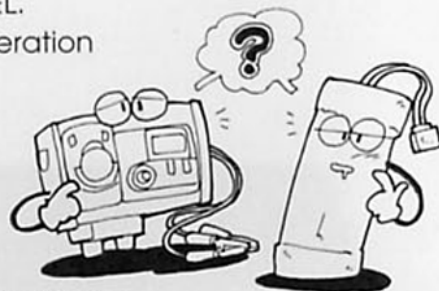


Thank you for purchasing the DX-102 LEVEL.  
Read this manual thoroughly since misoperation  
can damage ni-cd batteries.  
Store this manual with the LEVEL  
for the future reference.



## How to use the discharger.

A ni-cd battery is like a tank storing electricity.  
When electricity flows into the tank, this is called charging.  
On the other hand, when electricity is released from the tank, this is called  
discharging. It is natural that the Ni-cd will be discharged when running the model.  
So, why do you need a discharger? The uses are as follows:

- ① **Capacity Measurement** [ Measure it after full charging. ] This unit measures how much energy the Ni-cd can store.
- ② **Remaining Current Measurement** [ Measure it after running. ] This unit measures the remaining current in Ni-cd which is then used for adjusting gear ratios, motor, etc.
- ③ **Refresh Charging** Discharge the remaining current in Ni-cd before recharging in order to prevent "memory effect".  
[ Recharge Ni-cd after discharging with the LEVEL. ]
- ④ **Cycling** Reactivate ni-cd batteries stored for a long time.  
[ Discharge and charge several times. ]

## Features

- The LEVEL is a powerful discharger that can be used with a wide variety of Ni-cd battery packs, from power-source Ni-cd to transmitter Ni-cd.
- This unit can be used for a Ni-cd battery pack of 1 to 10 cells with 200mAh or higher.
- The discharging current can be switched, 1A or 5A.
- It measures the capacity(mAh) and time (sec.) of discharging from the start to finish.
- The power of Ni-cd is shown by the Average Voltage Function (AVE.VOLT) which indicates voltage during discharging.
- Discharging Cutoff voltage can be set every 0.05V in the range of 0.80~1.15V per cell.
- This unit can be linked with the BX-212 Charger, which makes it possible to charge after discharging (or, to discharge after charging) automatically.
- If the thermostat senses an increased temperature of the Heat Sink inside the LEVEL, This unit takes a pause in discharging until the temperature goes down.
- The Charger Stand II and Charger Piler can be used with this unit.
- Since the discharger converts the energy of ni-cd batteries into heat energy, it will usually get extremely hot. However, the case of the LEVEL will NOT become so hot like conventional dischargers due to the application of the floating heat sink.

## For the Safe Usage of this Unit.

Mis-operation may cause dangerous situation due to the nature of R/C model.  
Read this manual thoroughly to use this unit safely.

### Explanation of Warnings and Signs

In this manual, warnings are classified at three levels, depending on the severity of the danger posed by failure to observe the proper procedure in question. They are as follows.

- ! Danger** Failure to observe the matter discussed in such an item poses a serious threat of death or severe injury.
- ! Warning** Failure to observe the matter discussed in such an item poses a possibility of injury or damage to the equipment or property.
- ! Caution** Failure to observe the matter discussed in such an item poses a possibility of injury or damage to the equipment or property.

### ! Danger

- When using a car battery as the power supply, place the discharger at a distance from the car. ※If the discharger is placed in the engine compartment or in the car itself, a short circuit could occur.
- Do not put your face near a battery that is being discharged.  
※It may cause serious injury.
- If a battery leaks during discharging, do not let the liquid come into contact with your eyes. Blindness could result. ※If you do get the liquid in your eyes, flush your eyes with a large amount of water and then contact a doctor immediately.
- Do not store or transport this equipment together with batteries.  
※There is a risk of causing a fire when a short circuit occurs.
- Disconnect the power supply and any batteries before cleaning this unit. Use non-flammable solution for cleaning. ※Failure to do so could cause a fire.
- Do not connect the terminals to more than one ni-cd battery pack.  
※It is dangerous because a short circuit could occur between batteries.
- Do not use a household power outlet (AC mains).

