

Battery Equalization Circuit With Ramp Converter and Selective Outputs

An electronic battery equalization circuit that equalizes the voltages of a plurality of series connected batteries in a battery pack. The current waveform is in the shape of a ramp for providing zero current switching. The transformer has a primary winding circuit and at least one winding circuit. secondary In one embodiment, each secondary winding circuit is connected to a different pair of batteries. The equalizing current is provided to the lowest voltage batteries in one half of the battery pack during one half of the charging cycle. The equalizing current is then provided to the lowest voltage batteries in the other half of the battery pack during the other half of the charging cycle. In another embodiment, secondary winding each circuit is connected to a different single battery. The equalizing current is supplied to a lowest voltage battery in the battery pack during each half of the switching cycle. The electronic battery equalization circuit also includes a feedback control circuit coupled to the primary winding circuit for controlling the current from the equalizing current supply source. In another embodiment, optically coupled switches are connected to a battery voltage monitor to provide equalizing current to the lowest voltage even and odd numbered battery in the battery pack.