

# ONYX<sup>TM</sup> 225

## ADVANCED BALANCING AC/DC CHARGER INSTRUCTION MANUAL



The Onyx 225 charger is excellent for a large range of charging and balancing needs for electric vehicles, planes, boats and radio applications. Charge currents up to 6A and output voltages capable of charging up to 15 NiCd or NiMH or 6S LiPo, Lilon or LiFe cells make it the perfect charger for all charging needs. A built-in balancer ensures all cells are balanced and optimized for lithium packs, including LiFe cells such as LiFeSource brand packs. A built-in jack is perfect for charging radio batteries. AC/DC flexibility with detachable input cords, reversed backlit LCD, simple controls and menus make it super-easy to use anytime, indoors or out.



**It is strongly recommended to completely read this manual before use! Damage resulting from misuse or modification will void your warranty.**



**WARNING!! Charging lithium-based rechargeable batteries poses a risk of FIRE! NEVER treat lithium-based batteries in the same manner as other battery types. NEVER leave lithium batteries unattended while being charged! ALWAYS charge lithium-based batteries in a fireproof location! Failure to follow all care and handling instructions contained in this manual could result in quick, severe, permanent damage to the batteries and all surroundings!! Follow all safety precautions when using such batteries, as listed on page 3 of this manual!**

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## SPECIFICATIONS

AC input power:	110V 60Hz
DC input power:	11– 15V DC
Output power:	60W
Battery types:	1– 15 NiCd or NiMH cells(1.2– 18.0V) 1– 6 LiPo, Lilon, or LiFe cells (3.7– 22.2V)
Battery capacity range:	100– 60,000mAh
Fast charge current:	0.1– 6.0A linear, adjustable
Fast charge termination:	peak detection for NiCd/MH, cc/cv for lithiums
Fast charge safety timer:	off – 300 minutes
NiCd/NiMH peak sensitivity:	3– 20mV, adjustable
NiCd/NiMH trickle charge current:	auto (1/20 fast charge setting), or manual adjust (1-250mA)
Lithium balancing accuracy:	5mV per cell
Lithium balancing jack:	JST XH
Included balancing board:	ElectriFly® Adapter Board
Lithium max. node current:	300mA
Controls:	4 push buttons
Battery memories:	10
Display type:	2 × 16 reversed matrix LCD with backlight
Setup tones:	on/off
Audible melodies:	5
Included output adapters:	banana plugs to Standard banana plugs to Star Plug
Protective devices:	solid-state reverse polarity and current overload
Case size:	6.3 × 5.3 × 1.7" (160 × 134 × 43mm)
Weight:	11.1 oz. (314g w/o cords connected)

## SPECIAL FEATURES

- Detachable AC and DC input power cords.
- Built-in balancing for 1– 6 LiPo, Lilon, or LiFe (LiFeSource) cells.
- Up to 6 amps charge current.
- Includes a built-in radio battery jack.
- Includes Banana to Star Plug and Banana to standard charging adapters.

## STANDARD FEATURES

- A tiny built-in switching AC power supply is great for portability and cramped pit areas, yet can still deliver up to 6 amps charge current!
- Fully adjustable charge currents and multi-chemistry adaptability for a wide range of applications.
- A precise cc/cv charge algorithm carefully charges lithium-polymer, lithium-ion, or lithium-ferrite-phosphate (LiFeSource) batteries fully and safely!
- A peak detection system with automatic trickle charge fills NiCd and NiMH packs completely, for optimum battery voltage and run-time. 3-20mV adjustable peak detection helps to customize charger-to-battery performance.
- A reversed LCD with backlight – previously only available in expensive racing chargers – is great for easy viewing in any condition. Shows input, output, peak and individual cell voltages; charge current, capacity and time, and cell chemistry.
- Push-button controls and audible tones make for easy setup and control.
- A built-in fan helps to keep all electronics cool, for long-lasting performance.
- Built-in banana jacks allow for connection with most common charge adapters.
- A detachable DC power lead with alligator clips easily connects to many 12V DC power sources.
- Solid-state reverse polarity and current overload protection ensure long, trouble-free operation.

## IMPORTANT PRECAUTIONS



- **Disconnect the battery and remove input power from the charger immediately if the charger or battery becomes hot!!**
- Do not attempt to charge incompatible types of rechargeable batteries as permanent damage to the battery and charger could result.
- Do not use automotive type battery chargers to power the charger.
- Do not allow water, moisture or foreign objects into the charger.
- Do not block the fan or air intake holes, which could cause the charger to overheat.
- Do not attempt to use batteries with more cells or total voltage than listed in the specifications.
- Do not overcharge batteries as permanent damage could result. Do not use a charge current rate which exceeds the safe level of the battery.
- Do not leave the charger unattended while in use.
- Do not place the charger or battery on flammable surfaces or near combustible materials while in use, such as a carpet, cluttered workbench, paper, plastic, vinyl, leather, and wood, inside an R/C model or full sized automobile!
- Do not connect the charger to AC and DC inputs at the same time.
- Allow the charger and battery to cool down between charges.
- Always disconnect the charger from the power source when not in use.