### ! Warning

- Be sure to keep this unit out of the reach of children.
- Do not disassemble this unit.
- The supply voltage of this unit is 11~16V(DC). Use either a 1 A or higher stabilized power supply, or a 12V battery with above 5Ah that meets the regulation.

### ! Caution

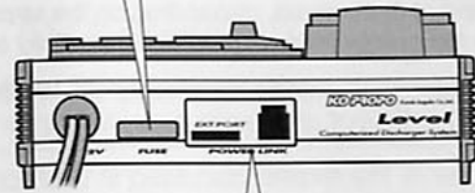
- Do not discharge battery other than hydropack and Ni-cd for R/C model. ● Do not put this unit on a fusible object. ● If the power supply cord is frayed or damaged, do not use this unit until the cord is replaced or repaired. ● Do not use this unit if it becomes wet. Send it to the repair service center. ● Do not use the unit if a foreign object (especially a metal object) is inserted through the slits on the side of this unit until the object is removed. ● Be sure to use a designated fuse. Other fuses will not provide the proper protection. ● Do not set up this unit near water or in a very humid location. ● Be sure to discharge at 1A in case of thin lead wires. The wires become extremely hot when they are forced to carry a large amount of current. ● Do not connect or disconnect the lead wire between this unit and power outlet when a Ni-cd is connected to the unit. Doing so will damage the unit. Shorting the terminals of the source power supply with the output terminals while discharging will damage the unit. ● Do not put an object or finger into the fan while the unit is in use. Doing so will cause damage to the fan and may cause injury. ● Be sure to remove the Ni-cd after the completion of discharge.

### Warranty Limitations

- The display on this unit is not intended for use as a measuring tool. The accuracy of the values displayed is not guaranteed.
- This unit is not made to improve the basic performance of a ni-cd battery. Deterioration in Nicd performance resulting from the use of this discharger is not covered by our company's warranty.

## Names of Parts / How to Use

**Fuse (2A)** When inserting a new fuse, be sure to push in correctly.



**Power link connector terminals**  
※Refer to P8

**Discharging Current Adjustment Knob**

Turn it to the right for 5A, and to the left for 1A.  
※When switching the current during discharging, turn it quickly because Error 03 could be displayed if it is turned slowly.

**Cooling Fan**  
Do not put anything on it.

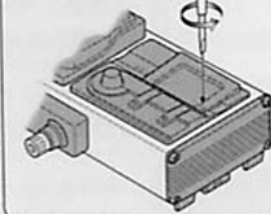
**Fuse (7.5A)**  
When inserting a new fuse, be sure to push in correctly.

**Vent**  
Do not obstruct the vent where hot air exits.

Connect to the connector whose terminals are soldered. Ni-cd voltage can be measured more precisely with thick and short connectors.

**Power Supply Outlet** Use either a stabilized power supply which holds above 1A, or a 12V battery with 5Ah or higher. ※In case of using a transformer as power supply, the power should be set as high as possible in the range of 12V-16V. Doing so increases the spin of fan, and the thermostat sensor becomes hard to operate.

**Adjusting LCD contrast**  
Turn gently with 2.4φ screwdriver.



**Alligator clips**  
Connect to the Power Supply Terminals. (+RED, -BLACK)  
※The number of cells and cutoff voltage are automatically reset as 6 cells / 0.9V when the unit is disconnected from the power supply terminals. Set them again.

**Start Key**  
It is used to start discharging or to select the number of cells, etc.

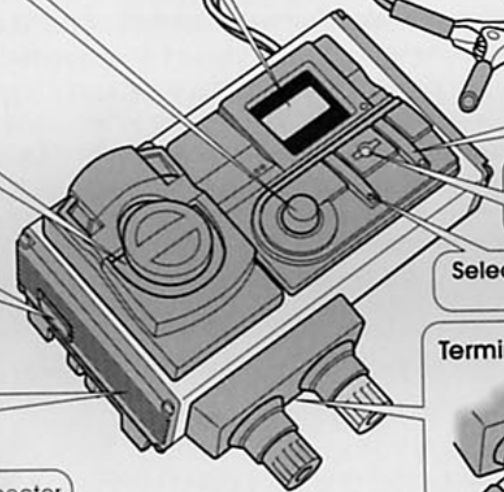
**Monitor Lamp**  
(Red: Discharging in progress)  
(Green: Standby)

**Select Key** It is used to switch the LCD screen.

**Terminals**  
Red (+)  
Black (-)  
Right turn to tighten.  
Left turn to loosen.

**LCD Display**  
The data is shown on this display.

**Power Supply Cord**



### Caution!

Be sure to connect or disconnect the Ni-cd as the unit is connected to the power supply.

