Mark Snyder Electric

12900 BROOKPRINTER PLACE, #200
POWAY, CA 92064
PHONE - 858 748-4612
FAX - 858 748-0252
CA - C10 395602
AZ - K11 268864

tinginfo@marksnyderelectric.com
C10395602

RE: Xantrex Freedom 458 Inverter/Charger (Turquoise Green Face), Freedom Marine (Blue Face), Freedom SW 2012 Gen #1, Gen #2 and Freedom SW 3012 Gen #1, #2, RV2012, RV2012GS, RV3012, RV3012GS, Prosine 2.0 and Prosine 3.0, RS 2012, RS 3012, MS 2012, MS 3012, Legend, Mariner, EMS

WHAT KILLS INVERTERS AND BATTERIES IN MOBILE AND OFF GRID APPLICATIONS

General Information: Identify Your Inverter.

The Xantrex Freedom 458 series (Turquoise Green Face) is probably the best most robust small modified sine wave mobile inverter in the industry it came out in 1999 and there are many original units still in operation. Most RVs have the single in single out version. The load limit on shore power or Generator is 3000 watts continuous pass thru.

There is a dual in dual out Freedom 458 for full-timers the 2530-12 if you are contemplating becoming a snow bird or being on the road for 2mos or more per year. The load limit on shore power or generator is 6000 watts continuous pass thru.

These inverter are no longer made but we still repair them on a limited basis depending on what is wrong with them Prosine 2.0 and Prosine 3.0, RS 2012, RS 3012, MS 2012, MS 3012, Legend, Mariner, EMS

If you are lucky enough to have a Freedom 458 Marine (Blue Face) 2511-12, or 3011-12 they are great inverters and most also have built in ECHO chargers.

The RV2012, RV2012GS and RV3012, RV3012GS are premium high-end modified sine wave inverters for full timers both units are dual in dual out. The load limit on shore power or generator is 6000 watts continuous pass thru. These inverters are very popular the boards are no longer made but we still have some boards and we repair boards and have refurbished units.

The Freedom SW2012 Gen #2 is a true sine wave single in single out inverter. The load limit on shore power or generator is 3000 watts continuous pass thru.

These inverter are no longer made but we still repair them on a limited basis depending on what is wrong with them Prosine 2.0 and Prosine 3.0, RS 2012, RS 3012, MS 2012, MS 3012, Legend, Mariner, EMS

All inverters die for a reason, so I provide this list to our customers and RV/ Truck, Boat repair centers, and mobile technicians.

Most of our customers re-install the inverters we repair themselves. It is CRITICAL that you be sure you have eliminated the source of the failure or you will blow it up again. We want our repairs to last for another 15- 20 years. Below is a list of the failure points please read thru this list and use it as a check list to be sure you do not still have a problem in your wiring or power source.

Many RV owners do not realize that the inverter charger also has a transfer function, and that when you are connected to shore power the loads still go through your inverter. You must limit your inverter loads to below 2000 watts when inverting and dry camping.

When on shore power or generator. You must limit your loads to 3000 watts including your charger unless you are programmed to 20 or 15 amps on share power option. I recommend to always set your control for 20 amp share power. This setting shuts your charger off automatically if you get over 20 amps. See more information on this below.

Your Freedom 458 Inverter has two basic modes of operation: Each inverter model varies some on remote programing. They all work in a very similar manor and have the same or similar limitations.

#1: invert when you are on battery power only and
#2: charge/transfer when you are connected to shore power or you are running the generator.

You are limited to 2000 watts or your name plate rating when inverting and when connected to shore power if your inverter is programmed for share power. When connected to shore power on the 20-amp share power setting it will automatically turn off the charger which draws 1200-1500 watts and it will allow you to draw up to 3000 watts of generator or shore power through your inverter transfer switch in your inverter. It is limited by the power relay in the inverter transfer switch that is rated for 3600 watts surge and 3000 watts continuous. This would allow you to run a microwave that 1200 watts and a TV, and a small coffee pot at 1000 or 1200 watts.

I recommend to check and verify your loads and determine what is connected to your inverter so you can regulate your loads. When in doubt run one appliance at a time in combination with your TV and other smaller loads.

