

## True vs. Modified: What's Your Sine?

*Understanding inverter basics should help answer the question.*

Inverters convert electricity from one form to another. Most marine inverters change low-voltage DC energy into AC voltage. They can be classified as True Sine Wave (TSW) or Quasi/Modified Sine Wave (MSW) inverters. Each class uses a different circuit design to produce AC voltage. Correspondingly, each has pros and cons in regard to the compatibility of electric appliances to the type of waveform produced.

To know which product best suits your onboard power needs, it's necessary to first have a basic understanding of how the different types work and the advantages and disadvantages of each.

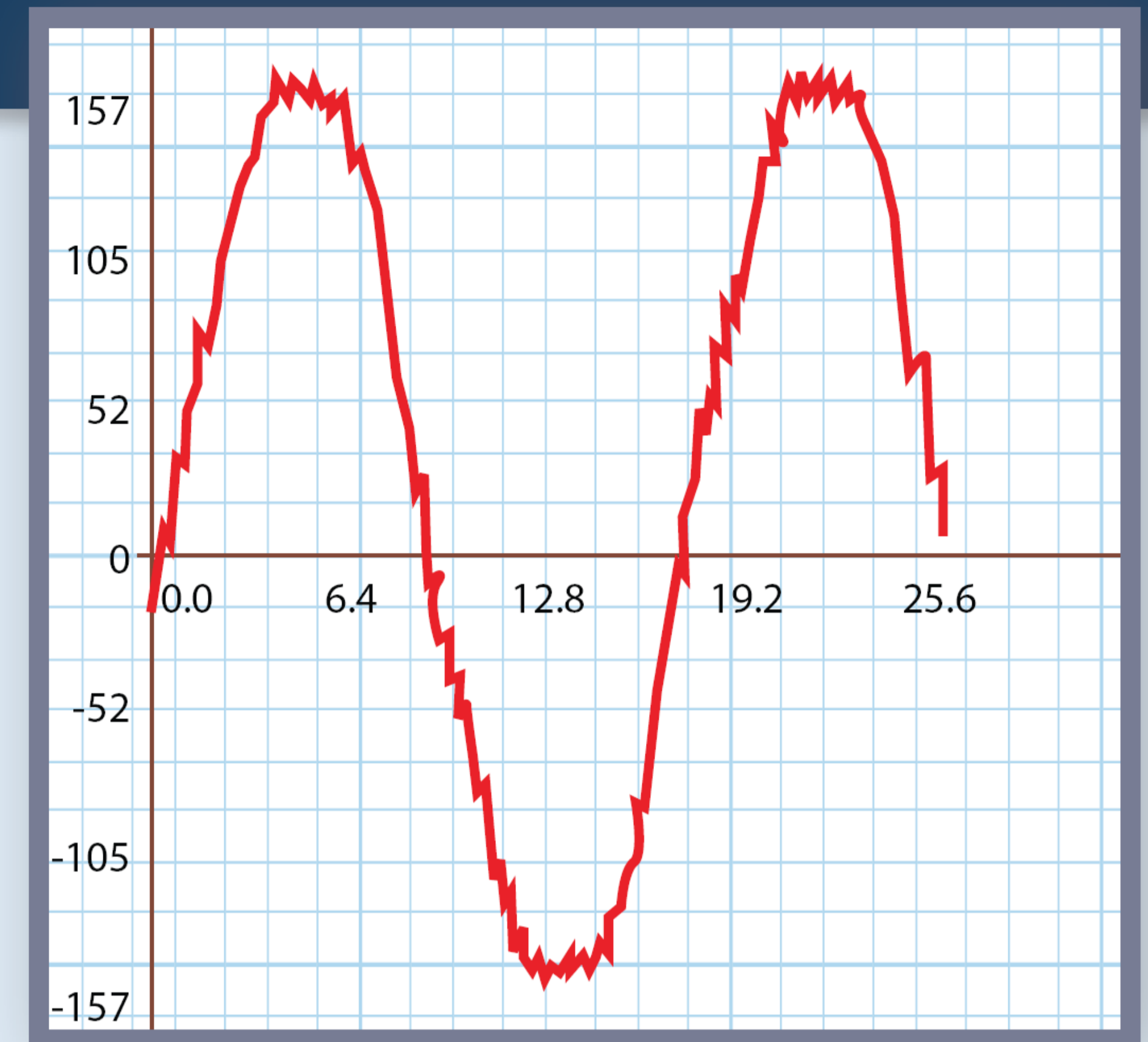
TSW inverters produce an AC output with a smooth, sinusoidal waveform (see illustration at right) that is identical to shore power. They will power any electric appliance within their load range without restrictions.

MSW inverters produce an AC output that has a stepped waveform and should only be used to power basic electric appliances not containing sensitive electronics, due to their possible incompatibility with the distorted waveform.

