

A/C Inverters Useful Information

Inverters are a minefield which people tend to enter into without much thought or consideration to the side effects associated with such devices. It is important to understand that, for every pound spent on an inverter, approximately the same amount may need to be spent on the D/C supply to ensure that the system works correctly. General points to look for with inverters:

The manufacturer's rated output of a good inverter is based on continuous use in an ambient temperature of 40 degrees C. Most imported inverters are not rated continuously but simply rated at their maximum output. By rating their inverters at their maximum output, these inverters appear much more powerful and better value than they really are. An inverter rated at 1500 Watts at 0C might be only a 1000 watts if continuously rated at 20 degrees C or only 500 watts when rated continuously at 40C.

It is important in marine or automotive applications to bear in mind that, whilst the average ambient temperature in Europe may be around 20C, the temperature in a hot engine room could be at least 40C. It should be clearly understood that a good 500 watt inverter, continuously rated at a high ambient temperature could easily outperform a 1500 watt output inverter rated at a low ambient temperature on continuous test.

In order to look competitive, many extremely reputable inverter manufactures have reduced their temperature ratings in order to up their output rating.

A high surge capacity is essential in order to cut production costs, many manufacturers give little time to surge capacity. This is a false economy as it limits the ability of an inverter to start equipment such as drills, computers and refrigeration compressors.

It may therefore be necessary to purchase an inverter with two or even three times the output, simply to do the same job. It is important for an inverter to be able to safely treble its rated output for a brief period to start some everyday equipment.

The cost of building the ability to deal with this surge start into an inverter is considerable and many manufacturers are reluctant to meet the expense which can increase the manufacturing cost by as much as 200%.

When running low power equipment for long periods such as televisions, videos, refrigerators or computers, it is vital to have an inverter with low 'quiescent' current (the actual current the inverter takes to run itself when in operation). This quiescent current can vary dramatically from 0.7 amps for switch mode inverters, 2 – 5 amps for transformer inverters and 25 amps for rotary converters. Inverters that have a high quiescent current are usually fitted with a 'power saver' circuit to switch the inverter off when not required, switching on only when a load is detected. Beware of inverters with this type of circuit as this circuit is designed to mask the high quiescent current of the inverter when on line.

It is very important to distinguish between the off load current of an inverter (with a power save circuit) and the actual quiescent current of the inverter when in actual use. This information is not readily available from most companies. A typical portable phone battery on recharge would require about 1 amp an hour for 12 hours, a total of 12 amp/hours. To provide this output a good switch mode inverter would actually use about 15 amp/hours, a transformer based inverter about 40 amp/hours and a rotary converter about 250 amp/hours, all to do the same task.

Wave form! All inverters are attempting to mimic the mains 230 volt sine wave form. This ensures that all equipment to be run on an inverter receives the same input waveform for which it was designed. With some equipment such as heaters and lights the input waveform is not important. However with things like electric motors and especially microwaves, the waveform is absolutely critical to achieve correct running. There are three inverter waveform types, square wave, quasi sine and sine wave.

The first type, square wave, is not suitable for marine use because it has no voltage control. This means that the input voltage is proportional to the output, i.e. if the transformer is wound to produce 230 volts at 12 volts when the engine is running at 14.8 volts, the inverter would produce about 280 volts. This will cause catastrophic problems with on-board equipment.

In order to overcome this regulation problem, the second waveform is used. This is called the step square wave or quasi sine. This waveform overcomes the regulation problem and maintains the output voltage over a large input voltage range. However it falls short of running a microwave 100%. A reasonable figure of 85 – 90% would be more realistic, with about 2% of timers not working. The big plus with this type of inverter is the cost, it is low cost and high performance, linked in with the fact that it will run 95% of general equipment such as microwaves, hair dryers, TVs, fridges, computers, drills, etc.

This makes it the most popular inverter choice by far (about 100 quasi sine inverters are sold to 1 sine wave inverter). However, equipment that has thyristor control in it, such as washing machines, will not run on the quasi sine wave form. The best waveform by far is the Pure Sine wave, however this does not necessarily mean it is good for your purpose.

The good side of a sine wave is it will run all equipment as well as the mains, however, the bad side is its cost and the fact that the quiescent current is about 2 – 7 times more than conventional quasi sine wave inverters (the Sterling units are about 2 times however other transformer models sold by our competitors are as much as 5 times more). Sine wave is a must when using washing machines and other thyristor controlled equipment.

Some quasi sine wave inverters can cause a black line on the TV but not with sine wave inverters, most bread makers need sine wave and a small percentage of portable equipment battery chargers need sine wave.