## Discharging Procedure Important! Be sure to check the following items before the start.

### ① Discharging Current

Use 5A when the capacity of Nicd is 1100mAh or higher. Use 1A when the capacity of Nicd is less than 1100mAh. However, use 1A for Nicd with thin lead wire for receiver, even when the capacity is 1100mAh or higher.

### ② Select the number of cells

The unit shuts off earlier if you set the larger number of cells than actually used. On the other hand, Ni-cd will be damaged due to over-discharging if you set the smaller number of cells than actually used.

### ③ Start discharging

The unit starts discharging after H mark appears on the LCD screen by pressing the Start key. (on any LCD screens but Ni-cd Select Screen and Cut Voltage Select screen.) After the start, the Ni-cd voltage is gradually decreased while the values on the Capacity and Average Voltage screens are getting larger. Discharging is stopped with the alarm when it decreases to the cutoff voltage.

## Explanation of LCD screen display

### ◆How to Switch the screen.

Switch the screen by pressing the Select key.



### ① The Voltage • Current Screen

This screen appears when turning the Power on. It indicates the voltage and discharging current of Ni-cd. H-mark appears on the left side of Current indication.

### ② The Capacity • Time Screen

The passage of time (sec.) is shown on the upper line, and a discharging current (mAh) is shown on the lower line. The values on this screen are stored until the power is turned off. You can check the deterioration rate by recording the capacity of a new Ni-cd.

### ③ The Average Voltage Screen

The average voltage during discharging appears on this screen. The values will be stored until the Power is turned off. You can check the deterioration rate by recording the voltage of a new Ni-cd.

### ④ The Supply Voltage Screen

It indicates the source supply voltage. (Measure it inside this unit)

### ⑤ The Ni-cd Select Screen **Be sure to set!**

The number of cells means the number of batteries inside a Ni-cd pack. (For example, there is an indication such as 6N or 8N on the label.) Select 1-10 cells by pressing the Start key. (The number 6 is selected when the Power is on.) The set value will be stored until the Power is turned off. (The value cannot be changed during discharging.)

### ⑥ The Cutoff Voltage Select Screen

The cutoff voltage is set at 0.9V when the Power is turned on. The cutoff voltage per cell can be changed in the range of 0.8 ~ 1.15V. The set value will be stored until the Power is turned off. (The value cannot be changed during discharging.)

### Caution

- ※ Error 08 appears when the unit becomes extremely hot, and it stops discharging. I mark appears on the voltage, current, capacity, and time screens. The unit restarts discharging when decreasing the temperature. Decrease the discharging current to 1A since Error 08 appears again at the same current.
- ※ Avoid consecutive use of this unit because the thermostat sensor easily operates due to heat accumulation.
- ※ Be sure to take the Ni-cd off after discharging.

## Explanation of Error Display.

When an abnormality arises, Error No. is displayed on the LCD with the alarm sound. Deal with the problem based on the following table.

<b>Error 01</b> Alarm Sound Three beeps	<b>Description of problem</b> The source supply voltage is 10V or less.	<b>Action to be taken</b> Increase the source supply voltage.
<b>Error 02</b> Alarm Sound Three beeps	<b>Description of problem</b> The source supply voltage is 16V or more.	<b>Action to be taken</b> Decrease the source supply voltage.
<b>Error 03</b> Alarm Sound One long beep	<b>Description of problem</b> The discharging current is abnormal.	<b>Action to be taken</b> Disconnect the Ni-cd immediately.
<b>Error 05</b> Alarm Sound No Sound	<b>Description of problem</b> Ni-cd is not connected.	<b>Action to be taken</b> Connect the Ni-cd.
<b>Error 08</b> Alarm Sound Three short beeps	<b>Description of problem</b> Paused due to high temperature.	<b>Action to be taken</b> Use 1A.

