



204 Carmichael Close NW
Edmonton, Alberta
Canada T6R 2K6

Business: (780) 437 7659
Toll Free: (866) 437 7659
Cellular: (780) 940 7153
Facsimile: (780) 434 5312
Email: infodesk@kmt1.ca
www.kmt1.ca

PulseTech Battery Maintenance Systems

What makes PulseTech products different from other battery charging and maintenance products available on the market?

PulseTech offers many battery charging and maintenance products that utilize our revolutionary and patented Pulse Technology. This technology is designed to help prevent the main cause of battery problems and failure: sulfation buildup (lead sulfate deposits on the battery plates) and related problems.

Some products may claim to provide the same benefits as ours, but most of them merely try to "maintain" the battery by charging them on a constant basis. The problem is too much charging will ultimately overheat and damage the lead plates. The "cure" will be much worse than the disease.

Other products even claim to remove lead sulfate deposits from the plates. This is usually done by over charging the plates with high voltage in order to literally knock the sulfates loose. In this situation, only a few sulfates are removed as active plate material sheds and falls uselessly away from the battery plates. It's like blowing up the house just to get rid of the termites.

PulseTech products enable the embedded sulfates to gently leave the plates and convert to active electrolyte. They also help prevent sulfates from building up again and won't harm the battery or the vehicle charging system in any way.

Will PulseTech products benefit other electrical components on my vehicle?

Yes. By maintaining your batteries in peak condition, your alternator does not have to work as hard at recharging your vehicle once it has started. The battery will accept a charge more readily and faster so alternator life should be extended. Plus, by maximizing available cranking amps, there will be more available energy going to your starter. The engine will turn over faster and more readily, so your starter should last longer as well.

Outside of sulfation damage, what are other common causes of battery failure that Pulse Technology will help?

It's interesting to note that other common causes of battery failure (buckled plates, shedding, overcharging, mossing, etc.) are directly related to sulfation buildup. For example, according to a leading battery service manual, buckled plates may be caused by "being overcharged while sulfated or stored in a deeply discharged state." Sulfate buildup weakens the plates to a point where batteries must be overcharged to accept

energy. This will then overheat and warp, or "buckle," the plates. This service manual also relates shedding of the plates to sulfation buildup. It states that, "if material has shed from the plates in small chunks, high charging rates on sulfated plates can be the cause." Each of these and other common causes can be avoided or greatly reduced through the use of our patented Pulse Technology.

Will PulseTech products work on gel cell batteries?

Yes. They work on any size and any voltage lead-acid battery. This includes all conventional flooded lead-acid batteries and sealed "maintenance-free" batteries, including VRLA, absorbed glass mat (AGM) and gel cell battery types.

How quickly will sulfation buildup occur on a brand new battery?

The rate of sulfation buildup on a battery will vary greatly depending on the battery's state of charge, usage, age, type and condition. It will occur faster on batteries that are used infrequently but will still affect frequently used vehicles (*see next question*).

Keep in mind that even brand new batteries may already be sulfated when they are installed on your vehicle. According to a leading service manual in the battery industry, "since sulfation buildup is likely to occur whenever batteries are neglected for long periods of time, it can occur in new batteries that have been in stock for a period of time as well as used ones."

Sulfation buildup begins to occur the moment electrolyte (acid or gel) is added to a battery. As new batteries sit in storage or on a store shelf, they will suffer from sulfation buildup. In order to ensure optimum battery performance at all times, it is best if a Pulse Technology product - such as the Xtreme Charge, SolarPulse or PowerPulse - is used on your battery the moment it is installed in your vehicle or the Pro-12 is put into use on your batteries in storage and/or awaiting sale or use.

Since sulfate buildup occurs more often with infrequently used batteries, will I need Pulse Technology even if a vehicle is operated on a frequent basis, like a car or delivery truck?

Absolutely. Even frequently used batteries charged by the alternator on a consistent basis may suffer from sulfate accumulations. This is especially true for cars, express delivery trucks, buses and other vehicles.