## GLOSSARY OF TERMS

**Amps (A):** The unit of measure for charge current.

**Milli-amps (mA):** A unit of measure for current, being amps (A) multiplied by 1000 and listed as “mA”. So 2.5A is the same as 2500mA ( $2.5 \times 1000$ ). Or, to convert mA to amps, divide the mA number by 1000. So 25mA is the same as 0.025A (25 divided by 1000).

**Capacity and milli-amp hours (mAh):** The amount of energy a battery can store is called its **capacity**, which is defined as how much current a battery can supply constantly over one hour of time. Most hobby batteries are rated for capacity in “mAh” or **milli-amp hours**. A 650mAh battery can deliver 650mA of current for one hour ( $650\text{mA} \times 1\text{hr} = 650\text{mAh}$ ). A 3200mAh battery can deliver 3200mA (3.2A) of current for one hour ( $3200\text{mA} \times 1\text{hr} = 3200\text{mAh}$ ), etc.

**“C” rating:** Capacity is also referred to as the “C” rating. Some battery suppliers recommend charge currents based on the battery’s “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 ( $3 \times 600\text{mA}$ ) 1800mA or 1.8A. The 1C current value for a 3200mAh battery would be 3200mA (3.2A), etc.

## INPUT POWER

**AC Input:** For indoor use, this charger includes a built-in switching AC power supply that delivers power by connecting the AC power cord to a common 110V AC outlet.

**DC Input:** This charger can be powered by a portable 12V DC power source. Located on the rear of the charger is a jack for the connection of the DC power cord. The DC input cord has a keyed plug so reverse polarity can be avoided. Once connected to the charger, connect the DC power cord to the 12V power source. Always match polarities (red lead to red “+” terminal, black lead to black “-” terminal). To utilize the charger’s **absolute maximum** power capabilities the DC power source must be capable of delivering at least 9 amps while maintaining 12 volts DC.

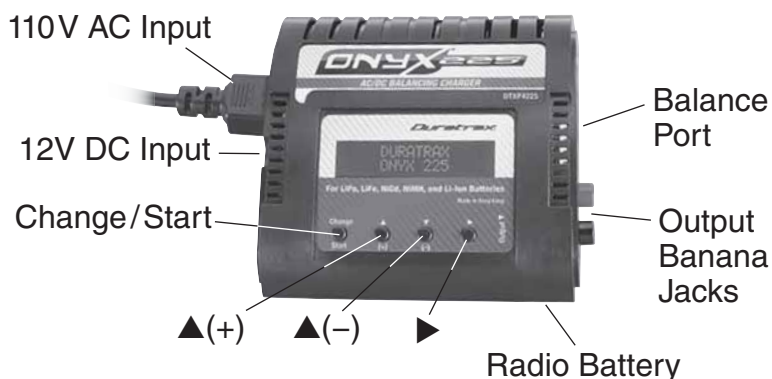


**WARNING! Never accidentally short together the positive (+) and negative (-) input connections when connected to 12V DC power. Failure to do so could result in permanent damage to the power source and the charger.**

This charger is rated for a maximum output power of 60 watts. Depending on certain conditions (if charge current is set to maximum, the maximum number of cells are connected to the output, and input voltage is low), the actual current delivered to the battery might be slightly less than the setting. This is normal.

The charger will be on at all times when connected to input power. Disconnect the charger from input power when not in use.

## CONTROLS AND CONNECTIONS



**CHANGE / START** (left): For starting a charge, or to change settings.

▲(+): For moving up through menus, or increasing the values of settings on-screen.

▼(-): For moving down through menus, or decreasing the values of settings on-screen.

▶: For moving to the right in the menus.

**OUTPUT BANANA JACKS:** For connection to a wide variety of charge adapters. Adapters with: a standard plug and Star Plug are

included. For small electric vehicle batteries, find a charge lead that best matches the type of battery you are charging. Look for these and other charge adapters at your local retailer:

ITEM NUMBER	CHARGE LEAD DESCRIPTION
DTXC2210	Adapter – Standard to Vendetta, MiniQuake, RS4 Battery
DTXC2220	Charge lead – banana plugs to standard
DTXC2222	Charge lead – banana plugs to Traxxas®
DTXC2223	Charge lead – banana plugs to mini plug
DTXC2225	Balancing lead – banana to 4mm bullet adapter 2S LiPo
GPMM3105	Charge lead – banana plugs to BEC connector
GPMM3149	Charge lead – banana plugs to micro connector

Always connect the charge lead to the charger first. Then connect the battery to the charge lead. Always match polarities on the battery wires, charge leads and banana jacks - black connections to black (-), red connections to red (+).

