



High Output Dual Charging System
multi charger X2 700

INSTRUCTION MANUAL



WARNING: THE CHARGING AND DISCHARGING OF RC HOBBY BATTERIES CAN BE DANGEROUS. FAILURE TO FOLLOW THE INSTRUCTIONS AND WARNINGS IN THIS MANUAL MAY RESULT IN PROPERTY DAMAGE AND/OR LOSS OF LIFE.

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Introduction

Congratulations on your purchase of the Hitec X2-700 charger from Hitec RCD, USA. The Hitec X2-700 is a high-performance, microprocessor-controlled charger/discharger with battery management capabilities that are suitable for use with most popular battery types. The X2-700 also features integrated balancing for eight-cell, Lithium-Polymer (LiPo), Lithium Iron Phosphate (LiFe) and Lithium-Ion (Lilon), as well as the latest high voltage Lithium-Polymer (LiHV) batteries.



THE CHARGING AND DISCHARGING OF RC HOBBY BATTERIES CAN BE DANGEROUS. FAILURE TO FOLLOW THESE EXPLICIT WARNINGS CAN

Warning

RESULT IN PROPERTY DAMAGE AND/OR LOSS OF LIFE.

- ⚠ NEVER LEAVE YOUR CHARGER UNATTENDED WHILE IN OPERATION.
- ⚠ NEVER CHARGE ON OR AROUND COMBUSTIBLE MATERIALS.
- ⚠ NEVER CHARGE A DAMAGED BATTERY PACK.
- ⚠ LOW COST, NO-NAME BATTERY PACKS POSE THE MOST DANGER. WE RECOMMEND YOU ONLY USE BATTERY PACKS THAT ARE SOLD AND WARRANTED BY A REPUTABLE COMPANY.
- ⚠ IT IS HIGHLY RECOMMENDED THAT YOU UTILIZE A SAFETY DEVICE SUCH AS A STEEL CASE OR LIPO SACK™ WHILE CHARGING LITHIUM CHEMISTRY BATTERIES.
- ⚠ IT IS HIGHLY RECOMMENDED THAT YOU KEEP AN OPERABLE “CLASS A” FIRE EXTINGUISHER IN THE CHARGING AREA.

FAILURE TO FOLLOW THESE WARNINGS CAN BE CONSIDERED NEGLIGENCE BY THE OPERATOR AND MAY NEGATE ANY CLAIMS FOR DAMAGES INCURRED.

Hitec RCD USA will not be held responsible for any damages or injuries that may occur by persons who fail to follow these warnings or who fail to properly follow the instructions in this manual.

Warnings and Safety Notes



Warning



Tip

Warning: Be sure to read this section for your own safety.

Caution: Be sure to read this section to prevent accidents and damage to your charger.



Note



Caution

Tip: This section will help you maximize the performance of your charger.










Note: This section will provide more detailed explanations.


These warnings and safety notes are of the utmost importance. You must follow these instructions for maximum safety. Failure to do so can damage the charger and the battery and in the worst cases, may cause a fire.



Warning

NEVER LEAVE THE CHARGER UNATTENDED WHILE IT IS CONNECTED TO ITS POWER SOURCE. IF ANY MALFUNCTION IS FOUND, TERMINATE THE PROCESS AT ONCE AND REFER TO THE OPERATION MANUAL.

-  The allowable DC input voltage is 11-30V DC.
-  Keep the charger away from dust, damp, rain, heat, direct sunlight and excessive vibration.
-  If the charger is dropped or suffers any type of impact, it should be inspected by an authorized service station before using it again.
-  This charger and the battery should be put on a heat-resistant, non-flammable and non-conductive surface.
-  Never place a charger on a car seat, carpet or similar surface. Keep all flammable volatile materials away from the operating area.
-  Make sure you know the specifications of the battery to be charged or discharged to ensure it meets the requirements of this charger. If the program is set up incorrectly, the battery and charger can be damaged.
-  Fire or explosion can occur due to overcharging.
-  To avoid a short circuit between the charge lead, always connect the charge cable to the charger first, then connect the battery. Reverse the sequence when disconnecting.
-  Never attempt to charge or discharge the following types of batteries:



Warnings and Safety Notes

- A battery fitted with an integral charge circuit or a protection circuit
- A battery pack which consists of different types of cells (including different manufacturer's cells)
- A battery that is already fully charged or just slightly discharged and non-rechargeable batteries (these pose an explosion hazard)
- A faulty or damaged battery
- Batteries installed in a device or which are electrically linked to other components
- Batteries that are not expressly stated by the manufacturer to be suitable for the currents the charger delivers during the charge process

PLEASE BEAR IN MIND THE FOLLOWING POINTS BEFORE YOU COMMENCE CHARGING:

- Did you select the appropriate program suitable for the type of battery you are charging?
- Did you set up the adequate current for charging or discharging?
- Have you checked the battery voltage? Lithium battery packs can be wired in parallel and in series, i.e. a 2-cell pack can be 3.7V (in parallel) or 7.4V (in series).
- Have you checked that all connections are firm and secure?
- Make sure there are no intermittent contacts at any point in the circuit.

Warnings and Safety Notes

Standard Battery Parameters

	LiPo	LiPo HV	Lilon	LiFe	NiCd	NiMH	Pb
Nominal Voltage	3.7V/cell	3.8V/cell	3.6V/cell	3.3V/cell	1.2V/cell	1.2V/cell	2.0V/cell
Max. Charge Voltage	4.2V/cell	4.35V/cell	4.1V/cell	3.6V/cell	1.5V/cell	1.5V/cell	2.46V/cell
Storage Voltage	3.8V/cell	3.85V/cell	3.7V/cell	3.3V/cell	n/a	n/a	n/a
Allowable Fast Charge	≤ 1C	≤ 1C	≤ 1C	≤ 4C	≤ 1-2C	≤ 1-2C	≤ .04C
Min. Discharge Voltage	3.0-3.3V/cell	3.1-3.4V/cell	2.9-3.2V/cell	2.6-2.9V/cell	.85-1V/cell	0.9-1V/cell	1.8V/cell



Warning

WHEN ADJUSTING YOUR X2-700 CHARGING PARAMETERS, BE SURE YOU SELECT THE PROPER BATTERY TYPE AND CELL VOLTAGE FOR THE TYPE OF CELL YOU ARE CHARGING. CHARGING BATTERIES WITH THE WRONG SETTINGS MAY CAUSE THE CELLS TO BURST, CATCH FIRE OR EXPLODE.

