

# RV Electrical Hookup



## Plugging In

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This document started out to describe the simple steps of plugging in an RV into a power pedestal for new RV owners. As I'm writing.... well... it has taken on a life of its own. If you lay awake at night and think about all those thousands of little things that can go wrong in the ever more complex, modern RV, I'd suggest you stop reading now and go have a glass of wine and s'mores instead.



## Power Pedestals

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Campground power pedestals generally have several power receptacles (the things with the holes) and their associated breakers. Generally, they have a 15 amp 120 volt receptacle like you would see in your home, a 30 amp 120 volt which is what most van RVs would require, and a 50 amp 240 volt receptacle. The 30 amp has 3 contacts (holes), a ground on top, hot connection lower left and a return on the lower right. The 50 amp has 4 contacts, a ground on top, hot-1, and hot-2 on the left & right, and a return on the bottom.

## Steps for Connecting RV Power or... How to Complicate the Simple Task of Plugging In

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### 1. Examine your Power Cord

First step is a quick examination of your power cord for bent pins, cuts and scrapes.

### 2. Check the power pedestal housing using a Non-Contact Voltage Detector.

This will verify that the pedestal is safe to touch and it doesn't have a hot wire shorted to the metal box with the power turned on.

Zap!! Just kidding.



### 3. Open cover carefully.

Be mindful it could be harboring wasps, bees or spiders. Oh my!



### 4. Visually check for a burned or charred receptacle.

Burning or charring is caused by worn out or loose fitting contacts between the receptacle and plug which causes arcing and overheating of the connection. This can melt or burn your power plug



### 5. Turn ON the breaker and check the pedestal box housing again with the Non-Contact Voltage Detector.

### 6. Check if the receptacle is wired correctly.

Here are several different ways you can quickly test for correct wiring pedestal power:

**A. (an OK method) Use an Electrical Receptacle Tester and a 30 Amp to 15 Amp adapter.**

(Note: These testers may not always warn of reverse wired receptacles).



**B. (GOOD) Using a 30 amp to 15 amp adapter and Klein Tools GFCI Receptacle Tester.**

Green light indicates receptacle is wired correctly.

This tester is nice because it also displays the voltage which ideally should be within a range of 115-125 volts AC

(Note: The problem with this tester is new electrical codes recommend all receptacles be wired Ground pin up on top.

RV receptacles also have the ground pin on top. That means the display is facing down. A homemade wired adapter

plug/receptacle that twists the wire 180 degrees is useful and can even twist 90 degree sideways to be read with the

breaker box lid opened.)



**C. (BETTER) Check each individual contact hole using the Non-Contact Voltage Detector.**



-Testing a **30 amp receptacle** for proper wiring:

Round hole on top - ground - GREEN - no power

Slot hole Lower right - return - GREEN - no power

Slot hole Lower left - hot - RED - power on

-Testing a **50 amp receptacle** for proper wiring:

Round hole on top - ground - GREEN - no power

Slot hole right - hot - RED - power on

Slot hole left - hot - RED - power on

Slot bottom - return - GREEN - no power

**D. (BEST) Testing with a volt meter**

If you are comfortable around electricity, the absolute

best way to test a receptacle is with a volt meter.

(A test meter like the MM600 is very handy have on board your RV for testing batteries, checking RV AC and DC voltages, temperature, etc.)



**7. OK enough of this testing! Turn OFF all breakers**

**8. (Optional)**

With breakers still off, **spray a bit of Contact Cleaner** into each hole of the receptacle. Contact cleaner will remove any corrosion on the contacts and provide a better conductive surface.



## 9. (Optional)

### Applying a very light coating of Dielectric Grease

occasionally to the pins of your plug will also create a better contact and create moisture barrier.

FYI: Dielectric grease is also good for trailer lights connectors, battery terminals. It is non-conductive. Do not use on rubber.



## 10. Plug in your surge guard and power cord into the pedestal

Wrap the power cord once or twice around the pedestal in case someone trips over it. (Those darn kids!) If the plug feels loose in the receptacle, arcing could melt and damage your plug.

**TIP:** Many new Surge guard protectors have digital displays similar to the above testers. They may NOT warn of reverse wired receptacles.

