

Trailer Systems (Electrical)

Presented

At The

**2009 2010 Restoration Rally - Albuquerque,
NM**

Electric System Characteristics

| | Propane | Water | Electric |
|--------------|-----------------|-------------------------|-----------------------|
| Source | Dealer | Tap | AC Receptacle |
| Storage | Tank (100 psi) | Tank | Battery (+ 12 VDC) |
| Distribution | Cu Pipe (½ psi) | Cu or Pex Pipe (50 psi) | Cu or Al Wire |
| Use | Heat | Drink, Wash, Flush | Heat, Light, Rotation |
| Waste | Heat & Exhaust | Gray & Black water | Heat |

Electrical Safety

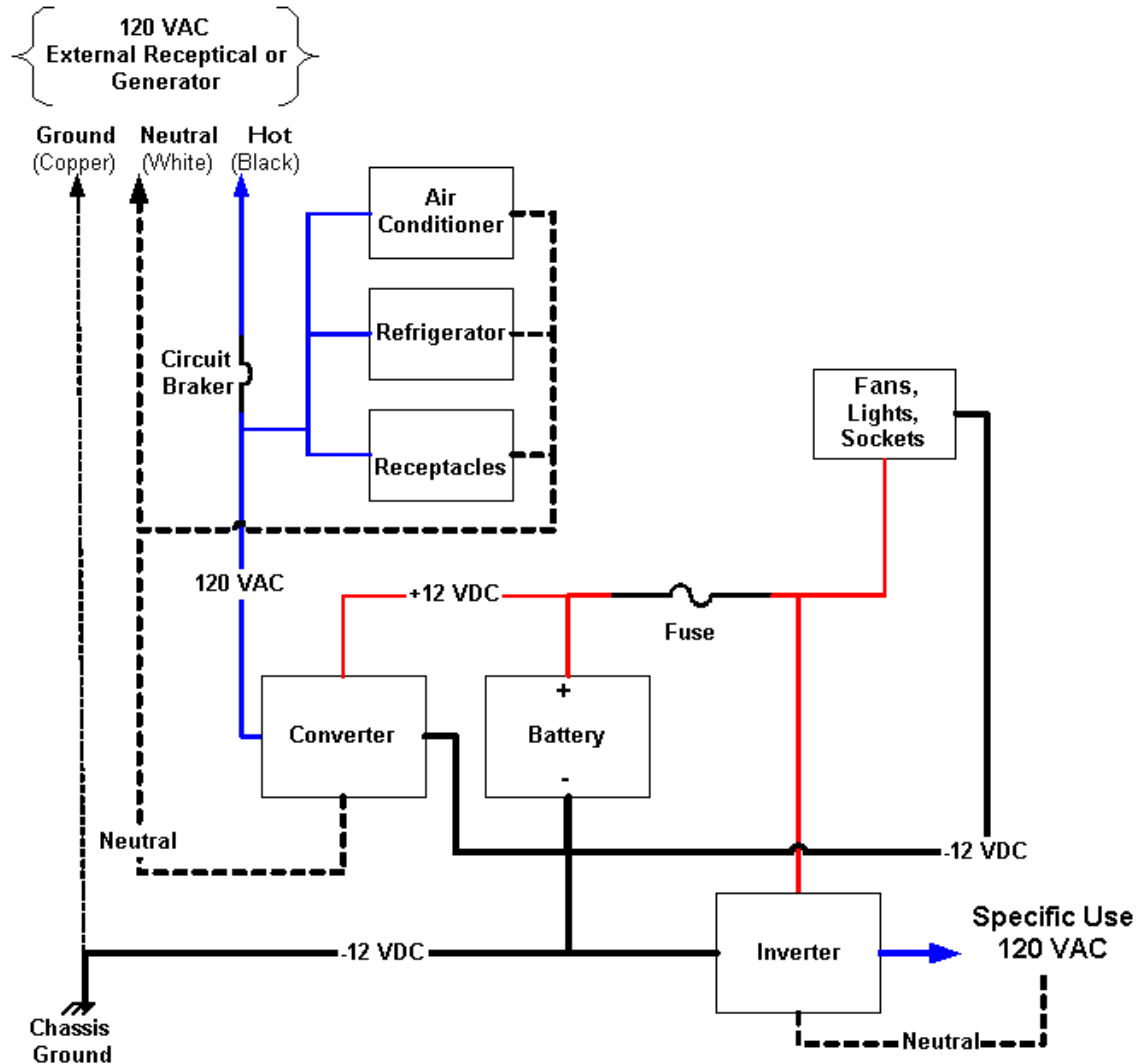
Shock

12 volts DC not dangerous

120 volts AC is dangerous

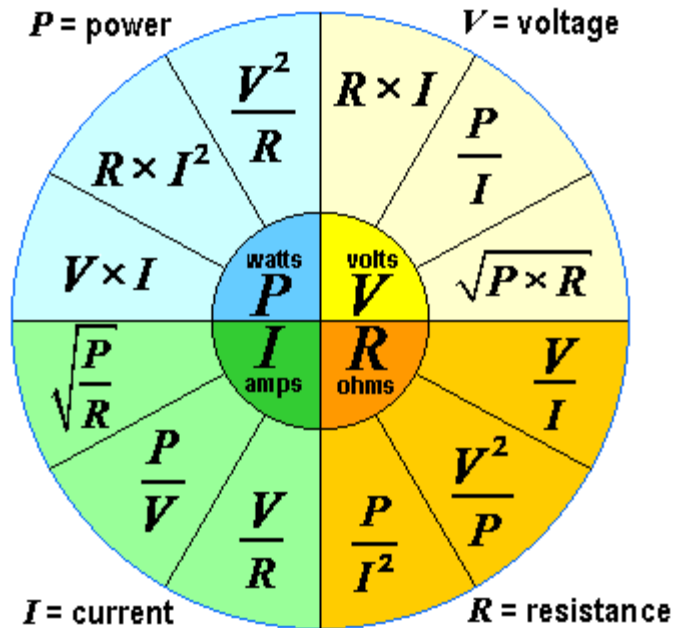
- Hot (black) and Neutral (white) must not be reversed.
- Neutral and Common (copper or green) are not connected in the trailer.

Electrical System Diagram



Do The Math

Lights, heaters, and motors present Resistance to the Current flowing through them, which is forced by the Voltage across them. As a result, they consume Power.



The Big Picture

Your RV runs on 12 volts DC supplied by the battery. 120 Volts AC is there to charge the battery, power big appliances, and provide receptacle power.

Batteries are charged by 120 VAC Converters and Solar Panels.

Sometimes Inverters change 12 VDC into 120 VAC to provide receptacle power when not externally available.