Before charging your batteries, it is critical that you determine the maximum allowable charge rate for your batteries. The X2-700 is capable of charging at high rates that may not be suitable or safe for your particular batteries. For example, Lithium cells are typically safe to charge at 1C, or the total mAh ÷ 1000. A 1200mAh battery would have a 1C charge rate of 1.2 amps. A 4200mAh battery would have a 1C charge rate of 4.2 amps. Some manufacturers are offering Lithium cells that can be charged at greater than 1C but this should ALWAYS be verified before charging a Lithium battery at rates higher than 1C. Voltage is just as critical as the charging amperage rate and this is determined by the number of cells in series, or "S". For example, a 3S LiPo is rated at 11.1 volts ("S" multiplied by a single LiPo cell with a nominal voltage of 3.7 volts DC. 3 cells x 3.7 volts each equals 11.1 volts DC).

Connect the battery's main leads to the charger output: red is positive and black is negative. Keep in mind that the gauge or thickness of your charging leads from the X1 to your battery must be of an acceptable current rating to handle the applied charge current. For maximum safety and charging effectiveness, always match or exceed the main battery lead rating when assembling or selecting your charging leads. If you charge a battery at a

Warnings and Safety Notes

high current rate (amperage) with a charging lead not rated for the chosen amperage, the wire could get hot, catch fire, short out and/or potentially destroy your battery and the charger. When in doubt, always use a higher gauge wire (lower AWG number). It is common to see charging leads constructed of 14AWG, 16AWG or 18AWG wire.

Always refer to recommendations from your battery manufacturer for your specific battery type and size before initiating a charge or discharge process.

Do not attempt to disassemble or modify Lithium or Lead-Acid battery packs.

Discharging

The X2-700 discharging functions are for two specific purposes:

- Refreshing the capacity of a Nickel-based battery that has lost capacity over time (NiMH or NiCd).
- Reducing the voltage of a Lithium battery for safe storage.



Warning

LITHIUM CHEMISTRY BATTERY PACKS SHOULD ONLY BE DISCHARGED TO THEIR MINIMUM SAFE VOLTAGE, NO LOWER. DEEP DISCHARGING A LITHIUM CELL WILL DO PERMANENT DAMAGE. REFER TO THE STANDARD BATTERY PARAMETERS TABLE ON PAGE 6 OF THIS MANUAL FOR MINIMUM DISCHARGE VOLTAGES.

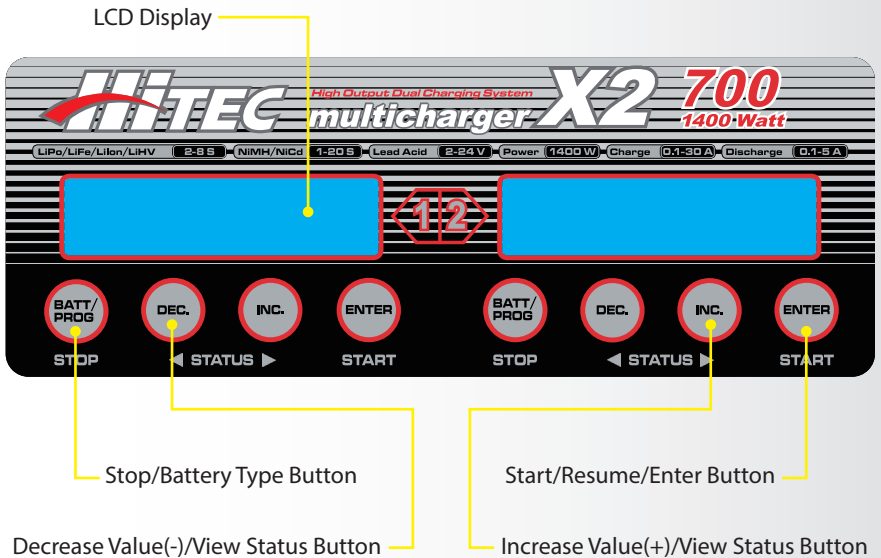
LiPo & LiHV Charge/Discharge Cycling

Lithium batteries are known to reach full capacity after a break-in period of about 10 charge/discharge cycles. We do not recommend you use the X2-700 charger to do this; normal use and recharging will achieve the same results. If you wish to perform a Lithium break-in on the bench with the X2-700 discharging to minimum acceptable voltages and performing a balance charge at 1C maximum rate is recommended. If you choose to break in your Lithium batteries under normal use, charging at only 1C for the first ten cycles will help ensure full performance and service life from your Lithium cells.

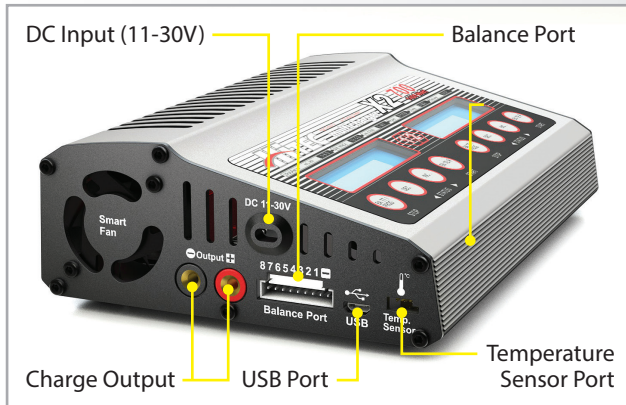
Charger Layout



1. X2-700 Charger
2. Battery Clamps
3. 2 x Universal Balancing Boards
4. XT-60 Charging Cable
5. T-Type Charging Cable
6. 2 x 18AWG Wire Charging Cable



Charger Layout



Specifications

DC Input Voltage	11 - 30 Volts DC
Total Charge Circuit Power	1400 Watts (700 Watts x 2)
Charge Current Range	0.1 - 30.0 Amps x 2
Discharge Current Power	30 Watts x 2
Discharge Current Range	0.1 - 5.0 Amps
Current Drain for LiPo Balancing	Max 800mAh per cell
NiCd/NiMH Battery Cell Count	1 - 20 cells
- Capacity Range	100 - 50,000mAh
LiPo/LiHV/LiFe/Lilon Cell Count	2 - 8 cells
- Capacity Range	100 - 50,000mAh
Pb Battery Voltage	2 - 24 Volts
- Capacity Range	100 - 50,000mAh
New Weight	2.69 lbs. (1220g)
Dimensions	7.9 x 5.5 x 2.2in (200 x 140 x 55mm)

Features

Optimized Operating Software

The X2-700 “auto” feature sets the charge and discharge current for you automatically, preventing overcharging which can damage your battery. In the event of an error, the X2-700 instantly disconnects the circuit and sounds an alarm. This feature can be set by the user and controlled through the two-way link for maximum safety.