#1. Causes of inverter failure. The inverter must be set up for SHARE POWER 20 amps. It must be programed properly so the charger shuts down when you use over 20 amps. If you are connected to shore power or generator you cannot freely use all your appliances. If you are running your microwave, coffeepot, hair dryer, electric heater, this will burn out your inverter AC transfer board and this is the primary cause of burn out of the AC board. It will take abuse for many years and finally give up and burn out.

I recommend prevention for a long life. This is the cause of 70-80% of these cases.

#2. Causes of inverter failure. The second reason for burnout of boards is a power surge. This can happen due to many air conditioners running at the same time in the summer or too many electric heaters in the winter. This causes brown outs or spikes in the power. This will cause components to burn out. This can be prevented with you surge protection. You can tell when you are getting a power surge when the lights dim and brighten. If this is happening it may be best to disconnect from shore power and run your generator. If lights are dimming or flashing when connected to the generator this is another problem, probably in the generator. Overloading is about 20% of the failures we see. I recommend the installation of a Progressive Dynamics surge protecting transfer switch for the best protection from power grid and generator issues. They have DC relays and are silent they do not buzz. We stock these surge protecting transfer switches. They have replaceable MOV boards if you have a very bad surge. See link:

https://www.progressivedyn.com/rv/automatic-transfer-switches/pd52dcs-pd52s-240-vac-50-amp-automatic-surge-protected-transfer-switch-the-silent-ats/

#3: Causes of Inverter Failure: The third reason is a lost neutral condition which can cause loss of the neutral on a 120/ 240 line. When this happens, 240 goes through your inverter AC board and appliances. This condition usually results in a strong burning smell and some sparking and arcing which you would notice. This can be caused by a bad connection at the power pedestal or a bad or burned wiring connection at your coach plug or elsewhere in the coach. This can cause major damage. The Progressive Dynamics surge protecting transfer switch protects from this condition.
#4. Causes of Inverter Failure: This happens seldom but does happen in about 5% of the cases if someone cuts off the temp sensor if the cable gets corroded, burned or cut and it contacts directly to the positive battery terminal. This is a guaranteed two board burn out. The thermistor is a sensor not an electrical connection. It should never contact the battery or short together.

It is best to connect the temp sensor to the negative terminal as if it accidentally gets shorted it

will only take out one board.

#5. Causes of Inverter Failure. The fifth cause is very rare but we have seen about a dozen of these in RVs and boats this year. There is a lightning strike close by and you are traveling, parked, your RV is stored or you are connected to shore power or generator. RVs and boats are not grounded when traveling and the grounds are not great when you are connected to shore power. These lightning events are random and are best avoided by shutting off all power and turning off the house panel breaker to the inverter. The wiring in the RV or boat acts like an antenna building, a higher potential. This condition is rate but it happens about ½% every year.

#6. Causes of Inverter Failure. The sixth cause, which is also rare are shorted batteries, or a loose battery connection this is about 5% if the time. Sometimes we get 3-4 of these in a row mostly on the full timers' boat and RV.

We like to try to understand why your inverter failed and how to prevent future events.

We want to be certain that the inverter is not damaged on re-installation. The DC source should be shut off including solar if it is tied in at the inverter. Your batteries should be at least 11.5 volts. The AC should be shut off.

#7. Causes of Inverter Failure. The seventh cause for this problem and most seldom is a tired or worn out component in the inverter. The symptoms with this problem would be for no reason the inverter just stops working. This is probably 1% of the time.

#8. Causes of Inverter Failure. The eighth cause is improper ventilation or siting. This is around 5% of the time. You must follow the inverter manufacturers recommendations this is normally 3-4 inches clearance. You must also have make up air and exhaust. There must be a source of fresh air and a way to get the heat out.

You must also keep the inverter away from sources of water if on boats or in RVs avoid under or around waterpipes.

You must also avoid sources of heat or corrosive fumes like the engine or exhaust.

#9. Causes of Inverter Failure. Causes of Inverter Failure. For dog groomers you must filter the dog hair externally we recommend using an air conditioning filter that will keep the hair out. You must clean daily to prevent overheating and killing fans and boards.