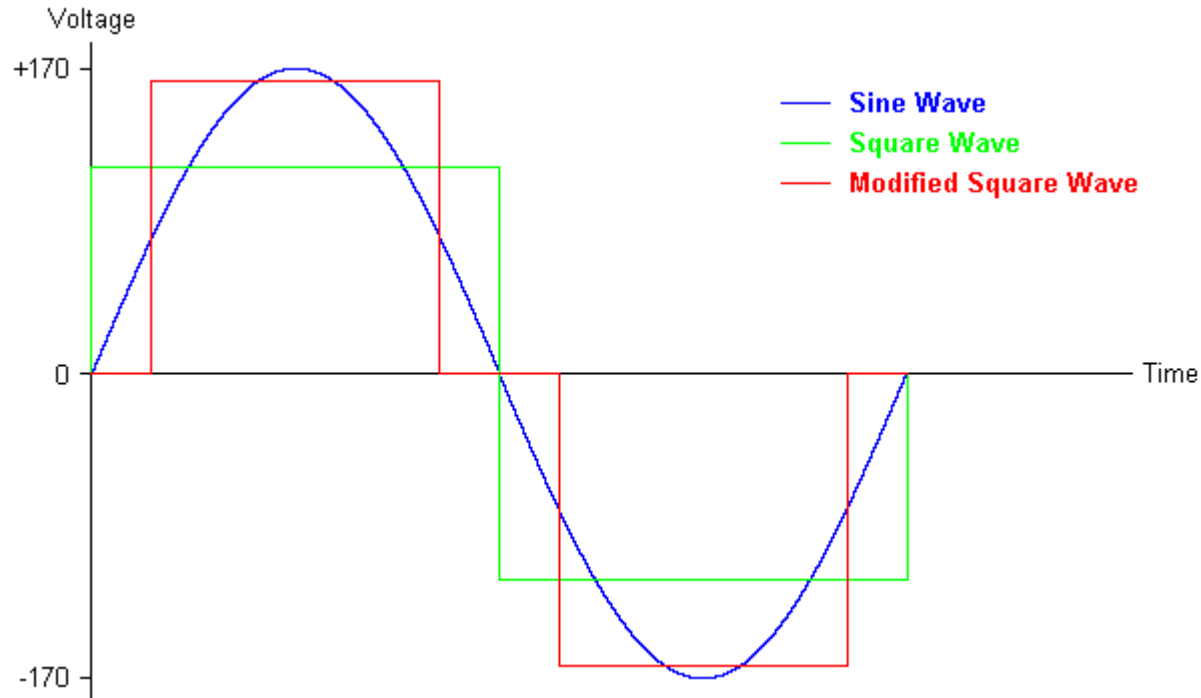
Batteries

- Capacity
 - Amp Hours (100 AH)
 - Low Temp reduces AH
- Charge
 - Full 12.6 – 12.8 VDC
 - 50% 12.2 VDC
 - 0% 10.5 VDC
- Charging
 - “Bulk” (varying volt) , Max Current
 - “Absorption” (14.2 – 15.5 VDC), Limited current
 - “Float” (12.8 – 13.2 VDC), Trickle current
- Load draws current (amps) over time
 - $\text{amps} * \text{hours} = \text{AH}$
- Load in Watts
 - Watts = Volts * Amps
 - *100W light on 120VAC draws 0.8 amps, but running on 12VDC it draws 8 amps.*
 - 25w is $25\text{w}/12\text{vdc} = 2\text{a}$
 - 100w is $100\text{w}/12\text{vdc} = 8.3\text{a}$

Inverter Characteristics

- **Square Wave**
 - Cheep
 - High standby current, low surge Current
 - Not good for electronics
- **Modified Square Wave**
 - Inexpensive
 - Peak voltage varies with battery voltage. Noise and harmonics.
 - Poor electronics performance
- **Sign Wave**
 - Expensive
 - Perfect output
 - Perfect electronics performance

Inverter (12VDC → 120VAC) Wave Forms



Electrical Big Deals

- Source Wiring
 - Reversed Hot & Neutral
 - No Ground
- Poor Connections
 - Loose Wires
 - Aluminum Wire Oxidation
- Drain on Battery
 - Amps = Watts / Volts
 - Battery stores Amp Hours of current

Electrical Troubleshooting

- 120 VAC
 - 120 VAC Monitor
 - Wiring Tester
 - Volt-Ohm Meter
 - 120 VAC Detector
- +12 VDC
 - 12 VDC Monitor
 - Volt-Ohm Meter
 - 12 VDC Detector