**BALANCE PORT:** To connect an adapter for balancing of lithium batteries. See page 7–8.

**RADIO BATTERY:** To directly connect a receiver or transmitter battery for charging.

## DETERMINING BATTERY TYPE AND SPECIFICATIONS

**IMPORTANT: What is your battery's CHEMISTRY TYPE, RATED CAPACITY, AND RATED VOLTAGE?** To avoid causing permanent damage to your battery, carefully read your battery's label and/or instruction sheet or consult your battery supplier and determine:

1. **TYPE:** Is the battery a nickel-metal hydride (NiMH), nickel-cadmium (NiCd), lithium-polymer (LiPo), lithium-ion (Lilon), or lithium-ferrite-phosphate (LiFe, such as LiFeSource brand)?
2. **RATED CAPACITY:** The amount of charge energy the battery can store should be listed on the battery's label in "mAh" ("milli-amp hours").
3. **RATED VOLTAGE:** If not printed on the battery's label, consult your battery supplier or determine the proper pack voltage as follows (refer to the charts at right):
  - a. NiMH and NiCd: number of cells  $\times$  1.20.
  - b. LiPo batteries: number of cells  $\times$  3.70.
  - c. Lilon batteries: number of cells  $\times$  3.60.
  - d. LiFe batteries (LiFeSource): number of cells  $\times$  3.30.

### NiCd and NiMH Battery Pack Voltages

Number of Cells	Nominal Voltage
4 cells	4.8 V
5 cells	6.0 V
6 cells	7.2 V
7 cells	8.4 V
8 cells	9.6 V
9 cells	10.8 V
10 cells	12.0 V
11 cells	13.2V
12 cells	14.4V
13 cells	15.6V
14 cells	16.8V
15 cells	18.0V

### LiPo, Lilon and LiFe Pack Voltages

Number of Cells	Nominal Voltage		
	LiFe	Lilon	LiPo
1 cell	3.3 V	3.6 V	3.7 V
2 cells	6.6 V	7.2 V	7.4 V
3 cells	9.9 V	10.8 V	11.1 V
4 cells	13.2 V	14.4 V	14.8 V
5 cells	16.5V	18.0V	18.5V
6 cells	19.8V	21.6V	22.2V

## GETTING STARTED

1. Connect the charger to input power. “Duratrax Onyx 225” will be displayed on the LCD.
2. The “**CHARGE START**” screen will automatically follow after the Duratrax Onyx 225. The top line of this screen will show which of the ten memories is active (0–9). All settings for this memory will scroll across the bottom line of this screen. If these settings match your battery and needs, skip to the BATTERY CONNECTION section.
3. If the settings in the displayed memory do not match your battery or needs, refer to the chart below for the factory default settings for all memories. To select one of these memories, while in the START screen press the CHANGE button. The memory number will flash. Press + or – to select a different memory number. Press CHANGE to activate this memory. Skip to the BATTERY CONNECTION section.

<b>MEMORY NUMBER</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Battery Type</b>	LiPo	LiPo	LiPo	LiPo	LiPo	NiCd	NiMH	NiMH	NiMH	NiMH
<b>Cell Count</b>	2	2	2	3	3	6	6	6	7	7
<b>Capacity (mAh)</b>	4000	5000	5700	5000	6400	1800	3000	5000	3000	5000
<b>Current</b>	4.0A	5.0A	5.7A	5.0A	6.4A	1.8A	3.0A	5.0A	3.0A	5.0A
<b>Safety Time (minutes)</b>	120	120	120	120	120	90	90	90	90	90
<b>Delta Peak (mV/C)</b>	–	–	–	–	–	10	8	8	8	8
<b>Trickle Current (mA)</b>	–	–	–	–	–	200	250	250	250	250

4. If none of the memories have settings which meet your needs, proceed to the ADJUSTABLE SETTINGS section below to change settings manually.

## ADJUSTABLE SETTINGS

1. Select the memory (0 through 9) that you wish to modify.
2. Press ► to find the “BATT SETUP” screen.
3. Press ▼ to move down to the BAT.TYPE screen. Press CHANGE to cause the setting to flash, then press (+) or (–) to find the desired battery type. Press CHANGE to confirm the new setting.



**WARNING! NEVER set the BAT.TYPE screen to a type that does not match your battery! For example, accidentally charging a LiPo battery in the NiCd setting could result in an overcharge condition on the battery, which could result in an intense FIRE!**

4. Press ▼ to find the CELL screen, to set the number of cells / nominal rated voltage of the battery. The number of cells in the pack is shown on the top line, and the nominal rated voltage of the pack will show on the bottom line. Press CHANGE to cause the setting to flash, then press (+) or (–) to find the setting which matches your pack Press CHANGE again to confirm the new setting.



**WARNING! For LiPo and Lilon batteries, NEVER set the voltage to a value which is higher than the rated voltage printed on the battery! Attempting to charge such a battery to a voltage that is higher than its rating could result in an overcharge condition on the battery, which could result in a very intense FIRE!**

5. Press ▼ to find the CAPACITY screen. If the charger fails to detect full charge, this function can stop the charge process after a certain amount of energy (mAh) has been delivered to the battery. This protects the battery from accidental overcharge.