## Description

<b>Charger</b> .....	The unit which supplies electricity to Ni-cd.
<b>Discharger</b> .....	The unit which releases electricity from Ni-cd.
<b>Capacity</b> .....	The amount of electricity the Ni-cd can store.
<b>mAh</b> ..... (milli-ampere hours)	A unit which denotes capacity. It is called 1000 mAh that 1000mA (1A) is released for an hour. The value is calculated by multiplying discharging current and the time together.
<b>Internal Resistance</b> .....	A resistant element which Ni-cd has. The lower the internal resistance, the more power and higher average voltage.
<b>Discharging Cutoff Voltage</b>	The voltage of Ni-cd when the unit stops discharging.
<b>The number of cells</b> .....	The number of batteries which are connected in series in a Ni-cd battery pack.
<b>Constant Current Discharge</b>	The method of discharging at a constant current
<b>Discharging Current</b> .....	The current when discharging Ni-cd.
<b>Charging Current</b>	The current when charging Ni-cd.
<b>Full-Discharge</b> .....	The state that Ni-cd has been properly discharged.
<b>Over-discharge</b> .....	The state that Ni-cd has been discharged too far.
<b>Full-Charge</b> .....	The state that Ni-cd has been fully charged.
<b>Cycling</b> .....	A cycle that repeats discharging after charging.
<b>Cycle discharge</b> .....	Discharging Ni-cd after a full-charge in order to activate the Ni-cd or to compute the capacity.
<b>Refresh charge</b> .....	Charging Ni-cd after full-discharge to eliminate the phenomenon called "memory effect."
<b>AC</b> .....	Alternating Current.
<b>DC</b> .....	Direct Current.
<b>Delta Peak</b> .....	One of the methods which detects the point of full-charge by the rapid charger.
<b>A (ampere)</b> .....	A unit which denotes current.
<b>V (voltage)</b> .....	A unit which denotes voltage.
<b>Fuse</b> .....	A part which cuts off abnormal current to protect a circuit.
<b>Blow</b> .....	The state that the protector stops working when the power supply is overloaded.
<b>The Stabilized Power Supply Unit</b> .....	The unit which produces direct current from an AC mains power outlet.
<b>The Switching Power Supply Unit</b> .....	One of the stabilized Power supply units.
<b>Hydropack (Ni-MH)</b> .....	Nickel metal hydride battery which has higher capacity than Ni-cd.



## Q & A (Question & Answer)

### 1. Can this unit be used only for Ni-cd batteries?

Yes. This unit is designed only for Ni-cd and Hydropack.  
We have not confirmed if the unit can suit different kinds of battery.

### 2. Will the service life of a Ni-cd battery be shortened by the use of this unit?

The Ni-cd cannot be damaged if the number of cells and discharging current are properly set.

### 3. How long does it take to discharge the Ni-cd?

It depends on the remaining capacity of Ni-cd and discharging current.

### 4. What is "memory effect?"

When a Ni-cd is repeatedly charged and used after not having been discharged completely, the capacity of the Ni-cd is diminished. This phenomenon is called "memory effect."  
It is ideal to charge the Ni-cd which is completely discharged.

### 5. The unit does not work independently, although it works when it is linked with the charger. 2A fuse blew. Replace it.

### 6. The displayed capacity is different from the value on the label of Ni-cd.

The displayed value indicates the capacity at that time. It can be close to the value on the label when a fully charged Ni-cd is discharged.

### 7. Nothing appears on the LCD even by pressing the key.

This is because the power supply voltage is 11V or less or there is a break in the circuit of crocodile clips.  
Check the supply voltage and connect to the power supply outlet again.

### 8. Is the discharging capacity of Ni-cd different for 1A and 5A?

Yes. The more current, the faster the voltage gets lower.  
The display of the average discharging voltage is also different between 1A and 5A.

### 9. The voltage is still high after the completion of the discharge. Is the Ni-cd really discharged?

Even though the terminal voltage looks high after discharging, there is no remaining.

### 10. Even though Ni-cd can be discharged by other dischargers such as DX-101, the LEVEL stops discharging shortly after the start.

This may occur when 5A is used.  
As mentioned in Q8, the unit stops discharging much earlier due to the low voltage.