Gadgets, 120 VAC Monitor



Jim Cooper
June, 2010

Rocky Mountain VAC
Rally

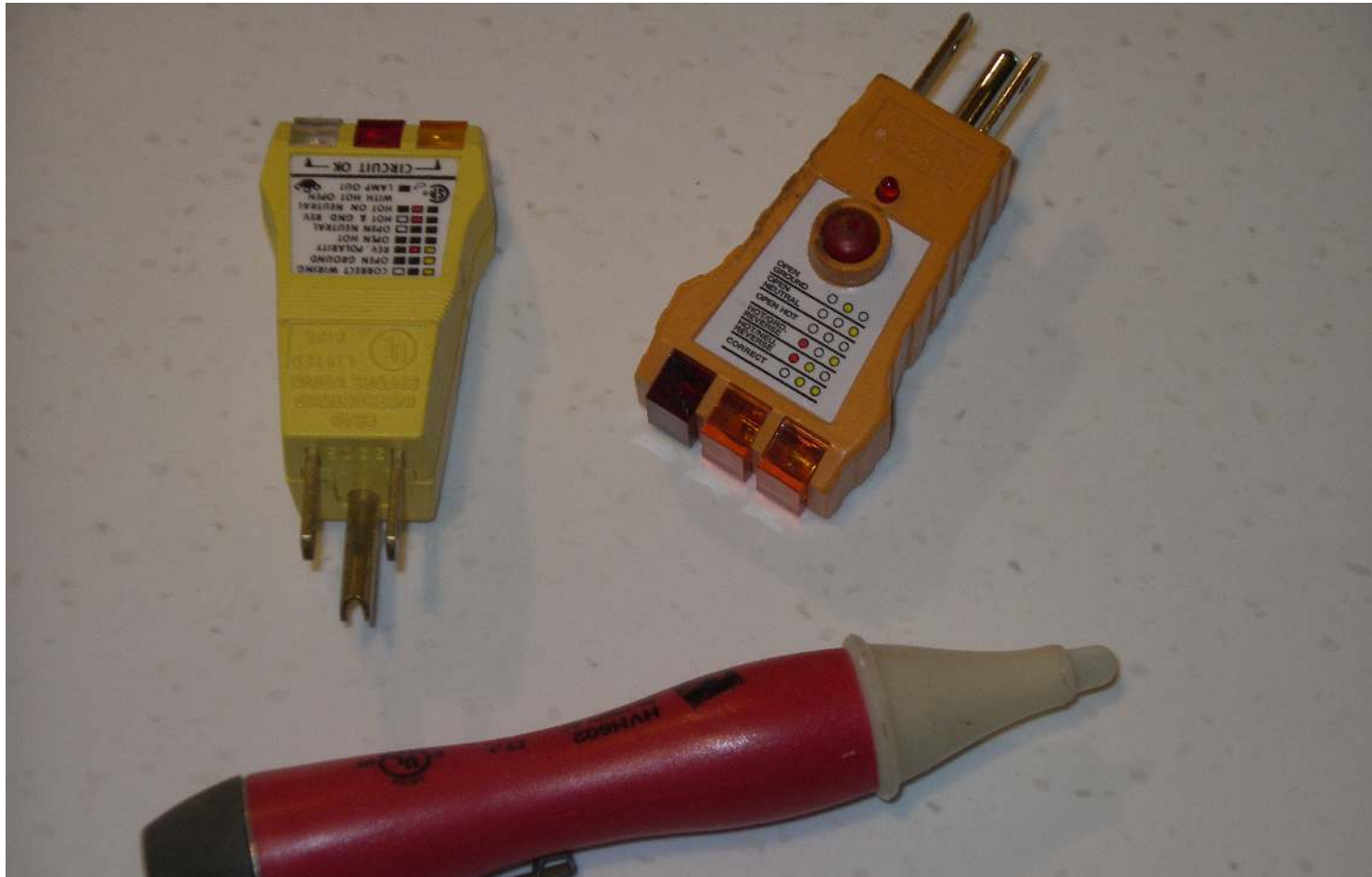
Gadgets, 12 VDC Monitor



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Gadgets, 120 VAC



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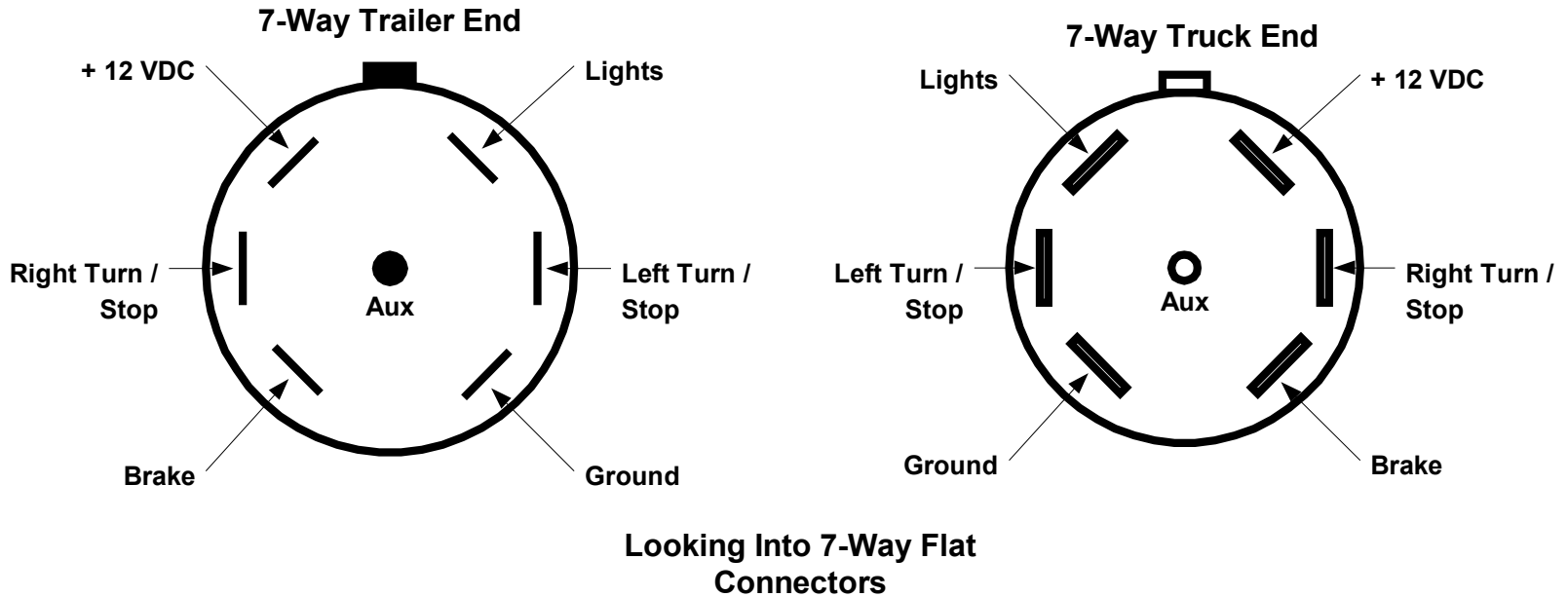
Gadgets, Multimeter



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Brake & Light Wiring



7-Way Connector

- Big Deals
 - Poor Contacts
 - Poor Ground
 - Open Fuses
- Troubleshooting
 - Voltmeter or 12 VDC detector
 - Fused Short

Gadgets, 7- Wire



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