Data Store/Load

A maximum of ten setting profiles can be stored for your convenience. The X2-700 will store the data pertaining to a program’s settings and you can recall data at any time.

Internal Independent Lithium Battery Balancer

The X2-700 features a built-in cell voltage balancer so you don’t need to fuss with external balancers while charging.

Monitoring Individual Cells During Discharging

When used with a balancing board the X2-700 can monitor each cell in the pack individually while discharging. If the voltage of any single cell is abnormal, the X2-700 will display an error message and the process will end automatically.

Adaptable to Various Types of Lithium Batteries

The X2-700 will charge and discharge a variety of Lithium batteries such as Lilon, LiPo, LiFe and the new higher voltage LiPo, (LiHV) batteries.

Multiple Lithium Battery Charge Modes

The X2-700 features six methods of charging: Regular charge, Fast charge, Balance charge, Storage charge, Micro charge and Micro Storage charge modes. We highly recommend using balance charge as it is the safest and best way to charge lithium chemistry batteries. If you plan on not using your Lithium chemistry batteries for an extended period of time, Storage charge mode is recommended to optimize your packs for long term storage and maximum lifespan.

Synchronous Mode

When charging two identical batteries, both channels can be set using channel one.

Features

Input Power Monitoring

The X2-700's input voltage is monitored to protect the battery from becoming damaged. The process ends automatically if it drops below the limit.

Capacity and Temperature Limits

The charge process will terminate if either the charging capacity or battery temperature exceeds the limit set by the user. The temperature function requires an optional temperature probe, which is not included with the X2-700.

Processing Time Limit

Protect your battery by setting a maximum time limit for charging and discharging.

Cyclic Charging/Discharging (NiMH and NiCd only)

A battery can be cycled 1 to 5 times consecutively. This process is good for refreshing and balancing your battery.

Maximum Safety

Our delta-peak voltage detection program for NiMH and NiCd batteries ends the charge cycle whenever a battery's voltage exceeds the set threshold.

Automatic Charging Current Limit

Charging current can be set by the user when charging lithium NiCd or NiMH batteries. The 'AUTO' charging mode, however, is recommended when charging NiMH batteries with low impedance and capacity.

LiPo Battery Meter

The user can check the battery's total voltage, the highest and lowest as well as each cell's voltage.

Battery Internal Resistant Meter

The user can check the internal resistance of each cell of the battery.

PC Control Using Charge Master Software

The free Hitec Charge Master software gives you an unparalleled ability to operate the charger through the computer. You can monitor pack voltage, cell voltage and other data during the operation. Additionally, you have the ability to set up the charger and update the firmware if required. Please check the Hitec RCD Inc website for the correct version required for your charger.

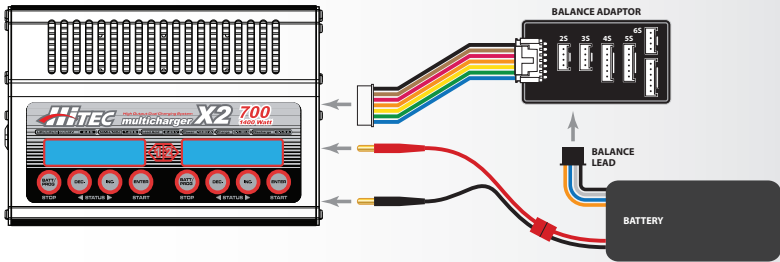
Charger/Battery Connections



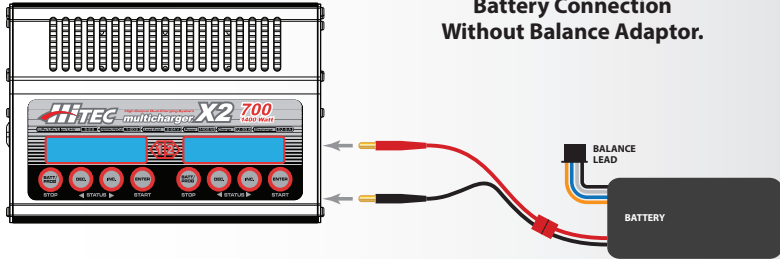
Warning

TO AVOID SHORT CIRCUITS, ALWAYS CONNECT THE CHARGE LEADS TO THE CHARGER FIRST, AND THEN TO THE BATTERY. REVERSE THE SEQUENCE WHEN DISCONNECTING THE PACK.

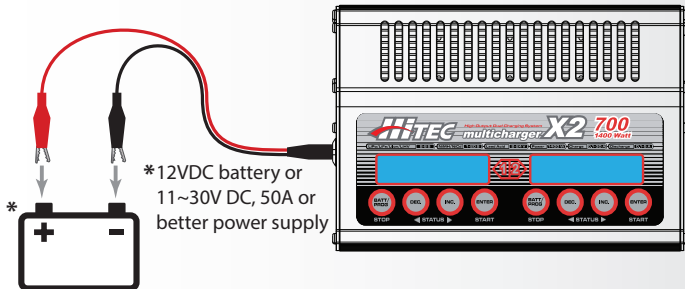
Battery Connection With Balance Adaptor.



