current to the converter/charger system, thus charging the batteries.
3. Connect the 7-way cord to your tow vehicle and run the engine at high idle to increase charging current and reduce charging time. Keep loads reduced until batteries are fully charged.

If your tow vehicle battery is dead or discharged, and the generator will not start, an external jumper battery or battery charger must be used to either start your tow vehicle engine or the generator. You may also connect to available shore power to operate the converter/charger system to charge the batteries.

When servicing batteries, always observe the following:



WARNING

Make sure the area around the battery is well ventilated.

Have someone within range of your voice or close enough to come to your aid when you work near a lead-acid battery.

Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.

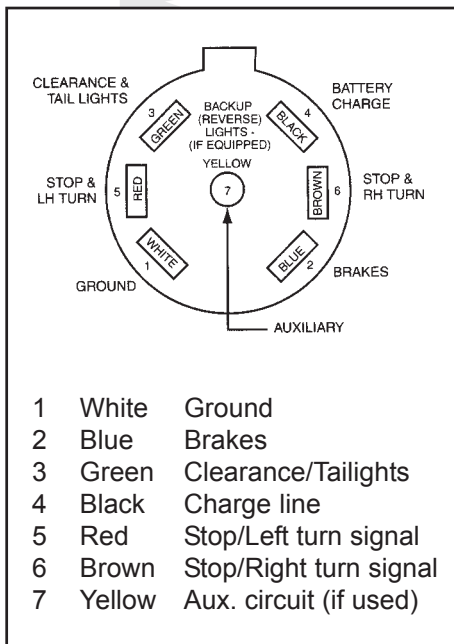
If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least twenty minutes and get immediate medical attention.

MVP RV

TIPS FOR DEAD BATTERIES:

Dead batteries raise a lot of questions, and in most cases are the result of owners misunderstanding their use, maintenance and capabilities.

- ▶ *Compartment, patio and bathroom lights left on are common causes of battery drain. If you are going to park the trailer for a period of time, plug in to shore power to insure the batteries are topped up prior to your next use. Check the batteries while the trailer is plugged in to make sure they are not overcharged or the electrolyte has not evaporated out. Battery failures caused by lack of water are not covered under the battery warranty.*
- ▶ *In most refrigerators there is a "humidity control" switch, usually just inside the door. Be sure it is off when you leave your trailer as this one function can draw down your battery quickly.*
- ▶ *Furnace and vent fans are one of the most common and significant power draws in your trailer. If you leave a furnace or vent fan on all night, your battery will be nearly completely drained by morning.*



7-Pin Wiring

7-WAY POWER CORD

The power cord circuits are protected by automotive type auto-reset circuit breakers mounted on a panel either in a forward compartment or under the front of the trailer on the chassis frame rail.

Be careful to prevent damage to the 7-way cord. When hitching and unhitching, make sure the cord is out of the way and cannot be damaged by the hitch and/or pin box. Do not allow the cord to drag on the ground. When not in use, cover the cord connector to prevent moisture from entering the connector. Clean the contacts in the cord with a contact cleaner every six months.

POWER WORKSHEETS

The following chart illustrates various combinations of power service and converters. The maximum available power to your RV depends on both the electrical service you connect to and the output capability of the converter installed in your trailer. **NOTE:** You do not have the total output current (amps) available when operating on 120-volt AC service. The service input current is also “converting” to DC and therefore not all current is available for the trailer AC circuits.

To find out how much power capacity your trailer has, select the type of service (30-amp or 50-amp) then locate the type of power converter (32-amp or 45-amp) and then match the system voltage. The amperage shown is the total amount of amps that you can use at a single time.

The worksheet on the next page lists the typical power usage for many recreational vehicle appliances. Write in any appliances or components you have that are not listed. Then add up the amperage for the appliances you would like to run, and then check the table below. If the total amount exceeds the available amount listed on the chart, you cannot use all of those appliances at the same time.

MVP RV

If you are operating on →	30-amp Service				50-amp Service	
and you have a →	32-amp converter		45-amp converter		45-amp converter	
for these circuits →	120-VAC	12-VDC	120-VAC	12-VDC	120-VAC	12-VDC
you will have available →	25 A	32 A	22.2 A	45 A	42.2 A	45 A

Power Use Worksheet

12-VOLT APPLIANCE Current Draw in AMPS

Radio	.5 – 6.0
Range Hood Fan	1.75
Power Roof Vent	1.5
Water Pump	4.0 – 8.0
A/C Circuitry	1.5
Furnace	4.0 – 6.0
CD Player	.5 – 1.0
Refrigerator	3.0
TV Booster	3.0 – 11.0
Trailer Lights	.69
Water Heater	1.0
Inverter (if installed):	
Other:	
Other:	

DC Current Draw: _____

120-VOLT APPLIANCE

Current Draw In AMPS

Air Conditioner	12.0
Microwave Oven	7.0 – 10.0
Toaster	10.0
Blow Dryer	6.0 – 8.0
Ceiling Fans	2.0
Water Heater	12.0
Refrigerator	3.0 – 4.0
Coffee Pot	8.0
Other:	
Other:	
Other:	
Other:	
Other:	
Other:	

AC Current Draw: _____

Total Current Requirement in Amps: _____

Note: Water heaters and refrigerators may require both 12-volt DC and 120-volt AC power depending upon the ignition.