The NICKLEMINDER **Model 8045** is a battery charger with two key characteristics. First, the NICKLEMINDER is designed to support Nickel Cadmium and Nickel Metal Hydride batteries. Full charge is determined by the most sophisticated microchip designed expressly for that purpose. Full charge may be established based on zero slope voltage detect, or rate of temperature increase. Secondly, the NICKLEMINDER is a programmed charger, with custom cell count and capacity tailored for the individual battery pack at the time of purchase at no extra charge.

CHARGE ALGORITHYM:

1. **SOFT START CHARGE**: the current increases gradually over the first two minutes from approximately one fifth of the bulk charge current up to the user selected bulk charge rate.
2. **BULK CHARGE**: current is supplied to the battery at the rate programmed into the charger for the unique battery pack.
3. **TOPPING CHARGE:** current is supplied for two hours at a C/10 rate to complete the charge cycle.
4. **MAINTENANCE CHARGE**: current is supplied at a C/40 rate until the battery is disconnected from the charger.

The following graph illustrates the ideal charge curve of a NiCad battery. The 8045 charger uses the four phase charging cycle outlined above. The charge cycle is broken down into approximately one second intervals. Within an interval, the charger will first supply the current it is programmed for as a bulk charge current. At the end of approximately one second, the current is shut off for 8 milliseconds. Then the current is reversed, discharging the battery at two and a half times the bulk charge rate for 5 milliseconds. The charger is quiet for 16 milliseconds, during which time a voltage measurement is made, and the results stored. The Model 8045 calculates the first derivative of the curve produced by these voltage measurements. When the first derivative goes to zero, the charger terminates the bulk charge phase and moves to the "Topping" phase. The graph, **Charge Tertmination Criteria**, shows the Model 8045 voltage curve as it brings a battery from full discharge to full charge. Because the Model 8045 is programmable over such a wide range of cell count and capacity, the data is given in "Volts per Cell".

Following the Soft Start phase, the Model 8045 supplies to the battery a constant current of C/4 to 4C amperes, depending on the bulk charge programming. As the battery reaches its capacity, the Model 8045 can terminate charging based on either voltage slope parameters or temperature slope parameters. Absent such an indication, an override timer will terminate charge.

The management of the current flowing to the battery during this process is critical if the process of energy storage is to be optimized. Nickel cells, Cadmium or Metal Hydride are charged at a constant current until the charge storage process is complete. The sophisticated operation of detecting this completion requires a computer. By selecting the proper program for the battery type being charged, the Model 8045