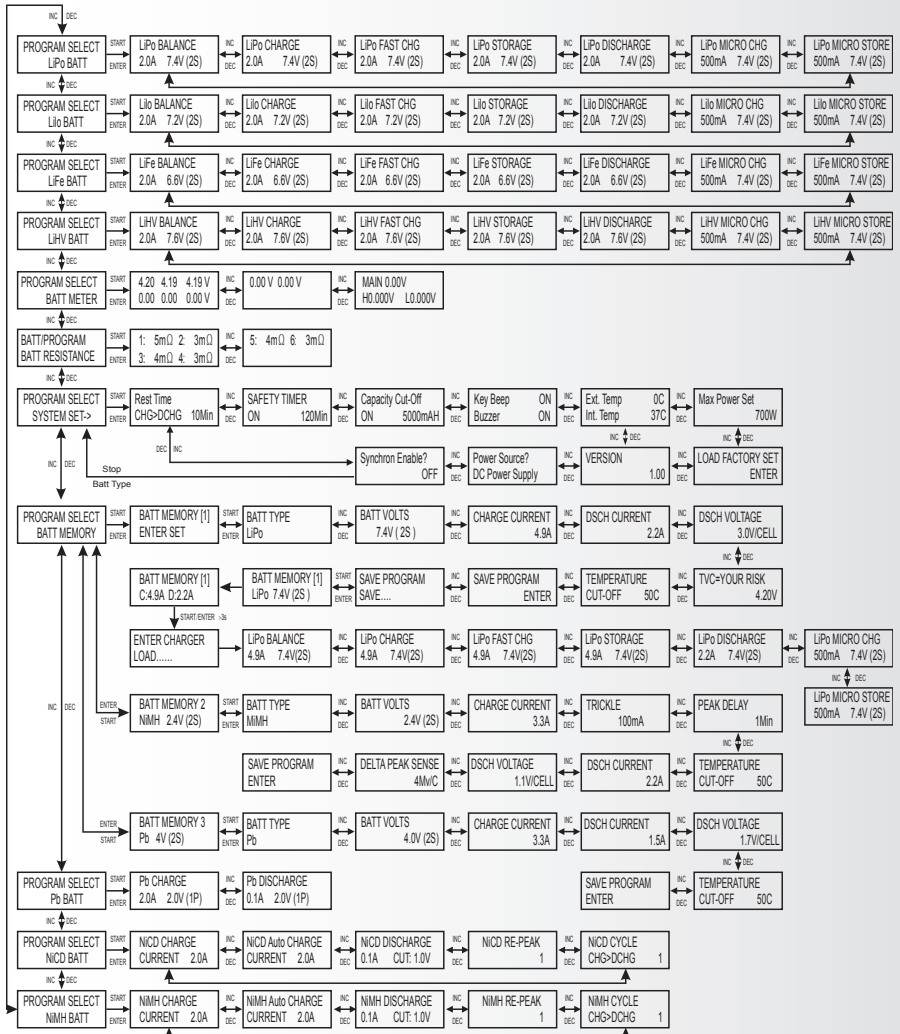
Battery Connection Without Balance Adaptor.



12VDC Battery/DC Power Supply Connection.



Flowchart



A larger version of this flow chart can be found on the web at www.hiteccrd.com

Lithium

This program is only suitable for charging/discharging Lithium (LiPo/LiHV/ LiIon/LiFe) batteries from 1 - 8 cells.

Lithium Battery Operations

The X2-700 offers the following lithium charge modes: Charge, Balance Charge, Fast Charge, Storage, Micro Charge and Micro Storage.



BEFORE SELECTING A CHARGE MODE, IT IS CRITICAL THAT YOU SELECT THE CORRECT TYPE OF LITHIUM BATTERY TO BE CHARGED.

Warning FAILURE TO DO SO CAN RESULT IN DAMAGE TO THE BATTERY AND POSSIBLE EXPLOSION.

Selecting a Lithium Battery Type: After powering on the charger press



PROGRAM SELECT
LiPo BATT->

the BATT/PROG button once to go to the "PROGRAM SELECT" screen. Use the INC. > button to advance to the type of battery you want to charge. Choices of lithium type batteries are; LiPo, Lilo, LiFe, and LiHV.



LiPo BALANCE
2.0A 3.7V

Once you have selected your battery type, press the

ENTER button to continue to the charge mode selection screen.



BEFORE YOU BEGIN CHARGING YOUR BATTERY, MAKE SURE YOU HAVE READ AND UNDERSTAND ALL OF THE WARNINGS AND SAFETY

Warning INFORMATION CONTAINED ON PAGES 4-7.



Note

LITHIUM BATTERIES CAN BE CHARGED WITHOUT THE USE OF A BALANCE ADAPTOR. A BALANCE ADAPTER CAN BE USED, BUT IT IS NOT REQUIRED. BALANCE CHARGE MODE IS RECOMMENDED FOR ANY BATTERY WITH A BALANCE LEAD.

See page 12 for the appropriate charging connection setup for this operation.

Selecting the Charge Mode: First, select the correct battery type by following the instructions above. Once you have set the correct battery type, press the ENTER button once to go to the charge mode select screen.



LiPo CHARGE
0.1A 3.7VC1SD

Use the < DEC. or INC. > buttons to scroll through the mode choices. The following modes are available when working with Lithium chemistry batteries:

Lithium Battery Operations (cont.)

Charge: Basic charge mode used for normal charging

Discharge: Basic discharge mode used for normal discharging

Storage: This mode is for charging or discharging batteries to the optimal storage voltage for the purpose of storing the batteries for a longer period of time.

Fast Charge: Charges faster than regular “Charge” mode although capacity may be reduced resulting in shorter run times.

Balance Charge: For batteries with a balancing connection, this mode balances the voltage of each individual cell while charging. This is the safest and most optimal way to charge Lithium chemistry batteries.

Micro Charge: Charges at a rate from 10~500mAh for smaller batteries

Micro Storage: Charges or discharges at a rate from 10~500mAh

Fast Charge: Charges faster than regular “Charge” mode although capacity will be slightly reduced.

Setting the Charge/Discharge Current: Once you find the mode you wish to use press the ENTER/START button and the current value will begin



flashing. Use the < DEC. or INC. > buttons to Set the Charge/Discharge current based on the battery manufacturer's recommendations. Once you have set the

Charge/Discharge current, press ENTER/START to move to the battery voltage setting.



Caution

Most manufacturers suggest a 1C charge rate for lithium chemistry batteries although some manufacturers are offering Lithium cells that can be charged at a rate greater than 1C. This should ALWAYS be verified before charging a Lithium battery at rates higher than 1C.

Setting the Voltage: The cell count indicator will be flashing, use the < DEC.



or INC. > buttons to adjust the value to the desired number. Press ENTER to confirm. The voltage and cell count should match the values listed on the battery label.

Program Start: You are now ready to execute the selected program. Press and hold the ENTER/START button until you see “BATTERY CHECK WAIT...” followed by the “CONFIRM/CANCEL” screen.

Lithium Battery Operations (cont.)

R: 3SER S: 3SER
CONFIRM(ENTER)

The “CONFIRM/CANCEL” screen displays the number of cells detected by the processor as “R” and the number of cells you set as “S”. If both numbers are identical, you may press the START/ENTER button to confirm and begin charging. If these numbers do not match, press the BATT/STOP button to return to the previous screen and carefully check the number of cells of the battery pack before proceeding.



