

Given the new kit structure, many teams will reuse valuable electronic items from year to year. Here are a few recommendations for preserving these items so that they remain in good condition for future FRC seasons.

- Make sure your electrical components (cRIO, Classmate, support boards, etc) are stored in a dry location that does not experience extreme fluctuations in temperature.
- If you're packing up your Classmate for storage, the manufacturer recommends storing the battery at 40% charge between 0 and 25 degrees C. If you do store your battery at 100% charge, make sure you store the battery as close to 0 degrees C as you can.

Temperature	40% charge level (recommended storage charge level)	100% charge level (typical user charge level)
0°C	96% after 1 year	94% after 1 year
25°C	96% after 1 year	80% after 1 year
40°C	85% after 1 year	65% after 1 year
60°C	75% after 1 year	60% after 3 months

- National Instruments recommends that you clean your cRIO (note: please don't give your cRIO a bath – this means clearing any debris out of the device so that the electronics aren't damaged or shorted). NI also strongly recommends that you install the cRIO gasket, provided in the 2010 kit of parts, which will help prevent foreign debris from getting in your cRIO. Instructions for installing the cRIO gasket are posted here (<http://digital.ni.com/public.nsf/allkb/FA1B856FC4EB6F9D86257673007935A1>). Teams can purchase additional cRIO gaskets from AndyMark here (<http://www.andymark.biz/am-0590.html>). Please note that installation of the gasket does not void any NI warranty.
- EnerSys, the supplier of the 2010 12V batteries recommends the following for storing your robot batteries: "In general, when lead acid batteries of any type are stored in a discharged condition for extended periods of time, lead sulfate is formed on the negative plates of the batteries. This phenomenon is referred to as "sulfation". Since the lead sulfate acts as an insulator, it has a direct detrimental effect on charge acceptance. The more advanced the sulfation, the lower the charge acceptance. "Brief storage", ie., a few days, at temperatures higher than the ranges recommended, will have no adverse effect on storage time or service life. However, if such use continues for more than one month, the storage time must be determined according to the new ambient temperature. The table below shows the normal storage time or shelf life at various ambient temperatures.

Temperature	Shelf Life
0°C (32°F) to 20°C (68°F)	12 months
21°C (70°F) to 30°C (86°F)	9 months
31°C (88°F) to 40°C (104°F)	5 months
41°C (106°F) to 50°C (122°F)	2.5 months

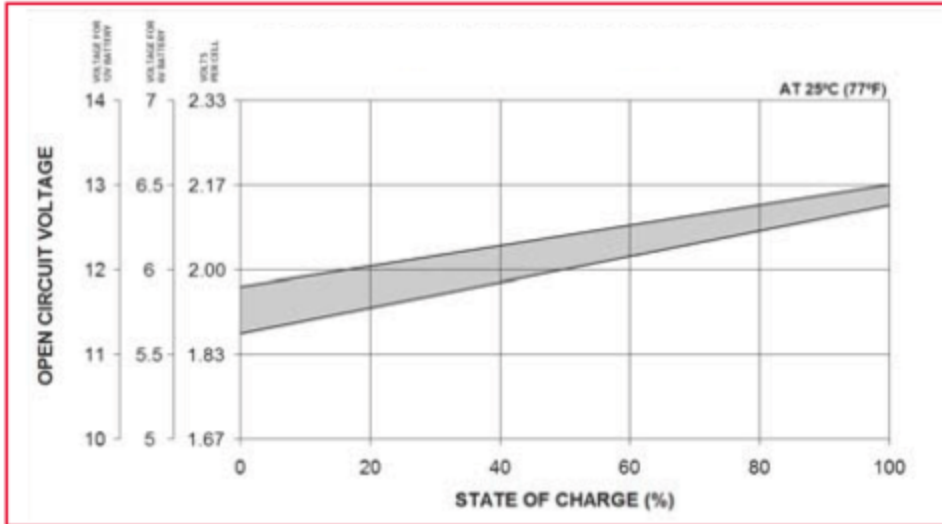


Figure 6. Open Circuit Voltage vs. State of Charge

“In general, to optimize performance and service life, it is recommended that Genesis NP batteries which are to be stored for extended periods of time be given a supplementary charge, commonly referred to as a “refresh charge”, periodically. Please refer to the recommendations listed under REFRESH CHARGING.”

REFRESH CHARGING:

“Since any battery loses capacity through self-discharge, it is recommended that a “refresh charging” be applied to any battery which has been stored for a long period of time, prior to putting the battery into service. Excepting conditions in which storage temperature have been abnormally high, refresh charging is recommended within the following parameters:

Battery Age	Refresh Charging Recommendations
Within 6 months after manufacture	4 to 6 hours at constant current of 0.1CA, or 15 to 20 hours at constant voltage of 2.40 volts per cell.
Within 12 months after manufacture	8 to 10 hours at constant current of 0.1CA, or 20 to 24 hours at constant voltage of 2.40 volts per cell.

Genesis NP batteries must not be allowed to self-discharge to less than 2.08 volts per cell on open circuit. To recover deeply discharged batteries, charge them for 24 hours using a constant voltage charger set at 2.40 volts per cell at 25°C (77°F) with a maximum current of 0.15C. A 16-hour recovery charge is possible by setting the charge voltage at 2.45 volts per cell and a maximum current of 0.25C.

In view of the above, consideration should be given to the fact that if the charging method used is constant voltage in which the charger employs current sensing for either state of charge indication or for reducing voltage (a two-step charger), during the initial stage of charging an over-discharged battery the charger may give a false "full charge" indication, or may initiate charge at a float voltage."