

Charger Technologies

Historically PMR users have had little choice when their batteries need to be recharged. Some methods still used today can be traced back to the invention of the rechargeable battery. While conventional charging techniques successfully put energy back into batteries they do not take into account the individual chemical state of each battery. In other words traditional chargers simply pushes energy in to the battery without regard to what the battery really requires.

The main problem with traditional battery charging is that the discipline of the operator must be relied upon to ensure the procedure is carried out to best effect without degrading the battery. OEM chargers detail a variety of rules that need to be followed. Few users have the time or the patience to stick to the complicated regime recommended by manufacturers. As a result many organisations invest significant resources on battery management to combat the problems caused by antiquated charging methods.

The following section gives a brief overview of the different battery charging methods available.

Trickle charger

The trickle or slow charger is the standard unit provided by most handset manufacturers. The unit works by pushing a steady current in to the battery at a rate which is normally 10% of the battery's capacity. So for example a 1700mAh battery will be charged at 170mAh. Typical charge times range from 8 to 12 hours.

It is left to the user to terminate the charge at the correct time. Failure to remove the battery from the charger means that more energy enters the battery than it can absorb. This causes a host of degenerative chemical processes within the battery that lead to reduced capacities and premature failure. In the worst cases the temperature inside the cells will become so high that the battery vents off the gas build up.

Benefits

Lowest Cost
Often included with Handset

Drawbacks

Long charge times
Requires user discipline
Constant rate of charge
No conditioning process
Long formation times
No termination of charge
Detrimental to the battery

Fast or Rapid Charger systems

As the name suggests this type of charger is quicker than the standard trickle charger. Rapid chargers work by providing a high rate of constant energy into the battery until a reference voltage is reached. Although the green ready LED illuminates the battery is usually only charged to 80% of its capacity. The charge is then dropped to a trickle rate that is approximately one tenth of the battery capacity. It is then up to the user to guess when the battery is charged to full capacity. Many manufacturers stipulate that the battery should be left on the charger for between 1 and 2 hours after the green light comes on. With no termination the rapid charger has a tendency to quickly overcharge and damage batteries.

Benefits

Shorter charge times
Can be multi-chemistry

Drawbacks

Poor battery life
Inaccurate charge indication
No conditioning process
Long formation times
Requires user discipline
Detrimental to the battery

Pulse Charger Systems

Pulse charging techniques were pioneered at the turn of the 20th Century with the last significant patent issued in 1967. The patent has now expired and a variety of pulse chargers are available from a number of manufacturers. The pulse charger works by subjecting the battery to a sequence of pre-programmed current pulses. The advantage of the pulse charger is that it provides for rest periods during charge. This type of charger can also help to break down dendrite growth, a contributor to the memory effect. However pulse chargers do not take into account the internal state of the battery. They merely subject the battery to a series of repetitive pulses. Some units even revert to a potentially damaging trickle charge once the battery approaches full capacity.

Benefits

Shorter charge times
Reduces memory effect

Drawbacks

No feed back or control
Repetitive charge sequence
Poor or no conditioning process
Long formation times
Can require user discipline

Intelligent ACT Charger-Conditioner

Advanced Charger Technology has invested over \$40 Million to solve the battery problems experienced by professional mobile radio users. The result is a unique, fully patented technology that actually responds to the chemical state of each battery. A charging and conditioning waveform is simultaneously applied to the battery ensuring the longest and most reliable performance possible. Another benefit of ACT's truly intelligent system is its ability to keep batteries in a charge receptive state. This translates into the world's fastest charge times. The charging and conditioning process is completely automatic and requires no intervention on the part of the user. There's no charging rules with ACT, simply put the battery on and remove it at any time.

Benefits

Fastest possible charge times
Conditions batteries during charge
Exceptional battery life spans
Elimination of memory problems
Precise termination of charge
Short formation times
No user discipline required
Reduced battery management and cost
Reduced battery disposal costs
Supports multiple battery types & chemistries

Drawbacks

Initial cost