DURING CHARGING, THE BATTERY SHOULD BE PLACED INSIDE A FIRE-PROOF/RETARDANT BAG AND ON A FIRE PROOF SURFACE AWAY FROM

Warning OTHER COMBUSTIBLE OBJECTS.

Pressing the Increase Button:

4.09 4.09V 4.09V
0.00 0.00V 0.00V

Voltage of each cell in the battery pack when the battery is connected with balance lead.

Fuel= 90%
Cell= 4.10V

Charged capacity percentage and average cell voltage of the battery pack.

Press the START/ENTER to exit

Pressing the Decrease Button:

IN Power Voltage
18.88V

Input Voltage

End Voltage
12.88V

End Voltage Setting

Capacity Cut-Off
ON 5000mAh

Capacity Cut-off Settings

Ext. Temp 0C
Int. Temp 38C

Internal and External* Temperatures

*External temperature requires optional temperature probe part no. 44159

Temp Cut-Off
80C

Temperature Cut-Off settings

SAFETY TIMER
ON 120Min

Safety Timer setting

Press the START/ENTER to exit

This program is only suitable for charging/discharging NiCd/NiMH batteries.

NiCd/NiMH Battery Operations

The X2-700 offers the following NiCd/NiMH charge modes: Charge, Auto Charge, Discharge Re-Peak and Cycle.



BEFORE SELECTING A CHARGE MODE, IT IS CRITICAL THAT YOU SELECT THE CORRECT TYPE OF BATTERY TO BE CHARGED. FAILURE TO

Warning DO SO CAN RESULT IN DAMAGE TO THE BATTERY.

Selecting the Battery Type: After powering on the charger, press the BATT/PROG button once to go to the "PROGRAM SELECT" screen. Use the INC.

PROGRAM SELECT
NiMH BATT

> button to advance to the type of battery you want to charge. Once you have selected your battery type, press the ENTER button to continue to the charge mode selection screen.

NiMH Auto CHARGE
CURRENT 1.6A

Selecting the Charge Mode: Use the < DEC. > buttons to scroll through the mode choices. The following modes are available when working with NiCd and NiMH batteries:

Charge: Basic charge mode used for normal charging

Auto Charge: In this mode, the charger will automatically detect the battery parameters and charge the battery automatically.

You should set the upper limit of the charge current in order to avoid damage from excessive current.

Discharge: Basic discharge mode used for normal discharging

Re-Peak: This mode is will peak charge the battery up to three times

Cycle: Automatically charges/discharges the battery up to 5 times. This process can enhance the performance of NiMH/NiCd batteries.

Setting the Charge Current: In Charge mode, you will be prompted to set the charge current or the maximum charge current for

NiMH CHARGE
CURRENT 0.1A

Auto Charge mode. Once you find the mode you wish to use, press the ENTER/START button twice and the

current value will begin flashing. Use the < DEC. > buttons to set the charge current based on the battery manufacturer's recommendations. Press ENTER to confirm your settings.

NiCD/NiMH Battery Operations (cont.)

Setting the Discharge Current: You will need to set a discharge current when using the Discharge and Cycle modes. After selecting the Discharge mode, press the ENTER/START button twice and the current value will begin flashing. Use the < DEC. or INC. > buttons to set the Discharge current based on the battery manufacturer's recommendations. Once you have set the Discharge current, press ENTER/START to confirm your setting.



NiMH DISCHARGE
CURRENT 0.1A



Note

The X2-700 uses the settings from the Charge and Discharge programs when performing the charge/discharge cycles in Cycle mode.

Setting the Cycle Functions: When choosing the cycle function you will be prompted to set the number of Discharge/Charge cycles to perform as well as the Charge/Discharge or Discharge/Charge starting/ending points. After select-



NiMH CYCLE
CHG<DCHG 1

ing the Cycle mode, press the ENTER/START button twice and the starting and ending cycle will begin to flash. Use the < DEC. or INC. > buttons to select the starting/ending point of your choice and press the ENTER/START button to confirm. Now the number of cycles prompt will be flashing Use the < DEC. or INC. > buttons to select



NiMH CYCLE
CHG<DCHG 1

the number of cycles you wish to perform and press the ENTER/START button to confirm.

Selecting the Number of Re-Peak Operations: When choosing the Re-Peak function you will need to set the number of times you want to Re-Peak the battery. After selecting the Re-Peak mode, press the ENTER/START button twice and the number of Re-Peak cycles will flash. Use the < DEC. or INC. > buttons to select the number of Re-Peak cycles you wish to perform and press the ENTER/START button to confirm.



NiMH CYCLE
CHG<DCHG 1

BEFORE YOU BEGIN CHARGING OR DISCHARGING YOUR BATTERY, MAKE SURE YOU HAVE READ AND UNDERSTAND ALL OF THE WARNINGS AND SAFETY INFORMATION CONTAINED ON PAGES 4-7.



Warning DURING CHARGING, THE BATTERY SHOULD BE PLACED ON A FIRE PROOF SURFACE AWAY FROM OTHER COMBUSTIBLE OBJECTS.

NiCD/NiMH Battery Operations (cont.)

Program Start: Once you have chosen the mode and set the proper parameters, press and hold the ENTER/START button to execute the program. You will see "BATTERY CHECK" followed by the operation screen. The X2-700 is now executing the chosen program. When the operation is completed the X2-700 will chime.

Information Displayed During the Process: A variety of information is available for viewing as the charger executes the selected program. Use the < DEC. or INC. > buttons to scroll through this information.

```
NiMH 0.1A 5.21V
D>C 015:42 00026
```

Real-time status: battery type, charge current, battery voltage, process, elapsed time and charged capacity

```
NiMH Sensitivity
D.Peak 4mV/Cell
```

Delta Peak Sensitivity

```
Capacity Cut-Off
ON 5000mAh
```

Capacity Cut-Off settings

```
SAFETY TIMER
ON 120Min
```

Safety Timer setting

```
Temp Cut-Off
80C
```

Temperature Cut-Off settings

```
Ext. Temp 0C
Int. Temp 36C
```

Internal and External* Temperatures

*External temperature requires optional temperature probe part no. 44159

```
IN Power Voltage
18.88V
```

Input Power Voltage.

```
TEND: FINISH 1
5.92V 00800mAh
```

Once the charger has finished the process, it will chime and display the end voltage and capacity.

