



WHAT SYSTEM SUITS YOU BEST?

Please take the time to read the following information before fitting your solar system.

SOLAR PANELS

Solar panels are made by a wide variety of companies and are made available in three different types.

Most panels on the market are of good quality, therefore any major brand may be purchased with confidence as all panels are made using the same technique. All brand name panels cost approximately the same price per watt when in comparison with each other.

However, as the wattage of your panel increases, the price paid per watt decreases.

PANEL # 1 AMORPHOUS

These cells are used in calculators, watches, toys and small solar applications. Some amorphous cells are flexible but are much larger in size per watt than mono crystalline panels.

Amorphous panels claim to be more shade tolerant.

PANEL # 2 MONO CRYSTALLINE

Made from silicone wafers, this is the smallest panel per watt. Ideally suited to caravan fit ups, the panel has a blue flake appearance to the cells. Most poly panels are made in a strong alloy frame with a glass cover which allows for easy mounting with very little flex

PANEL # 3 POLY CRYSTALLINE

These panels have round, half round or square cells covered with glass.

These are not very common panels these days.

THINK BEFORE YOU MOUNT!

When fitting solar panels to your caravan or camper trailer, it is important to mount the panels off the roof for air flow, as heat will reduce the output of your panels. Home of 12 Volt manufactures mounting frames to lift your solar panels in order to assist you in gaining optimum performance from your solar system.

When mounting panels be aware of the panels being shaded. Mounting too close to the air conditioner will shade the panels at different times of the day. Wind up antennas may also shade panels and reduce performance.

When mounting 3 or more panels to the roof of your caravan it is advisable to wire them in 6mm cable in lots of three (no more than this), or performance will be reduced. Do not, if possible, mount panels on the front slope of your caravan as performance will be reduced. This is due to the fact that most panels work at their optimum performance when facing north, which may mean that you need to reposition your caravan.

Remember that you are fitting solar panels, so whatever the salesman may tell you, they will not work unless you have sun. Solar panels have an output voltage of approximately 20volts therefore it is obvious that the more you shade a panel the lower the voltage will be. Voltage loss will greatly reduce its performance.

Keep in mind a battery will not charge unless the charge voltage is higher than the battery voltage.

E.G BATTERY - 13.5 CHARGER - 14.5VOLT

REGULATORS

A large selection of regulators are available with and without displays. Home of 12 Volt recommends a display unit for ease of use as the additional cost is not that great when you compare the extra features.

Keep in mind you may fit an extra panel at sometime so a larger regulator may be a good option.

E.G 3 x 80 WATT PANELS REQUIRE 15AMPS - THEREFORE A 20 AMP REGULATOR SHOULD BE FITTED.

REGULATORS MUST BE FITTED TO AVOID THE BATTERIES FROM OVERCHARGING.

BATTERIES

One of the most important parts of the system and one area where you do get what you pay for.

Home of 12 Volt only fit AGM batteries in caravans and camper trailers due to the fact that they are fully sealed, need no maintenance and have an extended life over wet cell batteries. These batteries can be fitted inside caravans under seats or beds. (The batteries do not omit any gas under normal charging conditions and can be mounted in any position).

When fitting batteries in a caravan it is recommended, if possible, to fit a maximum of three batteries in total.

E.G If you require 300 amp hours then 3 x 100 A/H or 2 x 150 A/H would be ideal.

If you require 450 amp hours then 3 x 150 A/H would be ideal.

This is good in a perfect world, however, it may not prove possible in all fit ups. Two to three batteries will charge easier than four or five and are also less prone to damage due to charging. If more than three batteries are required then it is recommended to keep cable length to a minimum.

If possible when calculating your needs, try to keep battery capacity to a maximum of 60% discharge. All AGM batteries have excellent discharge rates.

E.G 20% Discharge 1200 cycles

50% Discharge 800 cycles

The less you drain them, the longer they last.

100% Discharge 200- 300 cycles

Always charge your batteries after use.