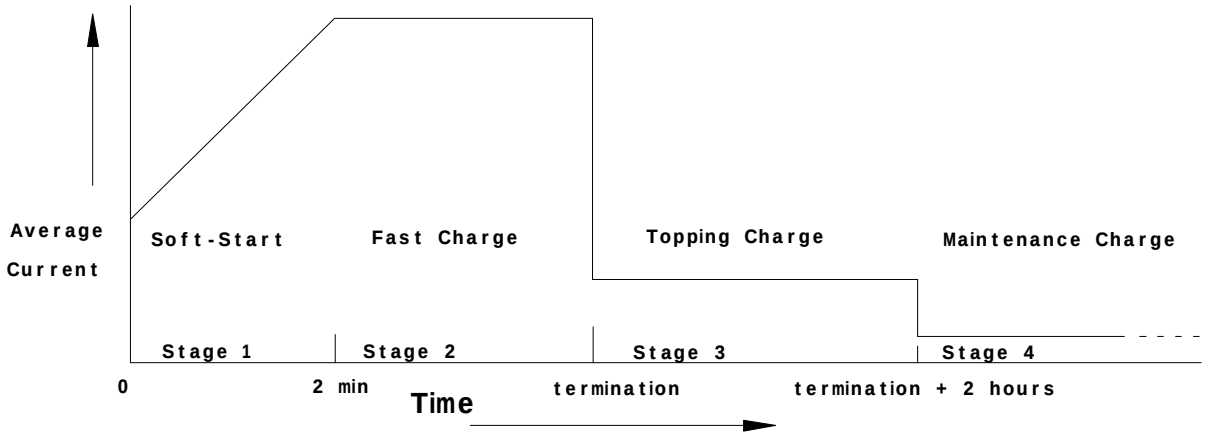
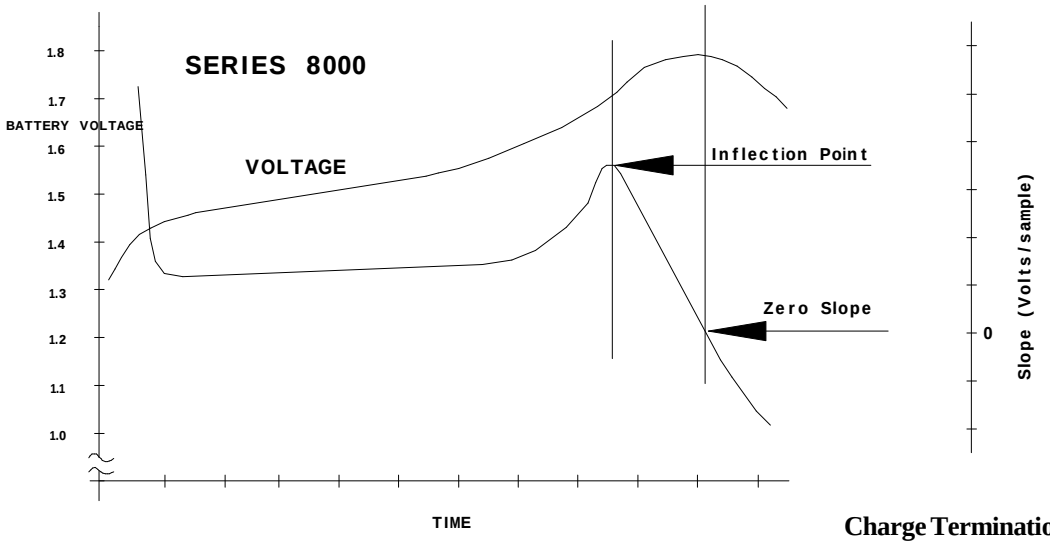


Figure 1

can determine with extraordinary accuracy full charge, and terminate the process. As a safety factor, if the "Zero slope" criteria is missed, a timer overrides all other measurements and terminates the charge process, preventing the damaging overcharge that can occur in less sophisticated chargers. Temperature is also a criteria that can terminate charge, either as a selected way of determining charge complete, or as a safety factor in voltage slope termination. To use this feature, a thermistor must be included in the battery pack.



Charge Termination Criteria

The **NICKLEMINDER Model 8045** is ideal for both charging and conditioning batteries of 20 amp hour capacity and less, with a power envelope of 35 watts delivered to the battery, and a maximum current out of 5 amps.. The instrument can be programmed for charge currents from 20 milliamps to 5 amps, from 2.4 volts nominal to 24 volts nominal, with an output power envelope limitation of 35 watts.

Specifications

Voltage Range	2.4 - 24.0 Volts(nominal)
Current Range	To 5 amps
Packs charged	1
Temperature Range	-30 to 40 Degrees C
8045D	11-15 VDC @5A
AC Voltage In	120 VAC
Frequency In	60 Hz
Power In	40 Watts

Ordering Information

The Model 8045 can be configured when ordering using the following information:

AAAA(D)-BB-CC-EE

AAAA is model number, BB is the cell count for the battery, CC is the battery's capacity in amp hours, expressed as two significant figures and EE is the charge time in quarter hour increments. For a five cell, 4.4 Ah NiCAD, and a C charge rate, the 8045's Model Number would be: 8045-05-44-04.

The maximum power delivered to the battery would be a nominal 35 watts, and the maximum current would be 4.4 amps.

Size:	Construction:	Finish:	Weight:	Operating Temperature:
5" Long, 2.5" High, 3.25" Deep	Aluminum body, ABS end caps	Electrolytic Hardcoat	1.5 lbs., .7 Kg	-30 to +40 Degrees C

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