Pb (Lead-Acid)

This program is only suitable for charging Pb (lead-acid) batteries with nominal voltages of 2 to 24V. A Pb (lead-acid) battery is significantly different from NiCd/NiMH batteries. Pb batteries can only deliver current lower in comparison to their capacity. The same restriction applies to the charging process. Consequently, the optimum charge current can only be 1/10 of the capacity. A Pb battery cannot be used for fast charging. Please follow the instructions provided by the battery manufacturer.

Pb (Lead-Acid) Battery Operations

The X2-700 offers the following Pb charge modes: Charge and Discharge.



BEFORE SELECTING A CHARGE MODE, IT IS CRITICAL THAT YOU SELECT THE CORRECT TYPE OF BATTERY TO BE CHARGED. FAILURE TO DO SO CAN RESULT IN DAMAGE TO THE BATTERY.

Selecting the Battery Type: After you power on the X2-700, BATT/PROG button once to go to the "PROGRAM SELECT" screen. Use the INC. > button to advance to the "Pb BATT" program. Once you have selected your battery type, press the ENTER button to continue to the charge mode selection screen.

Selecting the Charge Mode: Use the < DEC. or INC. > buttons to choose either the charge or discharge mode.

Setting the Charge/Discharge Current: Once you have selected the mode you wish to use, press the ENTER/START button and the current value will begin flashing. Use the < DEC. or INC. > buttons to set the Charge/Discharge current based on the battery manufacturer's recommendations. Once you have set the Charge/Discharge current, press ENTER/START to move to the battery voltage setting.

Pb CHARGE
0.7A 12.0V(CSP)

Setting the Voltage: The voltage indicator count will be flashing. Use the < DEC. or INC. > buttons to adjust the value to the desired voltage. Press ENTER to confirm. The voltage and cell count should match the values listed on the battery label.



BEFORE YOU BEGIN CHARGING OR DISCHARGING YOUR BATTERY, MAKE SURE YOU HAVE READ AND UNDERSTAND ALL OF THE WARNINGS AND SAFETY INFORMATION CONTAINED ON PAGES 4-7.

Pb (Lead-Acid) Battery Operations (cont.)

Program Start: You are now ready to execute the selected program. Press and hold the ENTER/START button until you see “BATTERY CHECK WAIT...” followed by the “CONFIRM/CANCEL” screen. The X2-700 is now executing the chosen program. When the operation is completed the X2-700 will chime.

Information Displayed During the Process: A variety of information is available for viewing as the charger executes the selected program. Use the < DEC. or INC. > buttons to scroll through this information.

Pb-6 0.4A 14.70V
DSC 003:10 00029

Real-time status: battery type, charge current, battery voltage, process, elapsed time and charged capacity

Capacity Cut-Off
ON 5000mAh

Capacity Cut-Off settings

SAFETY TIMER
ON 120Min

Safety Timer setting

Temp Cut-Off
80C

Temperature Cut-Off settings

Ext. Temp 0C
Int. Temp 38C

Internal and External* Temperatures

*External temperature requires optional temperature probe part no. 44159

IN Power Voltage
18.88V

Input Power Voltage

END: FINISH J
13.8V 01200mAh

Once the charger has finished the process, it will chime and display the end voltage and capacity.

Save/Load Data Programs

The Save Data and Load Data programs make it easy to store and load charge and discharge profiles for up to 10 batteries per channel. Data can be saved for each battery type and each charge mode available with the X2-700. This allows you to recall data for each battery when charging or discharging without having to set up the program over again. You can also edit settings for each saved battery.

Save Data Program



PROGRAM SELECT
BATT MEMORY

From the program select screen, use the ◀ DEC. or INC. ▶ buttons to scroll to the “BATT MEMORY” program. Press the ENTER button to enter the program.



[BATT MEMORY 11
ENTER SET-▶

When you enter the program, the profile number will begin flashing. Use the ◀ DEC. or INC. ▶ buttons to choose which profile (1-10) you wish to program or edit.



BATT TYPE
LiPo

Press the ENTER button twice and the battery type will begin flashing. Use the ◀ DEC. or INC. ▶ buttons to choose a battery type. Press ENTER to confirm.



BATT VOLTS
11.1VC 3S

Press the INC > button to advance to the voltage display. Press ENTER and the voltage rate value will begin flashing. Use the ◀ DEC. or INC. ▶ buttons to set the voltage rate. Press ENTER to confirm. The set voltage should match the voltage on the battery label.



CHARGE CURRENT
2.2A

Press the INC > button to advance to the charge current display. Press ENTER and the charge current rate begins flashing. Use the ◀ DEC. or INC. ▶ buttons to set the current rate. Press ENTER to confirm. The set charge current rate should match the recommendations of the battery manufacturer.



DSCH CURRENT
2.2A

Press the INC > button to advance to the discharge current display. Press ENTER and the current rate begins flashing. Use the ◀ DEC. or INC. ▶ buttons to set the discharge current rate. Press ENTER to confirm. The set discharge current rate should match the recommendations of the battery manufacturer.

Save Data Program (cont.)

DSCH VOLTAGE
3.2V/CELL

Press the INC > button to advance to the discharge voltage screen. This is where you will set the per cell end voltage when discharging your battery. Press ENTER and the voltage value begins flashing. Use the < DEC. or INC. > buttons to set the discharge current rate. Press ENTER to confirm.

TVC=YOUR RISK
4.2V

Press the INC > button to advance to the TVC (terminal voltage control) screen. This is where you will set the per cell maximum charge voltage. Press ENTER and the voltage value begins flashing. Use the < DEC. or INC. > buttons to set the TVC rate. Press ENTER to confirm.



THIS FUNCTION IS FOR ADVANCED USERS WHO UNDERSTAND THE CAUSE AND EFFECT OF CHANGING THIS VALUE. IT IS RECOMMENDED THAT YOU NEVER CHANGE THIS VALUE

TEMPERATURE
CUT-OFF 50C

Press the INC > button to advance to the temperature cut-off screen. When used with the optional temperature probe, you can set a cut-off point where the process will end. This can help avoid damage to your battery. Press ENTER and the temperature value will begin flashing. Use the < DEC. or INC. > buttons to set the cut-off temperature. Press ENTER to confirm.

SAVE PROGRAM
ENTER

Press the INC > button to advance to the save program screen. Press ENTER and the program will save to the selected memory.