**WARNING!! For LiPo, Lilon, and LiFe cells, always set the value in this screen to the exact rated capacity of the battery (or as close as possible). Lithium battery types can EASILY BECOME DAMAGED if overcharged and possibly START A FIRE! NEVER set the number in this screen to a value higher than the capacity (mAh) value printed on the lithium battery.**

Setting this screen to 110–130% of a NiCd or NiMH battery’s rated “mAh” value is recommended. As shown in the quick reference chart on page 6, locate the rated capacity of your battery in the left column, then find your battery’s 110% or 130% capacity value to the right. Enter the desired capacity value into this screen.

Press CHANGE to cause the setting to flash, then press (+) or (–) to find the proper capacity value (as close as possible). Press CHANGE to confirm the new setting.

6. Press ▼ to find the fast charge CURRENT screen:
  - a. For **lithium** based batteries, the charger will automatically set the charge current to a value of 1C (based on the value entered in the CAPACITY screen described above). This can be overridden manually.

b. For **NiCd and NiMH** batteries, refer to the chart here for recommended currents, based on the size of your battery shown in the left column. NOTE: if applying a slow charge to the battery as shown in the chart at right, it will be necessary to set the S\_TIMER function to "off" (see below).

c. To change the setting, press CHANGE to cause the setting to flash, then press (+) or (-) to find the proper capacity value. Press CHANGE to confirm the new setting. Do not exceed the maximum rated charge current for the battery.

7. Press ▼ to find the S\_TIMER screen. This is a backup safety timer designed to automatically stop fast charge if the battery has not reached full charge in a reasonable amount of time. The charger will automatically calculate and set this time in minutes based on the values entered in the current and capacity screens above.

To manually adjust this value, press CHANGE to cause the setting to flash. Press (+) or (-) to adjust the value. Press CHANGE again to confirm the setting. Do not increase this value so far that the charger no longer offers overcharge protection.

8. Press ▼ to find the ▲ DELTA PEAK V screen (NiCd and NiMH batteries only). This "peak sensitivity" function determines how well the peak detection circuit will fill the battery. Settings of 8-10mV for NiCd batteries, and 3-7mV for NiMH batteries are recommended. Lower values usually result in more precise peak detection, but unstable input power sources could cause the charger to errantly stop peak charge too early. Larger values could cause the battery to generate a little extra heat during charge, and result in slightly less accurate peak charges.

9. Press ▼ to find the TRICKLE charge current screen. This is the amount of trickle charge current that will be applied only to NiCd or NiMH batteries after peak charge has ended. The charger will automatically set this value based on the fast charge current setting divided by 20. This setting can be manually changed if desired. Setting this to "0mA" effectively turns this feature off. For "A", "AA", "AAA" size Tx or Rx batteries, it is not recommended to set the trickle current to larger than 50mA. Trickle charge is never applied to lithium batteries.

Once you've customized a memory to match your battery, the charger will memorize these settings until changed again manually. For easy reference, record your settings for each memory in the blank chart below.

After settings have been adjusted, press ▲ repeatedly to find the BATT SETUP screen, or press ► to find the START screen.

<b>NiCd &amp; NiMH Only Max. Charge Capacity Chart</b>		
<b>Battery's Rated Capacity (mAh)</b>	<b>110% Setting</b>	<b>130% Setting</b>
700	800	900
1000	1100	1300
1100	1250	1450
1200	1350	1550
1500	1650	1950
1600	1750	2100
1700	1900	2200
1800	2000	2350
1900	2100	2450
2000	2200	2600
2100	2350	2750
2500	2750	3250
3000	3300	3900
3300	3650	4300
3600	3950	4700
3800	4200	4950
4200	4650	5450
4600	5050	6000
5000	5500	6500

<b>NiCd and NiMH Battery Charge Current Chart</b>				
<b>Battery's rated mAh</b>	<b>Slow Charge</b>		<b>1 Hour Charge current</b>	<b>Quick Charge current</b>
	<b>current</b>	<b>charge time</b>		
700	0.1A	9-10 hours	0.7A	1.0A
1000	0.1A	13-15 hours	1.0A	1.2A
1100	0.1A	14-16 hours	1.1A	1.3A
1200	0.1A	16-18 hours	1.2A	1.4A
1500	0.2A	9-11 hours	1.5A	3.0A
1600	0.2A	10-12 hours	1.6A	3.2A
1700	0.2A	11-13 hours	1.7A	3.4A
1800	0.2A	12-13 hours	1.8A	3.6A
1900	0.2A	12-14 hours	1.9A	3.8A
2000	0.2A	13-15 hours	2.0A	4.0A
2100	0.2A	14-16 hours	2.1A	4.2A
2500	0.3A	11-12 hours	2.5A	4.5A
3000	0.3A	13-15 hours	3.0A	5.0A
3300	0.3A	14-16 hours	3.3A	5.0A
3600	0.4A	11-13 hours	3.6A	5.0A
3800	0.4A	12-14 hours	3.8A	5.0A
4200	0.4A	14-16 hours	4.2A	5.0A
4600	0.4A	15-17 hours	4.6A	5.0A
5000	0.5A	13-15 hours	5.0A	5.0A

**Note:** Turn S\_TIMER "off" for slow charges.

**Blank Memory Chart**

<b>MEMORY NUMBER</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
<b>Battery type</b>										
<b>Cell count</b>										
<b>Capacity (mAh)</b>										
<b>Current</b>										
<b>Safety time (minutes)</b>										
<b>Delta peak (mV/C)</b>										
<b>Trickle current (mA)</b>										

## USER SETUP SCREENS

As shown in the programming flowchart, while in the START screen press ► twice to find the USER SETUP screen. Adjusting the charger's audible tones and melodies is done here.