According to a leading service manual in the battery industry, "it is possible for a vehicle to develop an undercharged battery if it is constantly driven at slow speeds and left idling for long periods, as in heavy traffic combined with high electrical load conditions." If a vehicle is moving at slower speeds, idling a lot or suffering from an overtaxed electrical system the alternator is not able to charge at an optimum rate. The result is a battery that is not fully charged even though the vehicle is running all day. Since it isn't fully charged, it will begin to sulfate. A vicious circle is created because the more the battery sulfates the less energy it will accept and the battery will be more undercharged.

Ultimately, it will become completely compromised by severe sulfation and fail.

By keeping the battery plates clean with Pulse Technology, the battery capacity is optimized so it will accept and store energy more efficiently which helps eliminate the problem of undercharging.

Is it true that charging batteries in reverse polarity will desulfate the plates and prepare it for a better recharge?

Absolutely not. This will actually damage your battery and could even lead to an explosion. Attempting to charge a battery by reverse polarity should NEVER be performed for any reason.

For safe, effective prevention and removal of sulfation buildup on battery plates, use only our Pulse Technology products.

Will weather affect my battery?

Yes. What many people don't realize is that extreme cases of heat and cold will increase the speed of sulfation buildup and the rate of discharge within a battery. For example, when the weather starts to get hotter, the rate of sulfation buildup will actually double for every 10-degree increase in temperature. That means that if the temperature goes from 75° to 95°, sulfation buildup on battery plates will occur 400% faster than normal. Batteries stored or in vehicles in warm weather have the potential to fail due to the build up of sulfation, much sooner than batteries stored or in vehicles in milder weather.

Cold weather generates a real "Domino Effect". When it's cold outside, sulfation buildup in combination with the decreased efficiency of the chemical reaction within the battery will reduce its ability to provide operational power. This is aggravated as petroleum vehicle lubricants thicken due to the cold. This cold condition causes even more available power and capability to be taken from the battery to start the vehicle, so the battery has to work harder than normal to provide additional power demanded by the vehicle and as a result realizes a further reduction in voltage causing faster buildup of sulfates on the lead plates. Keep in mind that the battery's electrolyte can actually freeze if the battery is in an advanced state of discharge, and this will physically damage the lead plates, destroying the battery. At 1.270 specific gravity (100% charged) battery acid will freeze at -83°F (-64°C), at 1.200 it will freeze at -17°F (-27°C) and at 1.140 (completely discharged) it will freeze at only 8°F (-13°C).

Will PulseTech products damage electrical systems on cars and other vehicles?

It is not possible for any of our products to damage the electrical system on any vehicle. By attaching the product to the battery, the pulsing energy is absorbed within the battery and is not "seen" elsewhere in the system. This technology has been applied to a variety of military vehicles with very sensitive launching systems or computer systems with no interference problems.

Our products will only enhance a vehicle's electrical system operation, never detract.

Will PulseTech products hold up for day-to-day usage?

Absolutely! One of the reasons PulseTech first took this revolutionary technology to the U.S. Military many years ago was to verify the durability of the product. Because of our patented design and proprietary manufacturing process, our products are as durable, if not more so, than the piece of equipment you are mounting them on! This exceptional durability is also why we gave Xtreme Charge, SolarPulse and PowerPulse a 5-year limited product warranty!

Do the Xtreme Charge, SolarPulse and PowerPulse models have to stay on the same battery permanently or can you move them from battery to battery?

These units can be moved from battery to battery if the customer chooses to do so, but we strongly suggest you install them and use them on a regular basis. Remember that sulfation buildup happens 24-hours a day from the first moment battery acid is loaded into the battery. Although you can use Pulse Technology as a part-time fix, a continuous installation will give a much more effective result because not only do they eliminate the existing buildup, they also prevent the lead sulfates from building up again.

Can they be used on more than one battery at a time?

It depends on the model. The standard Xtreme Charge is designed for use on single 12 Volt system (2-6V batteries in series or one 12V battery only). The XC100 PARALLEL is designed for use on two to four 12V batteries connected in parallel. The SolarPulse (SP-2 and SP-5) are designed for use on 12V batteries. The SolarPulse may also charge more than one battery at a time. The 2-Watt works on two 12-volt batteries in parallel, dependent on battery size, while the 5-Watt works with up to four batteries in parallel, again dependent on battery size. The PowerPulse 24, 36 and 48-volt systems are "voltage specific" which means they are designed to work only with their designated voltages: A 24-volt PowerPulse on a 24-volt battery system only, and so on.