## 11. Connect your power cord into the RV

**12. Turn ON the breaker** for the receptacle (leave the other unused breakers off).

**13. Check the metal body of the van with the Non-Contact Voltage Detector** one more time, just to be safe.

## 14. Occasionally - Check the plug temperature and voltage.

When running the air conditioner or other high current appliance, occasionally check the plug temperature by touch or using an infrared temp tester gun. Also check the voltage inside the RV to verify the voltage is still within safe range (115-125 volts ac). On busy weekends with a full campground voltage drops are possible, especially on a hot summer day. Low voltage can damage some appliances.

Now if we haven't scared you so badly you want to go home – enjoy your camping trip (if you still can).



## Products Mentioned

(FYI: these are not Affiliate Marketer links – we are not rewarded or paid for recommending them. We just like this stuff! After all isn't that part of the RV ownership experience? – buying more stuff)

### Klein Tools Non-Contact Voltage Detector

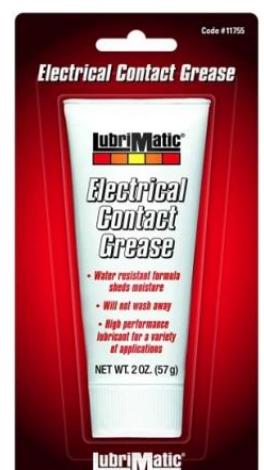
<https://www.amazon.com/Klein-Tools-NCVT-1-Non-Contact-Indicator/dp/B001UAHZAM/>



### Dielectric Grease

<https://www.amazon.com/LubriMatic-11755-Dielectric-Electrical-Contact/dp/B001446LP4/>

FYI: Contact dielectric grease is not a conductor. It works by reducing the oxidation and corrosion of the metal's surface. It also keeps moisture out of electrical contacts and inhibits corrosion. Use it on RV power plug pins, trailer plugs, trailer ground wire lug, battery posts. It is silicone based so will not react with plastic & rubber parts. (Vaseline is a petroleum produce and will damage rubber parts.)



**Contact cleaner** is a Non-Conductive formulation that evaporates quickly and leaves no residue.

<https://www.amazon.com/gp/product/B005DNRON4/>



<https://www.amazon.com/Receptacle-Electrical-Klein-Tools-RT250/dp/B08QW7K1JJ/>

**Receptacle Tester** - Good little tester for correctly wired receptacle and also has a button to test GFI receptacles. It displays voltage and reversed wiring.



<https://www.amazon.com/Camco-Dogbone-Electrical-Innovative-PowerGrip/dp/B000BUTDCA/>

**Dog bone** adapter or a smaller version adapter is a good option when a 30 Amp receptacle looks questionable. You may also encounter a RV Park that has only 50 Amp service.



<https://www.amazon.com/Quick-Products-QP-RV053-Triangle-Adapter/dp/B07BB89RV3/>

**Plug Adapter** - A 30 to 15 Amp adapter is handy to plug in test equipment before hooking up your RV power



<https://www.amazon.com/Multimeter-Auto-Ranging-Klein-Tools-MM600/dp/B018CLOSTC/>

**VOM Meter** is always handy for checking AC voltages, vehicle DC voltages and even little batteries to see why the TV remote isn't working.



<https://www.amazon.com/Portable-RV-Surge-Protector-EMS-PT30X/dp/B01N0W4CZ8/>

**Surge Protector**



Surge Protectors can block high voltage spikes and even protect your RV from low voltage situations by cutting incoming power. They may not warn of miswired pedestals.

## Bonus Material for Extra Credit

If you've made it this far, I've added some additional material for extra credit on your final exam. Oh, did I forget to mention there will be a quiz?

If you are camping 'South of the Border', extra caution is recommended. Electrical standards in Mexico are more relaxed than US and damages to RV electrical systems occur much more frequently and can be expensive to repair.

**TIP:** To measure the actual amperage your RV is drawing, you can use a Clamp-On meter on the power cord.

**TIP:** To make coiling the water hose and electrical cords, mark the mid-center of each and when you wind them up, start in the center.