An ounce of prevention is worth a lot of dollars so if you have at least some awareness of these causes of failure you can try to prevent them.

We do not want to fix the inverter, and have it thrown back into the fire if the problem that caused it has not been removed before the inverter is reinstalled.

WHY DO BATTERIES FAIL?

Batteries are also a challenge, I recommend Crown Heavy Duty Batteries see link on lead acid batteries.

A: Simple lead acid battery maintenance. Rules for long battery life. Lead Acid Wet Cells.

1. Program Your batteries for Bulk, Absorption, and Float according to the manufacturer's recommendations.
2. Charge Your Batteries according to the manufacturer's recommendations.
3. Keep batteries charged to float daily.
4. Do not discharge your batteries more than 50%.
5. Check your batteries with a good quality temperature compensated hydrometer once every 2- 3 months depending on how hard you use your batteries.
6. When lead acid batteries become more than 20 points off on specific gravity they should be equalized, as batteries age they sulfate. Equalizing 3-4 times a year can double your battery life.
7. Only water your batteries when they are floated, do not over water this can dilute the acid and damage your batteries.
8. Never let your batteries dry out, if you dry camp a lot and use your batteries a lot they may need watering as often as every 10-15 days. If they are mostly on float they may only need watering every 3- 4 month. Check your batteries monthly until you figure out your own watering cycle.
9. Good quality RV batteries that are well taken care of will usually last 6-7 years, if you do not dry camp often and keep them floated the longest I have seen is 12years they were at 60% capacity. Do not wait for your batteries to start shorting when they discharge to quickly replace them.
10. I have lived off grid for 35 years on solar and wind and my battery system is 48 volts and is made up of 24-2-volt Crown 1200 ah batteries, they just turned 23 years old and are still 90% capacity I will probably get another 7-8 years or more out of them. I equalize and water every 10 days due to the daily 30-50% cycling. I will replace them when they get to 70% capacity or the cells start failing.
11. When you store your RV or boat shut off and install a battery cut off. Charge up your batteries to float and disconnect your loads. The batteries should store ok for 90days maximum.
12. If you are in a freezing climate move the batteries indoors you will have to charge them a couple of times if you overwinter.
13. Proper ventilation is essential for long battery life. You must build enough space around

your batteries to keep them cool.

B: AGM Batteries:

To get the most out of AGM Batteries:

1. Program Your batteries for Bulk, Absorption, and Float according to the manufacturer's recommendations.
2. Charge Your Batteries according to the manufacturer's recommendations.
3. Do not discharge more than 15% -25% depending on manufacturers recommendations.
4. Keep batteries charged to float daily.
5. Use a good battery monitor to monitor your batteries.
6. If your batteries are kept charged most of the time they can last 15 years or more.

   I just changed some AGM batteries that had been charged daily on PV and only used once every 2-3 months for a weekend and they lasted 17 years.
7. I replace AGMs when they get below 70% capacity.
8. Install a battery cut off switch if you do not have one if you store your RV, boat, mobile lab, dog grooming van, etc. Charge your battery to float and be sure that you do not have parasitic loads. Most AGMs die because they are left dead for months.
9. If you are in cold country where batteries can freeze pull your batteries and move indoors. You may have to charge them a couple of times each winter.
10. Overheating: you have to prevent overheating and have good ventilation around the batteries. Just because they are maintenance free does not mean you can cook them.

For more information See Crown Battery PDF attached.

I am a Crown distributor and we can ship, we have very reasonable shipping rates.

See link for good quality hydrometer:

https://www.amazon.com/E-Z-Red-SP101-Battery-%20Hydrometer/dp/B000JFHMRU

Best Regards,

Mark E Snyder

Mark E. Snyder

-ALTERNATIVE ENERGY AND ENERGY EFFICIENCY EXPERT
- FIRE, FLOOD, AND EXPLOSION EXPERT
-FORENSIC ELECTRICAL EXPERT
-MASTER ELECTRICIAN
-CERTIFIED XANTREX INVERTER REPAIR TECHNICIAN

Cell phone: 858-231-3386
Office: 858-748-4612 ext-102