SAVE PROGRAM
SAVE . . .

Load Data Program

[BATT MEMORY 1]
LiPo 11.1UC3S)

[BATT MEMORY 1]
C: 2.2A D2.2A

ENTER CHARGE
LOAD . . .

From the program select screen, use the < DEC. or INC. > buttons to scroll to the "BATT MEMORY" program. Press ENTER and the memory number will begin flashing. Use the < DEC. or INC. > buttons to scroll to the memory you wish to load. When you've come to the one you would like to use, press and hold the ENTER button until you see the load screen.

Synchronous Mode

Synchronous mode allows the user to charge two identical batteries using the same settings. In synchronous mode, Channel 1 is the master and Channel 2 is the slave.

PROGRAM SELECT
SYSTEM SET->

Synchron Enable?
ON

On Channel 1 from the program select screen, use the <DEC. or INC. > buttons to scroll to the "SYSTEM SET->" program. Press the ENTER button to enter the program. Now press the < DEC. button once to get to the "Synchron Enable?" screen. Press ENTER to activate the selection. Use the INC. > button to select either on or off. Press enter to confirm.



Note

In synchronous mode, the controls on Channel 2 are disabled. Additionally, several features are unavailable. In the event the battery check process on Channel 1 fails, both channels will stop the process.

Advanced System Settings

The system is set to its factory default parameters when powered on for the first time. Users have the ability to change several parameters to fine tune the charger to their particular use. Caution should be exercised when changing these parameters as the user could set some that will result in undesired operation or result in compromised safety.

PROGRAM SELECT
SYSTEM SET->

Use the <DEC. or INC. > buttons to scroll to the "SYSTEM SET->" program. Press the ENTER button to enter the program. Use the <DEC. or INC. > to scroll through the settings. Press enter and the adjustable parameter will begin flashing. To change a parameter value, use the <DEC. or INC. > buttons. The value will be stored by pressing START/ENTER once.

The following system settings are adjustable in the X2-700 Charger:

REST TIME
CHG<DCHG 10Min

Rest Time: This is the setting that allows the battery to rest or cool down during the charge/discharge process of battery cycling. This parameter's default is 10 minutes and it is adjustable from 1-60 minutes.

Advanced System Settings (cont.)

Safety Timer
ON 120min

Safety Timer: When you start a charge process, the integral safety timer automatically starts running at the same time. This is programmed to prevent an overcharge of the battery if it proves to be faulty, or if the termination circuit cannot detect that the battery is full. The value for the safety timer should be generous enough to allow a full charge of the battery. The default setting is ON for 120 minutes. The parameters are either off or on with an adjustable time of 1-720 minutes.

Capacity Cut-off
ON 5000mAh

Capacity Cut-off: This program provides a maximum capacity protection function. If the Delta-peak voltage cannot be detected or the Safety Timer times out, the charge process will stop automatically when the battery reaches the user-set maximum charge capacity to prevent accidental overcharging. The default setting is ON at 5000mAh. The parameters are either off or on with an adjustable time of 100-50000mAh.

Key Beep
Buzzer ON ON

Key Beep and Buzzer: A beep sounds to confirm the user's operation each time a button is pressed. The buzzer or melody sounds at various times during an operation to confirm a different mode change or end of process. These functions can be switched on or off.

Ext. Temp 0C
Int. Temp 37C

Temperature: Displays the external and internal temperatures. External temperature is only displayed when used with the optional external temperature probe.

Max Power Set
700W

Max Power Set: This setting adjusts the maximum out-put wattage. This can be used to limit the amount of power a channel will use when relying on a power source lower than what's recommended.

LOAD FACTORY SET
ENTER

Load Factory Setting: Press ENTER to restore the charger to its original factory settings.

VERSION
HW: 1.00 FW: 1.01

Hardware and Firmware Versions: Displays the current hardware and firmware versions.

Power Source?
>Battery

HPower Source: Switch between DC power supply or battery power source.

Battery Meter

You can use the battery meter function to check your battery's total voltage, the highest voltage, the lowest voltage, and the voltage of each cell. Simply connect the battery to the charger via the main battery lead to the battery socket and the balance wires to the balance socket as shown on page 12.

PROGRAM SELECT
LI BATT METER

From the PROGRAM SELECT menu use the ◀ DEC. or INC. ▶ buttons to scroll to the LI BATT METER program. Press the ENTER button to enter the program.

4.09 4.09V 4.09V
0.00 0.00V 0.00V

The first screen indicates each cell's voltage.

MAIN 12.81V
H 4.200 L 4.188

Press the ◀ DEC. or INC. ▶ buttons to view the pack's total voltage and the cell with the highest and lowest voltage.

Battery Resistance Meter

The X2-700 has the ability to check your battery's total internal resistance, highest total resistance, lowest total resistance and the resistance of each cell. Simply connect the battery to the charger via the main battery lead to battery socket and the balance wires to the balance socket as shown on page 12.

PROGRAM SELECT
BATT RESISTANCE

From the PROGRAM SELECT menu, use the ◀ DEC. or INC. ▶ buttons to scroll to the BATT RESISTANCE program. Press the ENTER button to enter the program.

012 005 005 mΩ
006 mΩ

The first screen indicates each cell's internal resistance.

TOTAL: mΩ
H: 12mΩ L: 5mΩ

Press the + or — buttons to view the pack's total voltage and the cell with the highest and lowest internal resistance.

Warnings and Error Messages

REVERSE POLARITY

The battery/charger connections (red/black) are reversed.

CONNECTION BREAK

The battery connection has been disconnected.

CONNECT ERROR
CHECK MAIN PORT

The connection is incorrect and should be checked.

BALANCE CONNECT
ERROR

The balance connection is incorrect and should be checked.

DC IN TOO LOW

The input voltage is too high or too low. The X2-700 can draw power from a 11-30V DC power source.

DC IN TOO HIGH

CELL ERROR
LOW VOLTAGE

Voltage of one cell in the battery pack is too low.

CELL ERROR
HIGH VOLTAGE

Voltage of one cell in the battery pack is too high.

CELL ERROR
VOLTAGE INVALID

Voltage of one cell in the battery pack is invalid.

CELL NUMBER
INCORRECT

The cell number is incorrect.

INT. TEMP TOO HI

The internal temperature of the unit is too high.

EXT. TEMP TOO HI

The external temperature of the battery is too high.