The Pro-12 is designed to maintain up to 12 batteries at a time when in storage and/or waiting on a store shelf for sale. It utilizes a 750 milliamp charge with pulse on a .02 second rotation between connected batteries.

Do any PulseTech products work on 6-volt lead-acid batteries?

Yes. Although all of our products are designed for 12 volt or higher, system application of Pulse Technology on 6-volt batteries can be achieved through series connection of 6 volt batteries creating a 12, 24, 36 or 48-volt system. Product application is solely dependent on overall system voltage.

Which product should I use when storing my vehicles for long periods of time?

We suggest you use the Xtreme Charge (XC100) if stored indoors with access to AC power or SolarPulse SP-2 or SP-5 if stored outdoors without access to AC power but access to the Sun's energy. Besides preventing sulfation buildup, they also prevent the self discharge loss of battery power no matter how long your vehicle or equipment sits

unused - even months at a time.

For example, under normal conditions a lead acid battery will lose 1% of its energy a day while the vehicle sits unused. That means it will not take long for a battery to become completely discharged, especially if it was not fully charged in the first place. Xtreme Charge and Solar Pulse will not allow those batteries to lose energy and will maintain them indefinitely. The Solar Pulse will maintain and condition the battery and the Xtreme Charge will charge, maintain and condition the battery every day.

If you do not have access to AC power or sunlight, you can use PowerPulse. Keep in mind that PowerPulse was designed more for vehicles and equipment that are used frequently or charged on a regular basis vs. those that are stored. It does not charge at all. Based on lab testing, a 12-Volt PowerPulse will maintain a 12-volt battery for approximately 2 to 3 months off a full charge if left unattended. We cannot say the vehicle will always start at that point, but the battery will be free of sulfation buildup, will be able to be jump-started into action, and it will recharge and hold a charge almost like a new battery.

Does PulseTech offer AC-powered products?

Yes. The Xtreme Chargers are AC powered.

Are the PowerPulse and SolarPulse battery chargers?

All SolarPulse models produce a trickle charge for voltage maintenance along with the desulfation process via a separate circuit. It provides enough power to offset the normal daily discharge of a battery (usually 3.1mA to 10.1mA depending on the battery chemistry) plus a nominal amount of parasitic drain. This was recently verified independently by one of the major U.S. auto manufacturers. Keep in mind, though, that while they do supply a trickle charge and pulsing to the battery, the charge rate is not sufficient to charge a completely dead battery in a short time frame.

PowerPulse is a battery maintenance system designed to prevent sulfation buildup only. It will not charge.

Use of the Pulse Technology products will enable chargers to do their work more efficiently. Since they help keep the battery plates free of sulfate deposits, it takes less time to charge the battery and battery capacity is increased so it has greater discharge capabilities and will last longer between charges.

Does PulseTech offer Battery Chargers?

Yes. We offer four types presently. The XC Xtreme Charge, the X2 Dual Station Xtreme Charge, the XCR20 20 Amp Recovery Charger and the SC12 Pulse Charger 12 station charger.

The Xtreme Charge single and dual station units are state-of-the-art "smart" charging systems that are actually four chargers in one. It's a state-of-the-art charging system (up

to 2.5 amps) that works with all 12-volt lead-acid battery types including conventional flooded lead-acid batteries and sealed "maintenance-free" batteries, including VRLA, AGM and gel cell batteries. It also works off either 110- or 220-volt ac power so it can be used virtually anywhere in the world. At the same time, the Xtreme Charge uses our unique and patented Pulse Technology to remove sulfation buildup.

The XCR20 20 Amp Pulse Recovery Maintenance Charger is a heavy duty desulfation charger mounted in a rugged, weatherproof, atmospheric pressure equalized military grade case. It is ideal for a shop environment that requires fast charge and desulfation capabilities. It incorporates a full LED display for battery condition and charger operation, similar to our other chargers.