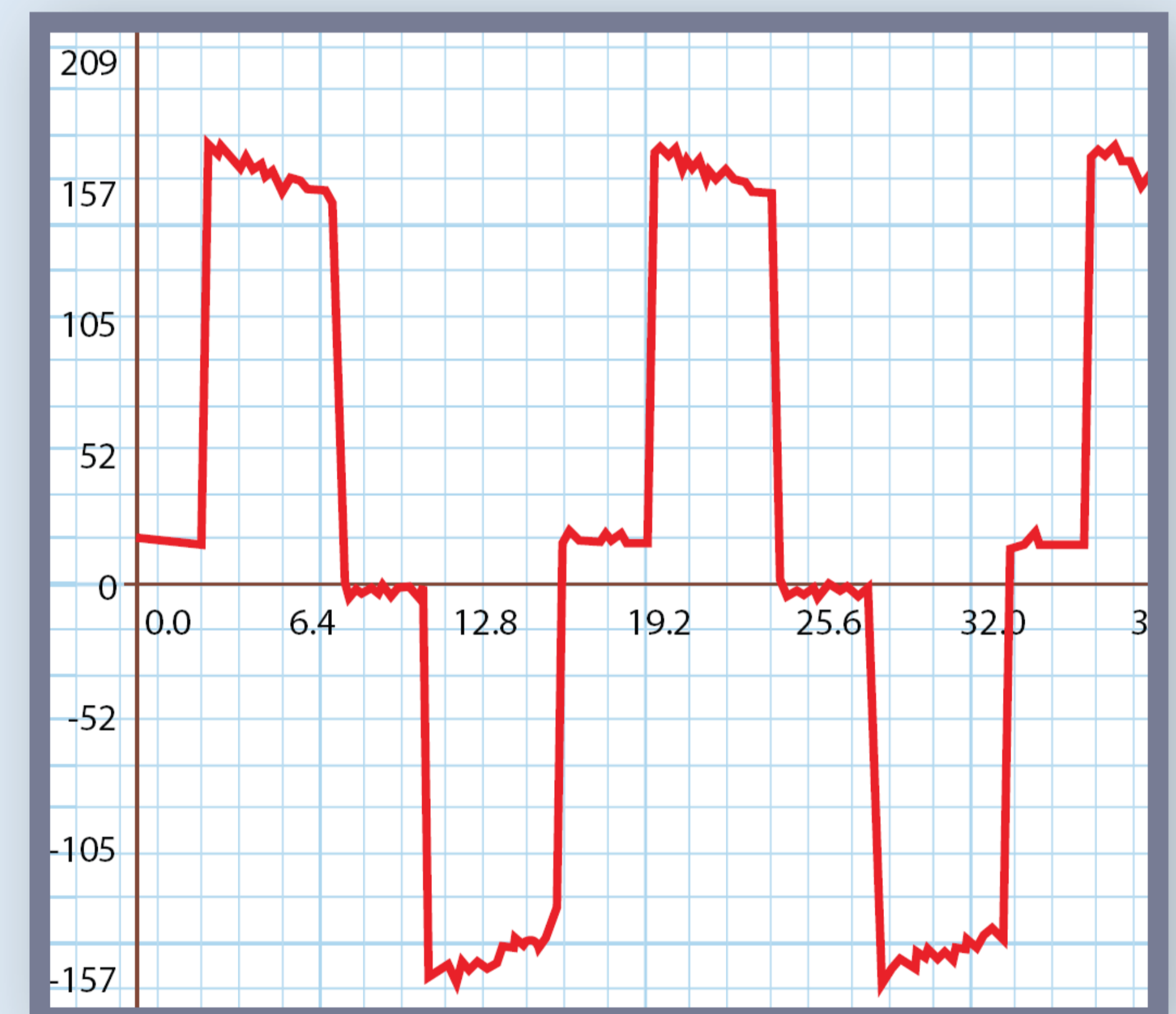
An MSW inverter uses a system of electronic switches and a transformer to invert stored battery energy into AC

power. Although this switch and transformer design is much simpler than that of the TSW inverter, the MSW's AC waveform is different from the power produced by an electric utility company. Its waveform varies in amplitude rapidly from zero volts to a maximum volt value and then rapidly back to minimum volt value with a pause each time it passes the zero-volt baseline. An MSW's output waveform will contain harmonics (frequencies) above 60Hz (cycles). These harmonics, or modifications to a true sinusoidal wave, can significantly affect the operation of some AC appliances. For example: LCD TVs operating on an MSW inverter will exhibit visible noise lines across the screen; microwave ovens will often not produce full output power, affecting cook times; and the popular "wall cube" chargers that recharge everything from your portable VHF to your digital camcorder, will likely have overheating issues. Also, drop-in battery chargers for cordless tools that are powered by a MSW inverter usually do not shut off when the battery has been fully charged, resulting in overcharging and overheating the tool's battery.

A TSW inverter uses a transformer and a specialized circuitry to produce an AC



*Smooth true sine waveform*



*Stepped modified sine waveform*

waveform that's clean and symmetrical. The TSW inverter's output is completely comparable with that of the power provided by a utility company (and most times superior to it). TSW inverters are the best choice when powering today's advanced entertainment and communication electronics.