OVER CHARGE
CAPACITY LIMIT

The battery capacity is more than the maximum capacity set by the user.

OVER TIME LIMIT

The charging time is longer than the maximum charging time set by the user.

BATTERY WAS FULL

In balance mode, the battery voltage is higher than the maximum voltage set by the user.

Using the Charge Master Software

The free “Charge Master” software gives you unparalleled ability to operate the charger through your computer. You can monitor pack voltage, cell voltage, and other data during charging, view the charge data in real-time graphs, or control charging and firmware updates from the “Charge Master.”

In order to connect the charger to a computer and enjoy the benefits of the “Charge Master” program, you will need a USB cable which is not included in this package. The cable must have an “A” plug on one end and a “micro-B” plug on the other to connect to the charger directly.

You can control, monitor, operate, and upgrade two channels with one computer. The “Charge Master” is available for download at www.hitecrd.com.

Recommended Accessories



HITEC 50A SWITCHING POWER SUPPLY
ePowerBox 50A

Commonly Used Terms

A, mA: Unit of measurement relating to a charge or discharge current. $1000 \text{ mA} = 1 \text{ A}$ (A = Ampere, mA = Milliampere).

Ah, mAh: Unit of measurement for the capacity of a battery (Amperes x Time Unit; h = hour). If a pack is charged for one hour at a current of 2A, it has been fed 2Ah of energy. It receives the same quantity of charge (2Ah) if it is charged for 4 hours at 0.5A, or 15 minutes (=1/4 hour) at 8A.

'C' - Rating: Capacity is also referred to as the 'C' rating. A battery's '1C' current is the same number as the battery's rated capacity number, but noted in mA or amps. A 600mAh battery has a 1C current value of 600mA, and a 3C current value of (3 x 600mA) 1800mA or 1.8A. The 1C current value for a 3200mAh battery would be 3200mA (3.2A).

Final Charge Voltage: The voltage at which the battery's charge limit (capacity limit) is reached after which the charge process switches from a high current to a low maintenance rate (trickle charge). From this point on, any further high current charging would cause overheating and eventual terminal damage to the pack.

Final Discharge Voltage: The voltage at which the battery's discharge limit is reached. The chemical composition of the batteries determines the level of this voltage. Below this voltage, the battery enters deep discharge zone. Individual cells within the pack may become reverse polarized under these conditions, resulting in permanent damage.

Nominal Voltage (V): The nominal voltage of the battery pack can be determined as follows:

- **NiCd or NiMH:** Multiply the total number of cells in the pack by 1.2. An 8-cell pack will have a nominal voltage of 9.6 volts (8×1.2).
- **LiPo:** Multiply the total number of cells in the pack by 3.7. A 3-cell LiPo wired in series will have a nominal voltage of 11.1 volts (3×3.7).
- **Lilo:** Multiply the total number of cells in the pack by 3.6. A 2-cell Lilo wired in a series will have a nominal voltage of 7.2 volts (2×3.6).
- **LiFe:** Multiply the total number of cells in the pack by 3.3. A 4-cell LiFe wired in a series will have a nominal voltage of 13.2 volts. (4×3.3).
- **LiHV:** Multiply the total number of cells in the pack by 3.7. A 4-cell LiHV wired in a series will have a nominal voltage of 14.8 volts. (4×3.7).

LIABILITY EXCLUSION

This charger is designed and approved exclusively for use with the types of batteries stated in this Instruction Manual. Hitec RCD, USA accepts no liability of any kind if the charger is used for any purpose other than that stated. We are unable to ensure that you follow the instructions supplied with the charger, and we have no control over the methods you employ for using, operating and maintaining the device. For this reason, we are obliged to deny all liability for loss, damage or costs which are incurred due to any misuse or operation of our products. Unless otherwise prescribed by law, our obligation to pay compensation, regardless of the legal argument employed, is limited to the invoice value of Hitec RCD, USA products which were immediately and directly involved in the event in which the damage occurred.

ONE YEAR LIMITED WARRANTY

For a period of one year from the date of purchase, HITEC RCD USA, INC. shall REPAIR OR REPLACE, at our option, defective equipment covered by this warranty. Otherwise, the purchaser and/or consumer is responsible for any charges for the repair or replacement of the charger. This warranty does not cover cosmetic damages and damages due to acts of God, accident, misuse, abuse, negligence, improper installation, or damages caused by alterations by unauthorized persons or entities. This warranty only applies to the original purchaser of this product and for products purchased and used in the United States of America, Canada and Mexico. Plastic cases are not covered by this warranty.

THIS WARRANTY IS IN LIEU OF ANY AND ALL OTHER WARRANTIES, WHETHER FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND WHETHER EXPRESS OR IMPLIED. REPAIR OR REPLACEMENT AS PROVIDED UNDER THIS WARRANTY IS THE EXCLUSIVE REMEDY. HITEC RCD, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY RELATING TO THIS PRODUCT, EXCEPT TO THE EXTENT PROHIBITED BY APPLICABLE LAW. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON THIS PRODUCT IS LIMITED TO THE DURATION OF THIS WARRANTY, REPAIR AND SERVICE.

Warranty and Service (cont.)

SERVICE AND REPAIR INFORMATION

To have your Hitec charger serviced:

1. Visit the Hitec website at **www.hitecrd.com** and download the service request form (under Support section).
2. Fill out the service request form completely and include a copy of your original receipt showing the purchase date.
3. Package your product in its original packaging or use a suspension-type packaging (foam peanuts or crumpled newspaper). Hitec RCD shall not be responsible for goods damaged in transit.
4. Ship prepaid (COD or postage-due returns will not be accepted) via a traceable common courier (UPS, insured parcel post, FedEx, etc.) to:

Hitec RCD USA, Inc., Customer Service Center, 12115 Paine St., Poway CA 92064

Disposal and Proposition 65 Warning



This symbol indicates that when this type of electronic device reaches the end of its service life, it cannot be disposed of with normal household waste and must be recycled. To find a recycling center near you, refer to the internet or your local phone directory for electronic waste recycling centers.

STATE OF CALIFORNIA PROPOSITION 65 WARNING:

This product contains chemicals known to the State of California to cause cancer. Use caution when handling this product and avoid exposure to any electronic components or internal assemblies.

Regulatory Compliance

Hitec's X2-700 satisfies all relevant and mandatory CE directives and complies with FCC Part 15 Subpart B: 2010.

www.hitecrd.com

MADE IN CHINA