The SC12 is a multiple (12 station) 8A battery charger. It is a portable charger that can solve your battery problems much more quickly – times 12! It not only charges 12 batteries at a time but will maintain and condition them as well. It's ideal for all service facilities that deal with multiple vehicles and multiple batteries.

Is it possible to recover a dead battery that will no longer accept a charge?

Yes. Although our products are designed for keeping new batteries in peak condition for a longer period of time, some of them can, in many cases, be used to bring batteries that will not accept and hold a charge back to useful condition.

First, use a PulseTech 390PT Digital Battery Analyzer to determine if the battery is a good candidate for recovery (Note: Even though the analyzer may read "REPLACE BATTERY", it could still be recoverable.)

The ideal way to recover a battery is to use our Xtreme Charge XCR20 Pulse Recovery Maintenance Charger. Make sure the cells are filled with distilled water (if required) and attach the battery to the Pulse Charger. If the Bad Battery light begins to flash, it is indicating a problem and the battery is probably not recoverable. If the light does not flash, you can proceed.

Leave the Charger on the battery for at least 36 hours. At any given point during the charge it may shut off automatically so it won't overcharge your battery. During the "off" period it is no longer charging but you will notice that it will continue to pulse condition the battery. As it continues to pulse and de-sulfate the battery it is likely to cycle through the charge and pulse sequence a number of times before the battery is brought back up to an improved condition. The number of times it may cycle will be dependant upon a number of factors including the age of the battery and the time it may have been sitting unused, the depth of discharge, the physical size of the battery (amount of plate surface area) and the depth or state of sulfation damage that may have occurred.

Next, use the PulseTech PT390 digital battery analyzer as mentioned above to check the battery for improvement. If there has been at least a 20% increase in Cold Cranking Amps (CCA), you may proceed repeating the process as needed, using the analyzer to check for improvement.

Keep in mind that some very badly sulfated battery plates could take several days or weeks to clean. Also, not all batteries can be totally recovered. If a battery has a short circuit or physical damage, it is impossible to bring back.

Pulse Technology

What is a pulse waveform?

Our Pulse Technology is defined by a distinct "pulse waveform" that has a strictly controlled rise time, pulse width, frequency, and amplitude of current and voltage pulse. It's the patented combination of the above that makes our products so different and so effective.

How does Pulse Technology work?

Pulse Technology is a unique, patented process that substantially eliminates sulfation buildup on battery plates, the main cause of lead-acid battery problems and failure. It works by reversing the natural electro-chemical reaction within the battery. In the normal energy transfer process within a lead acid battery, the sulfates in the electrolyte solution (battery acid) travel back and forth between the positive and negative plates, taking on and giving off energy. As lead sulfates form on the plates during the normal charge/discharge cycles, some of the sulfates will root to the plate and enlarge to the point where they will no longer accept or release energy.

Over time these sulfates can build up until battery efficiency is reduced and the battery finally ceases to function. Although there is actually enough reactive material in a battery to keep it working for many years, in most cases it doesn't because this sulfation buildup prevents the process.

In the past, nothing could effectively be done to stop sulfation buildup and related problems. But Pulse Technology changes all that. This technology is a process that removes excess lead sulfate deposits from the plates and converts them back to active electrolyte.

When used regularly, PulseTech's battery charging and maintenance systems will also help prevent the lead sulfates from building up again, effectively extending battery service life.

What are the benefits of using Pulse Technology? The main benefit of Pulse Technology is to ensure battery performance so you can rely on your battery any time you need it. As we said above, by cleaning the battery plates our unique Pulse Technology provides the following benefits:

- Get better performance by maintaining maximum battery efficiency and reliability
- Save money on battery costs by extending battery life dramatically
- Helps batteries charge faster and maintain greater reserve capacity so they can provide

more available power to your vehicles and accessories.

- Help protect the environment by not having to discard batteries prematurely.
- Improve your bottom line by reducing battery purchases and equipment downtime

If Pulse Technology can extend the service life of a battery, how much longer will the battery last?