To calculate the Amperage when you know the wattage, Divide the total wattage being used by 120 volts and you'll get the total amperage. Example: if you are using an Electric Space Heater in the RV and it is rated at 1500 watts, the amperage would be  $1,500w / 120v = 12.5$  Amps.

You can use an adapter (15 Amp to 30 Amp) and plug your RV into a 15 Amp home wall receptacle. You probably won't be able to run the air conditioner but the other appliances should be OK. On some RV's you can set limits on the amount of current (Amps) the system can draw. This will keep it from tripping the 15 Amp breaker you are plugged into. (Future Document to be added)

Something we 30 Amp users don't have to worry about – RVs that use the 50 Amp need to be careful that the return wire of the circuit is connected properly. If not, they could find themselves with 240 volts in their 120 volt system. This has the bad effect of burning out every appliance in the RV.

Electrical equipment technical standards are defined by NEMA – the National Electrical Manufacturers Association.

What are some of the different types of receptacles used on RVs?



30 Amp Plug NEMA TT-30P  
("P" stands for PLUG - male pins)



30 Amp Receptacle NEMA TT-30R  
("R" for receptacle - female socket)



50 Amp Plug NEMA 14-50P  
(male pins)



50 Amp Receptacle NEMA 14-50R  
(female sockets)



Twist on receptacle mounted on the RV  
for the cord to attach to  
NEMA L5-30P plug (male pins)



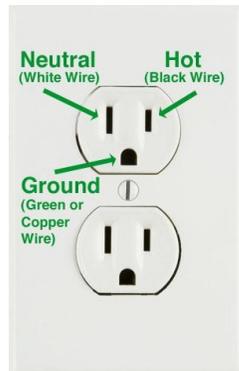
RV Power Cord NEMA TT-30P –  
NEMA L5-30R



Extension Cord:  
Plug (Male): NEMA TT-30P (RV 30 Amps, 125 Volts)  
Receptacle (Female): NEMA TT-30R (RV 30 Amps, 125 Volts)



Dog bone 50 Amp male (NEMA 14-50P) to 30 amp female (NEMA TT-30R)



NEMA 5-15R (15 Amp receptacle)



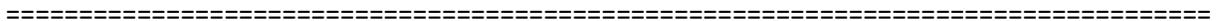
NEMA 5-20R (20 Amp receptacle)



NEMA 5-15P (Typical 15 Amp plug)



NEMA 5-20P (20 Amp plug)



## Hot Skin

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Now here comes some really scary stuff.



When you hear the term "Hot Skin" you probably think it occurs on the beach on a hot summer day. A more accurate term is "Hot-Chassis" condition. For RV owners, it refers to a wiring malfunction where the metal skin or other conductive metal parts of the RV have been electrified by a faulty power connection or something as simple as a burned out hot water heating element.

While death is extremely rare from hot skin, a Google search has revealed a few people that have been killed over the years including a 3 year old boy. One website stated 21 percent of RV owners in the survey have felt a tingle of electrical current at some time from touching metal of their RV while outside. If you ever do feel a tingle or shock of electrical current, power off the breaker immediately. Hot Skin can also be caused by a problem on another RV connected the same leg of power. Their wiring issue can reverse feed back to your RV.

For Class B vans and many other types of RV we don't have a good electrical path to "Earth Ground". Trailers on the other hand have a metal tongue jack post and metal leveling stabilizing jacks that provide solid grounding contact. That is assuming they aren't putting insulating blocks under the jacks. The rest of us sit on insulating rubber tires with the only earth ground connection back thru the power pedestal. Kind of makes you want to add a ground rod to our equipment list or insulating shoes..... Naww!



Now that you are scared to even touch your RV for fear of shock, sleep tight and enjoy your camping trip. Thanks for reading.

If you would like to see more information on Hot Skin, a quick Google search will find dozens of pages and videos. Here is a couple:

<http://noshockzone.org/>

YouTube <https://www.youtube.com/watch?v=GuWX9wJwvtU>

Kindle Book - No~Shock~Zone RV Electrical Safety \$9.99

<https://www.amazon.com/No-Shock-Zone-Electrical-Safety-Michael-Sokol-ebook/dp/B00L2DWBD8/>

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