SAFE CHARGING

I am using 12-volt 4-amp/hour rechargeable batteries for my camcorder and need a good charger for them. I've been using a transformer but I can never tell if I'm overcharging them. Do you have a circuit that can safely charge the batteries?—L. Shedler, Folsom, CA

When you consider all the brain damage you have to deal with if you want to use Ni-Cd's, it's amazing that anyone still uses them. That probably says more about the state of rechargeable-battery technology than anything else. Despite internal shorting and recharging hassles, they're more popular now than they ever were.

The key to success with Ni-Cd's is knowing how to recharge them without damaging the cells and there have been zillions of words published in this magazine and others (our words, of course, are much better) about how to take care of Ni-Cd batteries. A quick trip to your library will result in your finding out more than you ever wanted to know about the use and abuse of Ni-Cd's.

The rate of charge that can be used on a particular Ni-Cd cell depends on how it's constructed and its capacity. Most cells can't be rapidly charged without circuitry that monitors either their internal temperature or pressure, or both. That's because a Ni-Cd generates oxygen as it charges and, if the rate of charge is too high, the gas will be produced faster than it can be absorbed in the cell. As you can guess, the result of the overcharging is usually a rupture of the cell seals—and if that happens, the battery is history.

The safest charge rate for any cell is the so-called C10 rate. That refers to the time it would take a battery with a voltage of one volt per cell to reach full charge in ten hours. In more practical terms, the number is one tenth the rated amp hours of the battery. In the case of the cells you're using, that translates to a charging rate of 400 mA.

You can use any circuit you want to charge the battery as long as you calculate the correct resistor value to keep the charging current at 400 mA. Even the voltage you apply to charge the batteries isn't as important as keeping the charging current from exceeding the C10 limit.

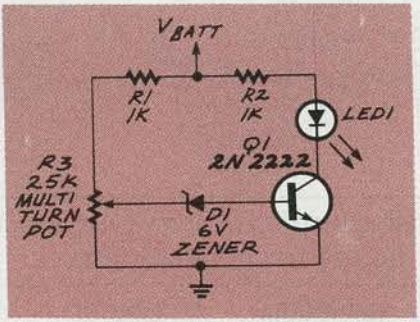

FIG. 1—WHEN CHARGING NI-CD's, this circuit will monitor the battery voltage and provide you with a signal when a certain, presettable voltage has been reached.

The circuit shown in Fig. 1 will monitor the battery voltage and provide you with a signal when a certain, presettable voltage has been reached. The signal can be used to sound an alarm, trigger a relay, or whatever else you might need. The relay could drop the charging rate by adding another resistor in series with the current limiter or even disconnect the charger completely.

When you first apply the charger to a drained battery, the voltage in the system will drop to the battery voltage and, as the battery continues to charge, the system voltage will rise. When it reaches a level determined by the setting of R3, Q1 will turn on and you'll get current flow through its collector-emitter junction. As shown it will turn on an LED but, as I mentioned, you can replace that with a relay or whatever you want.

There's absolutely nothing critical about building the circuit and its accuracy is totally dependent on how well you can tune R3. That's why it's listed as a multiturn potentiometer. All you have to do to calibrate it is to apply 12 volts and slowly adjust R3 until the LED (or, of course, the relay) turns on.