1. Press ▼ to find the MELODY screen. To change, press CHANGE, and then (+) or (-) to select from 5 different tones, or turn off. Press CHANGE again to confirm.
2. Press ▼ to find the BEEP screen. To turn on or off the beeper, press CHANGE, then (+) or (-). When turned on, the beeper will sound anytime a button is pressed. Press CHANGE again to confirm.

## VIEW DATA SCREENS

While in the START screen press ► three times to find the VIEW DATA screens. The charger can display several types of input, output, and battery data in these screens, as follows:

1. Press ▼ to find the INPUT V screen. This is the DC voltage measured on the charger's input. Even if connected to an AC input, that voltage is converted to a DC voltage inside the charger and will be displayed in this screen.
2. The OUTPUT V screen shows the DC voltage measured on the charger's output.
3. The PEAK V screen shows the highest measured battery voltage during the last charge.
4. The CHG CAPACITY screen shows how much charge energy was delivered to the battery during the last charge.
5. The CHG TIME screen shows how many minutes the charger delivered a charge to the battery. This does not include any time that a trickle charge was delivered.
6. Press ► to return to the START screen.

## BATTERY CONNECTION

1. After determining which battery type is to be charged, what connector is being used and all appropriate programming is completed, the correct adapter will need to be installed prior to charging. If an adapter other than what is included is needed, please refer to the 'CONTROLS AND CONNECTIONS' section on page 4 for a list of adapters that are sold separately.
2. For **NiCd/NiMH**: Plug the adapter into the charger FIRST. Then connect the battery to the adapter ONLY after it has been connected to the charger. Proceed to the 'Starting Charge' section.
3. For **LiPo, Lilon OR LiFe**: Lithium batteries for R/C are commonly available in two different assembly/wiring configurations: wired for balancing, and non-balanced. It's important to know which configuration you have before proceeding. **Consult your battery supplier if you are unsure if your battery is wired for balancing, if it's not wired for balancing but has a built-in safety circuit, or neither.**

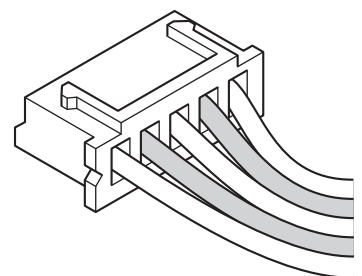


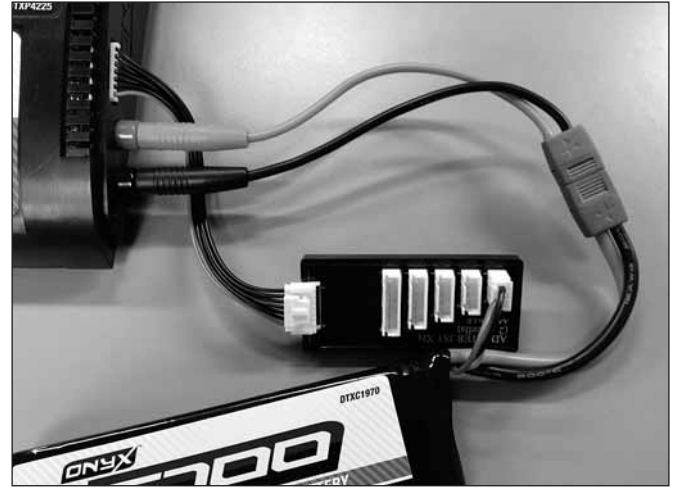
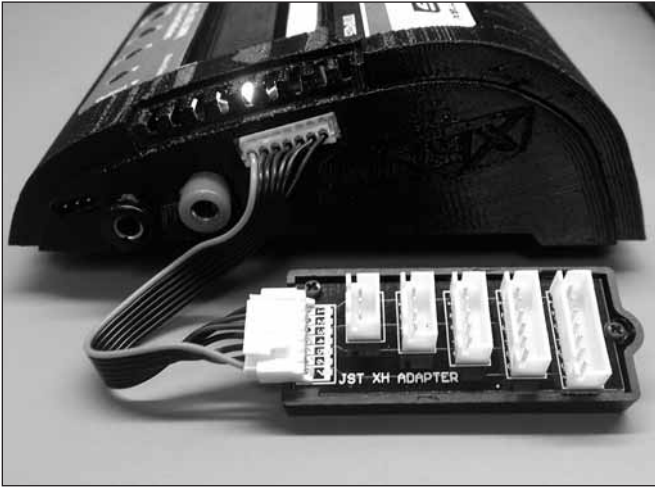
**WARNING! It is NOT recommended to charge a LiPo battery which is not wired for balancing, or which does not have a built-in protection circuit! Such types of LiPo batteries have NO means to protect the equipment or the user from damage that could result from an overcharge condition of any single cell in the pack.**

Packs wired for BALANCING have a unique connector which has more than two wires going to the pack itself (like shown at right.) Each wire is connected to an individual cell inside the pack, by which the charger monitors the condition of the individual cell and controls whether it should be charged. Such packs SHOULD be charged with a LiPo charger that is capable of balancing, such as the Onyx 225.

