Inverter History

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The earliest inverter was the motor generator, which was developed to serve the needs of World War II. A popular brand of that era was Redi-line, which is still around today. The motor generator was reliable and, at the time, was the only way to convert DC power to AC. The output waveform fit a wide variety of applications but it was inefficient. It required 30 amps to turn on, the vehicle had to be running to support the unit, and it had no startup surge capacity. Bluebird used a motor generator in their coaches during the late 1970's and early 1980's.

Current Production Redi-line Motor Generator

Tripp Lite, a Chicago based company founded in 1922, first produced a unique automobile headlight that had been invented by Graham Trippe. The product line expanded to include electronic inverters. The early units used mechanical vibrators to oscillate DC power into square wave AC. In the early 1960s, solid state transistors replaced the mechanical vibrators. The first advantage of this type of inverter was that it was not a motor generator. The unregulated square wave design could operate resistive loads but it had no surge power for starting motors. It was unable to operate reactive loads like compressors, icemakers, or microwave ovens. There were many compatibility problems including no frequency control, which was added later. This allowed a steady draw, which could operate turntable motors and clocks. Through the years, square wave technology has been phased out. Present day modified sine wave technology is utilized in Tripp Lite's line of UPS (Uninterruptible Power Supply) devices and inverters. The company provides UPS systems, AC and dataline surge suppressors, line conditioners, network management accessories, cabling, and power inverters to a global market.

Vanner Inc., was established in 1977. The company developed a warning light flasher module for emergency vehicles and ambulances, and subsequently developed isolators and chargers. In 1979, Vanner introduced their first inverter: a 1000-Watt modified sine wave unit used in ambulances. For this 1000W inverter, Vanner patented true RMS regulation and a power transistor drive technique. This transistor drive technique achieved an unheard of 87% efficiency. A few years later the product expanded into various types of vehicles including remote television vans. The product line expanded with 2200W and 3000W inverters. In 1983, the first 24V to 12V battery equalizers were sold. In 1986, one of the inverter models included a microprocessor control circuit. In 1988, Vanner was sold to B. Elliott, an English holding company. In 1993, Vanner and sister company, Weldon, combined. In April of 1994, Vanner-Weldon purchased the rights to several Dynamote products, including a pure sine wave inverter. In 1997, Vanner and Weldon separated back into two divisions but both are still owned by the same parent company. Vanner products are not common in the RV industry because the company focuses on industrial applications.

Photo courtesy of Vanner, Inc

TruSine™ Sine Wave Inverter TSC24-4500D

In the early 1980's, there were two companies manufacturing inverters for the RV market, Heart

Interface and GTO Electronics. In 1986, one of the original owners of Heart split off to form a new company, Trace Engineering, which later produced a similar product. The Heart inverter had a battery charger/converter built in and was the first to reach over 90% efficiency. It could also surge three times its rating. In 1985, Heart and GTO secured UL listing for inverters used in the RV industry, which opened doors for OEM builders. Heart developed the first inverter/charger with a UL listing.

Heart Interface Freedom 25

First generation inverters used Metered Darlington Technology. This special circuit metered base current to power a transistor proportional to load. The magnetic design increased efficiency. Second-generation inverters used FETs (Field Effect Transistors). Since FETs have almost no switching losses, efficiency was markedly improved. In 1990, integrated circuits allowed the creation of energy management systems. In 1993, the first microprocessor-controlled inverter/charger was introduced. The advantages of modified sine wave technology are efficiency and relatively economical cost. The modified sine wave, however, still cannot run all loads because of poor peak voltage regulation and the fact that the AC output is not a "true" sine wave. The inverter mode draws pulsating current from the batteries. The charger output current also pulsates.

Photo courtesy of Trace Engineering

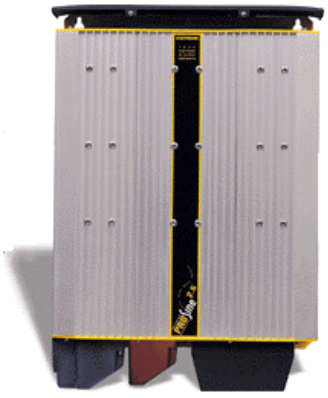
SW4024 by Trace Engineering

Trace Engineering developed and patented improvements to the modified sine wave technology in their SW series inverters. While not a true sine wave, the output is a multi-step approximation that results in fewer load incompatibilities. The charger is more efficient and results in lower AC distortion. In addition, there are several other features in this inverter package including an automatic generator start/stop, a battery temperature sensor, and three independently set voltage relays. Trace Engineering supplies inverters to a global market. In fact, in South America, the word for "inverter" is "Trace," just as "Kleenex" is the word for "tissue" in the United States.

Exeltech was founded in 1987., and manufactures high frequency sine wave inverters. It claims the first “N+1” redundant inverter systems, “Hot” swappable capability, and modular design. At present, there are no charger options for these inverters.

Statpower Technologies Corporation, headquartered in British Columbia, Canada, was founded in 1988. The company manufactured MSW inverters using high frequency design, and provided portable power for remote areas worldwide. In 1995, they introduced a pure sine wave inverter/charger. Using high frequency switching techniques, they were successful in producing a high output charger with a power factor approaching "1." There is negligible distortion at the DC port in both inverter and charger modes, which we view as a technological milestone.

Photo courtesy of Statpower



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