CHARGING BATTERIES

12 volt charging can be an extremely handy option and in most cases it is a must have. However, most vehicles will not charge your battery 100% It is more likely that they will charge them to around 85 – 90% of the battery's capacity. However, when solar is fitted this does not become a problem as the solar tops up the balance. A charging kit from the vehicle to the caravan must be done via Anderson plugs and not your standard 7 pin plugs as this is inefficient and may result in damage. A 25 – 50 amp charge rate is possible through the vehicle but cable size should be kept as large as possible to reduce voltage drop.

240 volt charging should be done if possible at a rate of 10% of the battery's capacity.

E.G 300 amp hour = 30 amp charger.

This is not a must have, however, it is ideal if you do not have solar to back up the charger.

E.G 300 amp hour = solar 15 amps & charger 15 amps (PERFECT!)

NOTE: A 30 amp charger will not charge a 300 amp hour battery in 10 hours. This is due to the fact that when a battery reaches 70 – 80% charge, the output of the charger (amps) reduces steadily and the remaining charging may take up to a further 4 hours. Overall, the total charging time will reach approximately 12 – 14 hours; however, in most cases your batteries will not be 100% flat (10.5 volts).

NOT ALL THE POWER GETS TO YOUR BATTERIES

You will never be 100% efficient due to a little thing they call resistance.

A small loss will occur between your solar panels and your batteries both when charging and when you start using your power. However, most losses are minor and the majority of systems should be at least 95% efficient. This is a fact of life and no matter what you do, this can not be avoided.

CABLE SIZE

This is a very important part of the performance of your system as voltage drop can and will impair your performance.

E.G An 80watt panel mounted on the roof wired in 3mm cable will only give approximately 70% of its output. If, however, in the same circumstance you wired the panel with 6mm 50 amp cable you would receive 100% of its output.

BIGGER IS BETTER WHEN IT COMES TO CABLE!

At Home of 12 Volt most of your system will be wired in 6mm cable or larger in selected fit ups.

THE INVERTER

This unit is used if you require 240 volt power from your solar system.

There are two main types of inverters available on the market today; modified sine and pure/true sine.

Modified sine is a cheaper alternative; however, it is not suitable for all electrical appliances as its output is not as regular as pure sine.

A pure sine inverter is the best inverter that is available on the current market. It has the capability to run all electronic devices and is the best option if the cost does not prohibit its use.

Remember when choosing an inverter you must first calculate your needs and add 10%. Do not underestimate the size of the inverter that you may require or you will be disappointed and may result in damage to the inverter if it is overloaded.

Keep in mind when fitting inverters they can use a huge amount of power.

EG 1200watts at 240 volt is 100 amps at 12 volt.

Therefore some items on 240 volt become impractical to use. It is therefore recommended that you cook on gas, heat on gas, and do not use items with heating elements when using an inverter. If you have a larger system fitted, some appliances with heating elements may be used.

If you do not need your inverter, turn it off. This is because most inverters will use 1 amp per hour on standby. That's 24 amp hours per day (more than a 40watt solar panel can produce!)

With inverters, you get what you pay for. A good inverter should have at least twice its output as a surge, if it does not... Do not buy it! The reason for this is because a high surge is required to start many electrical products. E.G TVs, microwaves, etc

DIODES

Diodes should be fitted when more than one panel is mounted in order to stop feedback from one panel to another. They act like a one way valve. Solar panels will charge the battery but can additionally discharge the battery if diodes are not fitted.

Home of 12 Volt fits diodes to all solar fit ups including its range of portable panels.

FUSES AND CIRCUIT BREAKERS

These products will reduce and in most cases totally eliminate the chance of short circuits or melt downs of your system.

Fuses can be replaced with the same rated fuse if shorted whilst circuit breakers are either push buttons or automatic reset. (If the short circuit persists, remove all appliances).

CHOOSING YOUR SYSTEM

When selecting your system it will take time to calculate your needs and additional time will be required to determine where it should be fitted.

Keep in mind the extra weight in your caravan should be laid out as to not affect things like total weight and ball weight. A little time in planning can save a lot of trouble down the track.