**NON-BALANCED** packs are wired so the charger can only detect the voltage of the entire pack (not individual cells), so there is only one charge lead. It's highly recommended to ONLY use such types of LiPo packs if they have a built-in charge safety circuit which prevents any single cell in the pack from being overcharged. Simply connect the battery's main power lead to the charger's banana jacks (note proper polarity).

Balancing Connector

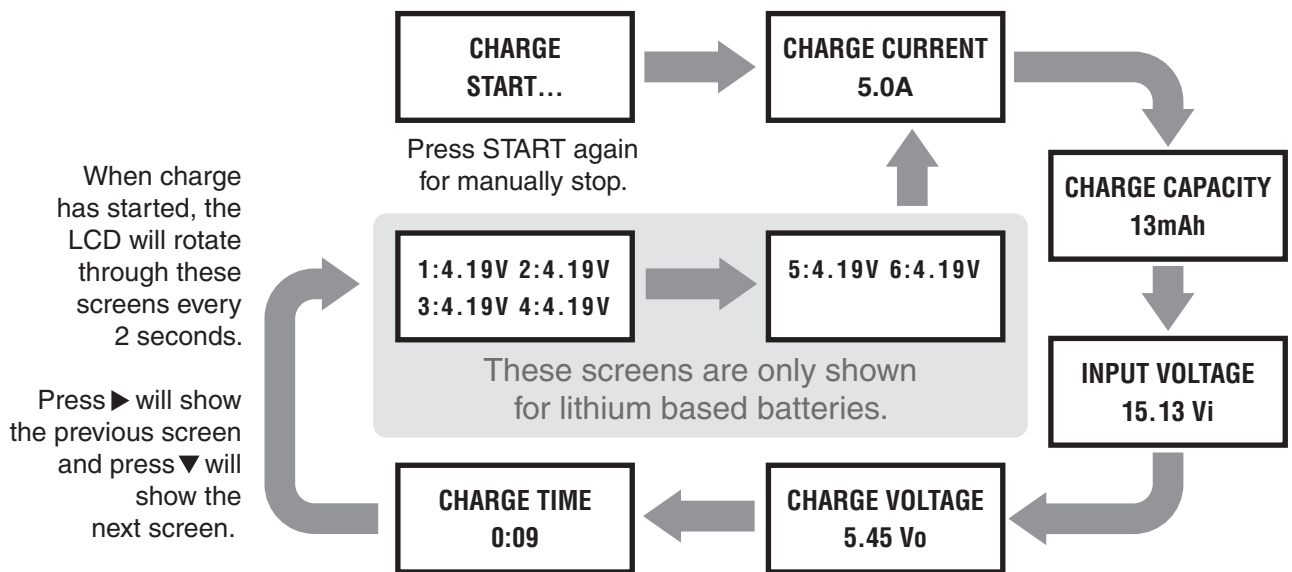




- To balance a LiPo battery during charge, connect the balance board adapter that matches your battery's balance connector to the charger's balancing jack (above left). The red wire will always be on the left. Then connect the battery's balance lead to the balancing board. Lastly, connect the battery's main power lead to the adapter connected to the charger's banana jacks (note proper polarity, shown above right).

## STARTING CHARGE

- Press ► until the CHARGE START screen is found. This screen must be showing in order to start a charge.
- Press and hold START for 3 seconds to start charging the battery. The charger will then display several types of information during the charge process like shown below:



For **NiCd and NiMH batteries**, a linear charge current will be delivered to the battery. The peak detection method will be used to accurately look for the highest battery voltage during charge. Once this is detected, the charger will automatically stop fast charge and go to trickle charge mode.

**CAUTION:** Make sure the charge current setting is safe for your battery to prevent overheating of the cells. “AAA”, “AA”, “A”, and “2/3A” size batteries generate heat more quickly than large sub-C batteries. Most radio batteries should NOT be charged at currents greater than 1.5A. Failure to follow this recommendation could permanently damage your battery.

Lithium batteries are charged using the “constant current/constant voltage” method (cc/cv). Constant current is delivered during the first part of fast charge. When the battery reaches a pre-set voltage, constant current is no longer delivered, and a constant voltage is applied to the battery. As the battery's voltage becomes equalized to the voltage on the charger's output, charge current will steadily begin to drop. This is normal. When current reaches an approximate value of 1/10C, the charge process will end completely.