It's difficult to determine an exact length of time because service life of a battery varies depending on usage. One independent report stated that Pulse Technology could theoretically "make a battery last forever", but, obviously that's a little hard to prove. By using Pulse Technology, though, the life of your batteries will be extended dramatically. There is actually enough reactive material in a battery to perform the energy transfer process for many, many years, but sulfation buildup prevents that from happening. Now, by preventing — and even removing — sulfation buildup, Xtreme Charge, Solar Pulse and PowerPulse and other products available from PulseTech Products Corporation, Pulse Technology products enable batteries to fulfill their true potential — in performance and life cycle.

Our products have been evaluated by NASA, Stennis Space Center, Management Equipment Evaluation Program (U.S. Air Force), the Army Research Lab, battery, auto and boat manufacturers, as well as commercial customers and individuals. The answer from all is the same — "This product does exactly what you say it does!" One evaluating source even stated in their conclusions that "we can't tell you exactly how long "the application of Pulse Technology" will make a battery last, but we estimate it will add at least eight to ten years of life."

Have any scientific studies been done on Pulse Technology?

Yes. Independent scientific studies by researchers at two major universities have confirmed that our patented Pulse Technology does provide exceptional benefits to all types of lead-acid batteries. These studies were conducted in response to a request from the scientific and engineering communities for scientific validation of claims that our technology actually improves battery efficiency and lengthens battery life. PulseTech contracted with Oakland University in Rochester, Michigan and Ohio State University in Columbus, Ohio to conduct separate evaluations of the technology. These extensive evaluations began in the summer of 1998 and ended in August 2000.

Results of the studies confirmed that several significant improvements in lead-acid battery performance are attributable to our Pulse Technology. These improvements are caused by the effect of our exclusive and patented Pulse Technology in reducing the buildup of lead sulfate crystals on lead-acid battery plates.

During these studies, the crystalline buildup were regularly investigated by X-ray diffraction methods. The X-ray diffraction data confirmed the positive effects of pulsing on the battery plate morphology because it shows more even distribution of lead sulfate

crystals over the surface area of the battery plates.

It also revealed a significant reduction in the size of the lead-sulfate crystals. These microscopic changes greatly improve a battery's ability to accept and store more energy. Because they store more energy, batteries are lasting longer between recharges, and they are capable of providing more available power than batteries not using our technology.

The effect of the pulsing on the formation of these crystalline structures also increases the battery's durability. Pulse Technology prevents sulfate-induced corrosion that is the primary cause of shedding of active material. By helping to prevent shedding, the average life span of the battery can be increased dramatically. Tests show that it is possible to get three to five or more times as many cycles from pulsed batteries than non-pulsed batteries. As a result, even batteries on frequently used vehicles and equipment will receive significant benefits.

Can PulseTech products overcome a battery's internal resistance?

The internal resistance within a battery is a function of the electro-chemical reaction that is taking place. You do not want to interfere with this, as it is part of the energy transfer process. However, you want to offset the negative impact of this process, which is exactly what our patented Pulse Technology accomplishes.

Power Pulse

What is the minimum cutoff voltage and maximum design voltage for each of the PowerPulse Products?

- PP-12L (12V) – Min – 9.5V, Max – 36V
- PP-24L (24V) – Min – 18V, Max – 48V
- PP-36L (36V) – Min – 27V, Max – 60V
- PP-48L (48V) – Min – 36V, Max – 72V

Note: Although the voltage windows are broad to allow for charging system voltage limits, proper application of the products based on the overall battery / battery pack voltage (PP-12L for 12 V Battery / Pack connection, etc.) is required based on the design optimization of the pulse amplitude for each specific battery / configuration.

Can PowerPulse units be damaged by voltage spikes?

Yes, any voltage over the maximum designed voltage will cause damage and is not covered under warranty.

Does the PowerPulse unit draw battery power continuously while connected?

Yes – The PowerPulse uses a small amount of battery power. It continually draws power

out and pulses it back in, with the net draw being small – only 3 to 4mA.

Can the wire leads on the PowerPulse be repaired if cut either as part of the installation or inadvertently during or after installation?

Yes, as long as you solder the connections, matching all colours for proper polarity and sealing the connections using heat shrink tubing. Please note that once the product is modified – the warranty is void.

Can the wire leads on the PowerPulse be extended for installation as needed?