At [Home of 12 Volt](#) we can spend time planning your system fit up if required.

By using the chart provided you can calculate your needs or simply fill blanks and we at [Home of 12 Volt](#) can do the calculations for you.

If you choose to have [Home of 12 Volt](#) fit your system, or you decide to fit it yourself, just remember to plan before you fit. This way you can be sure that you will have a system that will perform in all conditions.

POINTS TO REMEMBER

1. Each 80watt panel fitted will require approximately 100 amp hours of battery power.
E.G 3 x 80watt 300 amp hours

You will need larger capacity batteries to cover your needs in bad weather conditions and to store power during the day to use at night.

2. When fitting a solar regulator 3 x 80watt panels will require a 15 amp regulator, so you should consider fitting a 20 amp to enable you to fit an extra panel later if required.
3. AGM batteries are fully sealed and entirely maintenance free. They do cost a bit more but are completely safe when fitted inside caravans. We at [Home of 12 Volt](#) highly recommend the use of AGM batteries.
4. A 12 volt charge system from your vehicle will charge at a rate of approximately 30 amps and can be a handy option if you are a frequent traveller.
5. For best results, recharge at 10% of a battery's capacity. This can be done by 240 volt & solar charging.
6. For best results, wire your gas fridge to your caravan batteries and solar system (less voltage drop means better performance).
7. Never run your fridge or charge your batteries from your 7 pin caravan plug as this can result in a melt down of your plug. It is recommended that an Anderson system is used.
8. Finally keep it simple and enjoy your system.

APPROX SOLAR OUTPUT FOR 6 HOURS A DAY SUNLIGHT

1 x 80 watt panel = 30 Amps

2 x 80 watt panels = 60 Amps

3 x 80 watt panels = 90 Amps

A system that requires 90 amps per day would require 3 x 80 watt panels and batteries equivalent to 300 amp hours for continuous power supply.

Note: Your system will perform much better in summer than what it will in winter due to the longer days and stronger sun.

Keep in mind that batteries are rated in amp hours at 25°C. This means that temperature will affect the level of output that you will receive from your batteries. When the temperature is colder than 25°C you will receive less output from your batteries, and in reverse, when temperature is above 25°C you will receive a higher output from your batteries.

A quick and easy way to conserve power is to fit low wattage fluoro or L.E.D lighting. It is sometimes cheaper to change lighting than to add another solar panel to your system.

Finally, it is good to remember that it is not a perfect world when fitting solar panels to caravans as everybody's needs are different. But if you get it close from the start you can and will learn to work with what you have and get the most out of your system.

By now you should know a bit more about solar and the system that you may require. Remember to keep in mind that just because you now have solar panels fitted to your caravan, it does not mean that you will not run out of power. Even the most expensive systems can struggle to keep up with prolonged periods of bad and overcast weather.

It is now time to calculate your own needs and build a system that will meet your requirements.

POINTS TO REMEMBER

1 Amp at 12 Volts = 12 watts

1 Amp at 240 Volts = 240 watts

Amps x Volts = Watts

EG 10Amps x 12 Volts = 120 watts

Watts / Volts = Amps

EG 120 watts / 12 Volts = 10 Amps

APPLIANCES	WATTAGE	X	HOURS PER DAY USAGE	=	DAILY LOAD
LIGHTING				=	
KITCHEN LOUNGE	2 X 12 watt		3	=	72
AWNING	1 X 12 watt		.5	=	6
BEDROOM	1 X 12 watt		1	=	12
SHOWER	1 X 18 watt		0.5	=	18
APPLIANCE				=	
WATER PUMP	36 watt		0.5	=	18
T.V.	30 watt		3	=	90
TV/DVD PLAYER	50 watt		2	=	100
MICROWAVE	1000		0.25	=	250
FRIDGE 12 VOLT	20 watt		24	=	480
POWER REQUIREMENT					1046
PLUS 10%					105
TOTAL					1151
TOTAL AMPS PER DAY = TOTAL /12 VOLT			1151 / 12 = 95.91 amps per day		