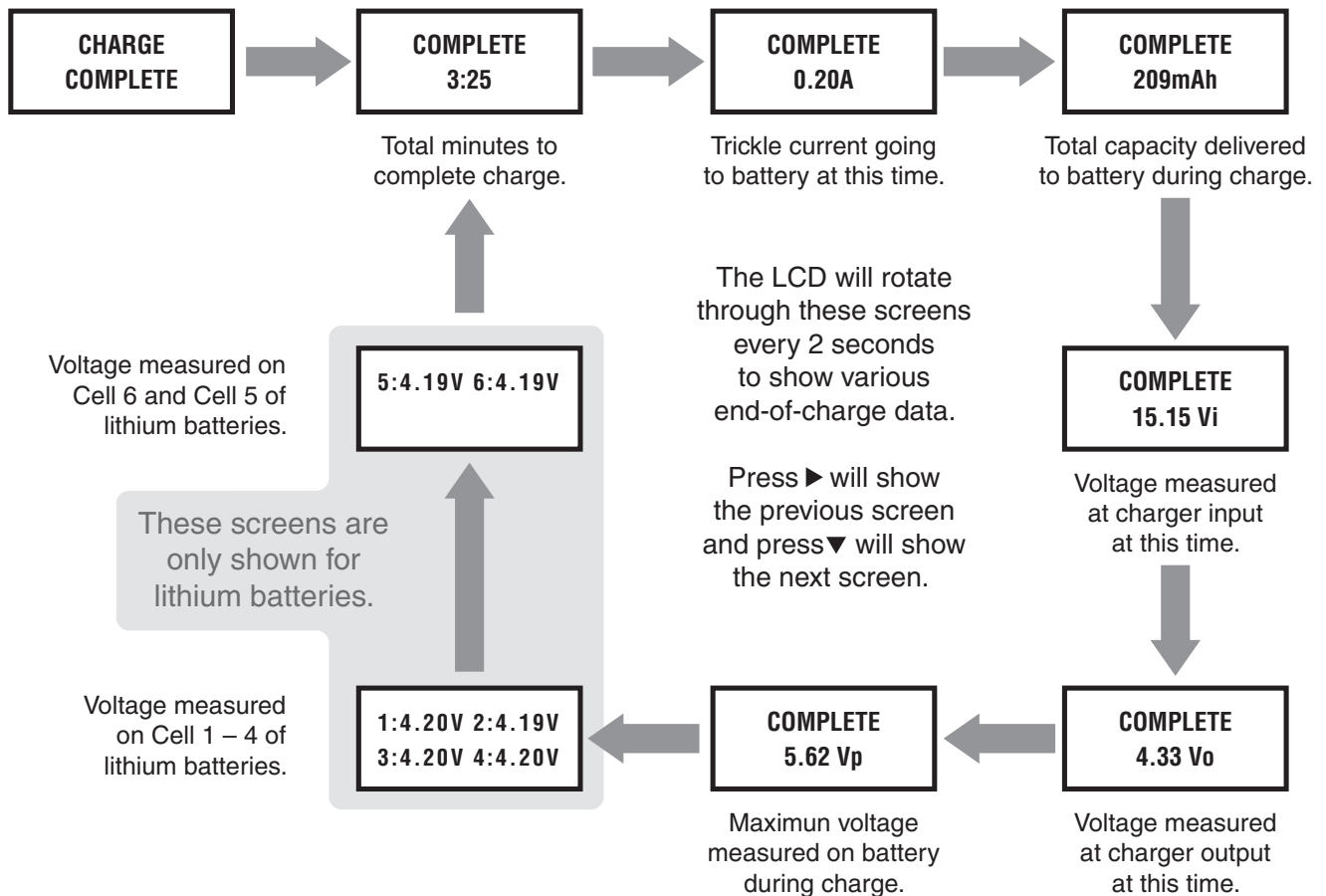
When the “CHARGE VOLTAGE” screen shows the voltage of the battery during charge, the loading affect of the charger will skew the voltage reading of the battery, which is normal. A higher current will skew the reading more than a smaller current. Voltage readings taken when charge is finished will more accurately show the true voltage of the battery.

To manually stop a charge while in progress, either disconnect the battery from the charger or press START.



## CHARGE COMPLETE

When the charger has determined that the battery is full and fast charge ends, audible tones will sound for about 10 seconds and a new set of screens will show final results of the charge process like below:



For NiCd and NiMH batteries, the charger will automatically apply a trickle charge to the battery when peak charge ends, shown in amps “A” on-screen. A trickle current of 200mA will be displayed as “0.20A”. A trickle current of 50mA will be shown as “0.05A”, etc. The charger will remain in trickle charge mode until the battery is disconnected, or the START button is pressed.

Trickle charge will NOT be applied to lithium batteries. When fast charge ends, lithium batteries can be disconnected from the charger and are ready for use.

If the fast charge backup safety timer expires before the battery is fully charged, the display will show “TIMEOUT”. If this occurs, you might want to attempt to re-peak the battery by starting another charge. Refer to the Troubleshooting Guide for more details.

To exit the “CHARGE COMPLETE” screens, press **▶** to find the START screen. Then, pressing **▶** until the VIEW DATA screen is found will show all data relating to the last charge that was performed.