Yes, as long as the extended wire gauge is stepped up by one wire size to 16 AWG wire and limited to no more than 20 additional feet in total extended length. Also, you will need to use a wire with like copper stranding, outer insulation and color, wire gauge size and quality. Solder the connections matching all colors for proper polarity and seal them with heat shrink tubing. If done as directed, extending the leads in the field by a total maximum of 20' will not affect product functionality. Please note that once the product is modified – the warranty is void.

When limited by the distance between batteries in a parallel connected battery pack, is it OK to connect the PowerPulse to the Positive and Negative terminals of only the first battery in the pack?

No. It is best to connect to the positive terminal of the first battery and the negative terminal of the last battery. If there is a situation where the distance between the batteries exceeds the distance allowed by the fully extended 6' cable distance of the PowerPulse product, an additional PowerPulse should be used.

Why does the red LED not immediately come on when I touch the terminals to POS and NEG terminals of a battery?

The PowerPulse is designed to take a small amount of power from the battery and “Pulse” it back into the battery. It takes roughly 2 seconds to “load” the circuit to provide the Pulse input. The complete pulse cycle (load > pulse > re-load > Pulse again) takes about 5 seconds. So, a connection of good solid integrity (bolted on) would need to be made for at least 5 seconds for the red LED Pulse indicator to begin to flash indicating that battery conditioning has begun. On an extremely discharged battery or battery pack flashing can be slower.

What would happen if I accidentally connected the PowerPulse to a battery in reverse?

1st, the unit will not function properly or provide desulfation to your battery and 2nd, the red LED will come on steady (not flashing) and will slowly dim as the unit protects itself from the reverse polarity connection. The unit will not be damaged by temporary reverse connection as it is designed to protect itself. Long term reverse polarity connection will damage the unit and void warranty.

Battery Chargers

What are the factors that determine when the Xtreme Charge shows 25%, 50%, 75% or 100% charged on its LED meter?

While we cannot tell you all the details as this is part of our patented process; we can tell you this much...The Xtreme Charge shows 25%, 50% or 75% based on a composite result comprised of multiple readings over time gathered and reported on by its microprocessor. These factors gathered by our patented algorithms and compiled and reported on by the Xtreme Charges microprocessor determines a reading of 25%, 50% or 75% charged. The 100% reading is shown based on a composite result gained from amperage acceptance over a given time period under charge and the level it has dropped down to over another period of time. As one technical editor stated in an article about our products – “The Xtreme Charge brings Dad’s old buzzing box of diodes into the computer age!”

Will "double clamping" two sets of leads help me to charge a larger battery more quickly when using the SC12?

Yes, clipping two sets of leads (one of each from two separate channels) on the SC12 to a battery will safely double the amperage going to a given battery allowing a faster charge which is especially useful when charging a larger battery. Always top the battery off for a few hours with one channel (one set of leads) after bulk charge is complete.

Battery Testers

What voltage windows is the Xtreme Charge Quick Battery Tester set at to determine 25%, 50%, 75% and 100% charged?

- 25% - 9.8 to 12.0V
- 50% - 12.0V to 12.4V
- 75% - 12.4V to 12.6V
- 100% - 12.6 to 13.8V

Note: for battery state of charge indications the Quick Battery tester is a very basic open circuit voltage meter designed to help determine when a battery should be recharged. It is not intended to be used for in depth diagnostics

What voltage window is the Xtreme Charge Quick Battery Tester set at to determine Good and Bad Alternator reading?

Good – 13.8V to 14.7V, Bad – 14.7V - up

Note: the Quick Battery tester is only a basic open circuit voltage meter designed to help determine if there may be a fault in the charging system – the “Bad” indicator light only lights as a result of a High voltage limit of 14.7V or higher – there is no low voltage indicator for a “Bad” reading.

Multiple Battery Charging and Maintenance

Battery Conditioning

Solar Products

How much sunlight does SolarPulse need to work?

The solar panel on the SolarPulse Battery Charge Maintenance System is so efficient, it only requires one to two hours of direct sunlight a day to accomplish its task for a full 24 hours. This is true even if you live in areas where skies are cloudy or lightly overcast most of the time. In these situations the solar panel may require a little more time to absorb enough sunlight.