### 11. The Ni-cd pack in the transmitter cannot be discharged.

The Ni-cd cannot be discharged directly from the Charger cord because of a diode in the charging circuit. Discharge the Ni-cd after taking it out of the transmitter.

### 12. What are the values for 2000mAh Ni-cd batteries?

They depend on the frequency of use and type of Ni-cd. Use a new Ni-cd as guideline.

### 13. What happens to the unit if a fuse blows.

In case of 7.5A fuse, the unit cannot discharge even though the LCD screen operates. In case of 2A fuse, all functions cannot operate. (All functions except fan operates when the unit is linked with BX-212)

### 14. The LCD contrast becomes darker in proportion to discharging.

This is because discharging heat increases the temperature of the LCD. Adjust with the Contrast Adjusting VR on the right side of the LCD. (Refer to P3)

### 15. The unit cannot start discharging even though there is a remaining current in Ni-cd.

Make sure that the right number of cells is selected. When the number is selected but the unit still does not work, either there is no remaining current or the service life of the Ni-cd has gone.

**16. The displayed supply voltage is different between the DX-102 and BX-212, even though they are connected to the same power supply outlet.**

Both of them calculate the voltage internally. The difference in the voltage depends on thickness of the cord which makes a difference in current consumption.

**17. Is the Ni-cd with 200mAh or less able to be discharged?**

It is very tough on the Ni-cd because the minimum discharging current is 1A for this unit. For example, it is 10C discharging for 100mAh Ni-cd. (5A for 500mAh Ni-cd.)

**18. The sign "\*\*\*\*\*V" appears on the Average Discharging Voltage screen.**



The unit calculates the average voltage every 0.5 seconds and stores all the data. The sign "\*\*\*\*\*V" appears when the data exceeds the capacity of CPU. It possibly occurs when discharging the 3000mAh Ni-cd with 1A.

**19. Why should I input the number of cells?**

Because the Ni-cd will be over-discharged as the voltage of Ni-cd is gradually decreasing after the start. Input the right number for proper operation.

**20. The cutoff voltage per cell is set on the Cutoff Voltage screen. What voltage does this unit actually cut off at?**

The actual cutoff voltage is the cutoff voltage per cell multiplied by the number of cells. For example, 0.9V X 6 = 5.4V for 6 cells.

**Specifications**

The specifications are subject to change without notice due to improvement.

- Usage**..... The discharger designed only for Ni-cd and Hydropack batteries.
- Method**..... High Frequency FET control, stabilized current discharging.
- Discharging Current**... Switching method 1A/5A
- Dischargeable Number of Cells**... 1~10 cells
- Dischargeable Nicd Voltage**... 1.2 V · 2.4 V · 3.6 V · 4.8 V · 6.0 V · 7.2 V · 8.4 V  
9.6 V · 10.8 V · 12.0 V
- Recommended Dischargeable Nicd Capacity** 200mAh or more
- Discharging Cutoff Voltage (per cell)** 0.80V~1.15V (set every 0.05V)
- Power Supply Voltage** 11V~16V (DC) Use 12V stabilized power supply which holds above 1A, or 12V battery with above 5Ah.
- Dimensions/ Weight**... 149x82x50mm(excluding projections),440g

**When you ask for a repair service,**

describe the problem in as much detail as possible. Doing so will make our technicians pinpoint the cause of the problem faster, reducing the length of repair time. We are able to answer the question only about KO's batteries. Contact a sales agency, regarding any other batteries.