To make sure you are receiving the full benefit of SolarPulse Pulse Technology, make sure the solar panel is mounted in an area where it has access to as much available direct sunlight as possible. The solar panel will then absorb sunlight, convert it into energy and the circuit box will maintain and desulfate the battery on a daily basis.

Does SolarPulse need direct sunlight to work?

No. Obviously, the better exposure to bright sunlight the more efficiently the unit works. But, because of the unique design, SolarPulse accomplishes its assigned tasks with minimal amounts of ultraviolet (UV) exposure. A rule of thumb is SolarPulse requires on average one to two hours per day of sunlight to provide benefit. Even cloud cover provides UV exposure that can then be converted to energy. Common sense plays a part, the more the better, but it doesn't have to be "Death Valley" sun to be effective. The SolarPulse works extremely well even in notoriously cloudy locations like Seattle.

Where do you install the solar panel?

Installation of the SolarPulse solar panel is one of personal preference. Since the SolarPulse employ solar panels with a fully encapsulated heavy duty polyurethane coating, they are weatherproof and virtually indestructible so they can be mounted almost anywhere.

Ideally, the most effective location for the solar panel is on top of your vehicle or equipment. That way it is sure to receive the most exposure to sunlight during the day. If for some reason you cannot mount it on top, be sure to locate it where it will receive as much sunlight as possible.

NOTE: Do not mount the panel behind a windshield. Most windshields are UV protected and dramatically reduce solar panel output. Since the panel is so efficient, it can be installed either horizontally or vertically, but we suggest you mount it horizontally.

Do your solar panels generate more power in cold or hot weather?

PV cells generate more power in cold weather. As with most electronics, heat is an enemy. In this case heat causes resistance and a reduction in light to power conversion efficiency.

Do your solar panels provide power during overcast weather?

Yes, however overcast weather does cause a reduction in light to power conversion. Generally speaking in bright overcast you would expect 50 to 70% efficiency. In dark overcast 5 to 10% efficiency.

What is the efficiency of your solar panels over extended time periods – years?

With the use of premium mono-crystalline PV cells that we use, you can expect 95% efficiency in light to power conversion at the 20 year use period.

What is the functionality of the red LED on the SolarPulse Control Module box?

The steady red LED provides an indication that there is full sunlight shining on the solar panel and that the SolarPulse is connected properly and delivering power to the battery.

If the red LED on the SolarPulse Control Module box is flashing intermittently, what does this mean?

This means that sunlight being delivered to the solar panel is either intermittent; possibly being blocked intermittently by shade, clouds, tree branches, etc. Or, sunlight is weak from either dawn, dusk or a cloudy day.

Can the wire leads on the SolarPulse be repaired if cut either as part of the installation or inadvertently during or after installation?

Yes, as long as you solder the connections matching all colors for proper polarity and seal them with heat shrink tubing, product functionality will not be affected. Please note that once the product is modified – the warranty is void.

Can the wire leads on the SolarPulse be extended for installation as needed?

Yes, the wire leads between the solar panel and the control box can be extended by a maximum of 100' as long as the extended wire gauge segment is stepped up by one wire size to 16 AWG wire, you will be fine. In addition, using the same methodology as just mentioned, you may extend the leads between the battery and the control box by a

maximum of 20' using stepped up 16 AWG wire extensions. Also, you will need to use a wire with like copper stranding, outer insulation and color, wire gauge size and quality. Solder the connections matching all colors for proper polarity and seal them with heat shrink tubing. If done as directed, extending the leads in the field will not affect product functionality. Please note that once the product is modified – the warranty is void.

Can I place the Solar Pulse or any solar panel in the front dash area or rear deck of my Car, RV etc. to provide power and/or pulse conditioning to my vehicle battery?

Yes, but it is not recommended. You can expect to lose between 50 and 75% in amperage output due to the UV protection and tinting in vehicle rear windows and/or windshields. Newer vehicles usually have more UV protection than older vehicles and due to this, are worse than older vehicles in this regard. In addition your panel could also lose significant “charge time” in the sun due to the shading effect that the vehicle roof will provide to the panel at various times of day and due to the various direction that the vehicle may be facing - North, South, East or West. Directly on top of any vehicle is always best if possible.