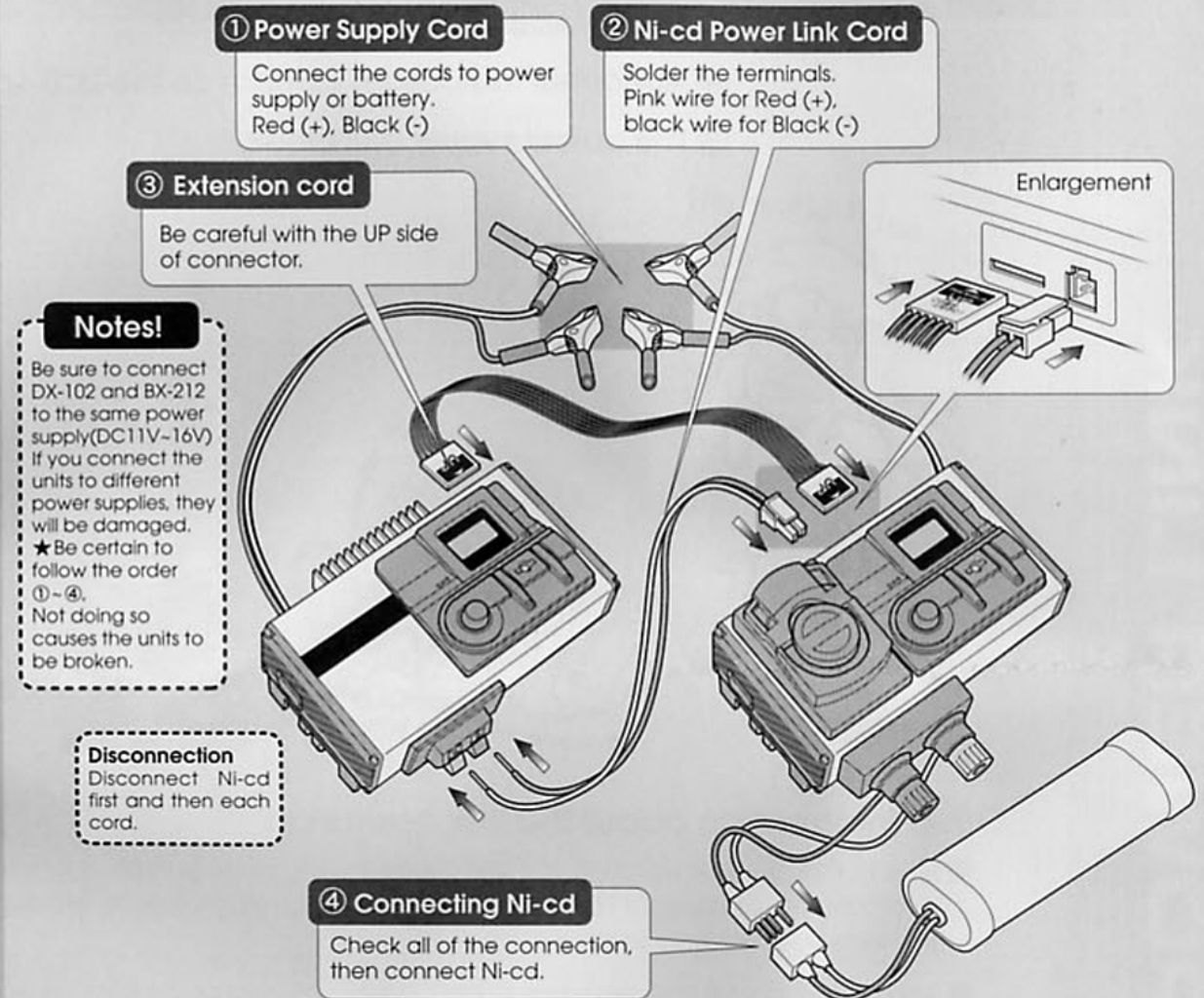
**KONDO KAGAKU CO., LTD. Service Department**

4-17-7 Higashi-Nippori Arakawa-ku, Tokyo 116  
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**The Usage for the link operation with BX-212.**

It is possible to discharge Ni-cd after charging (Cycle discharge) and /or charge Ni-cd after discharging (Refresh Charge) by connecting the BX-212 charger. (Use our optional cord.)

**How to Connect the BX-212 Charger.**



**Usage**

The unit first starts operating by pressing the START key. When making a mistake, disconnect Ni-cd and restart.

**❶ Check the following items before the start!**

- 1. Charging Current for the charger
- 2. Discharging Current and the number of cells for the discharger

**❷ Charge ⇒ Discharge (Capacity Measurement)**

Press the START key of BX-212 to start charging. After full-charging, the DX-102 starts discharging automatically with the alarm sound.

**❸ Discharge ⇒ Charge (Refresh Charge)**

The unit starts discharging, by pressing the START key of the DX-102 until the H mark appears on the LCD screen. After discharging, the BX-212 starts automatically with the alarm.

**❹ Note when using each unit independently.**

Be sure to disconnect the terminals of power link cord and extension cord. Take Ni-cd out first when disconnecting or connecting cords.