## CARE AND HANDLING OF NiMH BATTERIES

- Do not allow NiMH batteries to overheat! Disconnect overheated batteries from the charger immediately and allow to cool.
- Do not attempt to use the charger’s lithium functions with NiMH batteries.
- Store NiMH packs with some voltage remaining on the cells (refer to battery supplier).
- It is important to recharge NiMH batteries immediately prior to use, as they have a high self discharge rate.
- “AAA”, “AA” and “A” size radio batteries can safely be peak charged at currents up to 1.5C to 2C (battery capacity × 1.5 or 2.0). High charge currents can overheat batteries and thus reduce service life, especially for smaller size cells.

## CARE AND HANDLING OF LiPo, Lilon, and LiFe BATTERIES



**WARNING!! DO NOT** try to charge lithium-polymer (LiPo) or lithium-ion (Lilon) or lithium-ferrite-phosphate (LiFe) cells in the same way as other battery types! Always read the instructions that are included with your lithium batteries carefully before use. Failure to follow these care and handling instructions can quickly result in severe, permanent damage to the batteries and their surroundings and even start a FIRE!

- **ALWAYS** charge lithium batteries in a fireproof location, which could be a container made of metal or ceramic tile. Monitor the area with a smoke or fire alarm, and have a lithium approved fire extinguisher available at all times.
- **NEVER** attempt to extinguish a lithium fire with water or a non-lithium approved fire extinguisher!
- **ALWAYS** provide adequate ventilation around LiPo/Lilon/LiFe batteries during charge, while in use, and during storage.
- **NEVER** allow LiPo, Lilon or LiFe cells to overheat at any time, as they can and usually will become physically damaged and could possibly **EXPLODE** or catch **FIRE!!** If a battery becomes overheated (over 140°F, 60°C), disconnect it from the charger IMMEDIATELY!
- **NEVER** continue to charge LiPo, Lilon or LiFe batteries if the charger fails to recognize full charge. LiPo and LiFe cells which swell or emit smoke may be in an overcharge condition and should be disconnected from the charger immediately.
- **NEVER** set the charger's LiPo/Lilon/LiFe battery voltage settings to a voltage that is HIGHER than the nominal rating of the battery itself, as such cells cannot handle overcharging in any way.
- **NEVER** charge LiPo, Lilon or LiFe batteries at currents greater than the "1C" rating of the battery, or the maximum rated current as specified by the battery's manufacturer.
- **NEVER** allow LiPo, Lilon or LiFe cells to come in contact with moisture or water at any time.
- **NEVER** allow the internal electrolyte from LiPo, Lilon or LiFe batteries to get in the eyes or on skin – wash affected areas immediately if they come in contact with the electrolyte and contact your physician!
- **NEVER** attempt to use the charger's NiCd and NiMH functions for LiPo, Lilon or LiFe batteries.
- **ALWAYS** keep LiPo, Lilon or LiFe batteries away from children.

## BATTERY STORAGE

NiCd, NiMH, LiPo, Lilon and LiFe cell manufacturers recommend applying a 40% full charge to the batteries before being put in storage. To achieve this, setting the CAPACITY screen to a reduced level before charge will cause the charger to deliver only a partial charge to the battery.

Multiply your battery's rated capacity by 0.4 to find the proper value. Enter this value (or the closest available value) into this screen. For example: The 40% full charge capacity of a battery rated at 3200mAh would be  $(3200 \times 0.4)$  1280mAh. The closest possible setting for this would be 1300mAh. The 40% full charge capacity of a battery rated at 1600mAh would be  $(1600 \times 0.4)$  640mAh. The closest possible setting for this would be 650mAh.

Once this value is set, proceed to charge the battery. When charge ends, you should notice that only about 40% of the battery's rated capacity was delivered during charge by looking at the "COMPLETE" screen as explained above.

## COOLING FAN

A built-in cooling fan helps to keep the charger cool during operation. This will help extend the service life of the charger, and allow it to function more accurately and efficiently. The fan only functions while a battery is being charged. **CAUTION: Do not block the vent holes for the cooling fan on the left side of the charger. Failure to do so could cause the charger to overheat and possibly cause permanent damage.**

## ERROR MESSAGES AND TROUBLESHOOTING GUIDE

Several safety features are included in this charger to protect itself and the battery against certain unwanted conditions, as follows:

LCD MESSAGE	PROBLEM AND SOLUTION
“INPUT VOLTAGE LOW”	The input voltage is below 11.0V DC. Make sure the input voltage is above 11.0V DC.
“INPUT OVER 17V”	The input voltage is above 17.0V DC. Reduce input voltage below 17.0VDC.
“WRONG +/- OR OPEN”	A battery is not connected to the output when charge is initiated. Make sure a good connection exists between the battery and charger and re-try.  The battery is connected backwards to the charger's output when charge is initiated.
“OPEN CIRCUIT”	The battery has become disconnected during charge. Re-establish a good physical connection between the battery and charger, and re-start charge.
“CELL/TYPE ERROR”	Shows if the charger measures the voltage of the battery to be lower - or higher - than the number of cells set in the charger for the respective battery. Re-confirm the number of cells in your battery, and make sure the charger is set to the proper battery type. If the charger is set to the proper setting, it's possible that the battery might have been discharged too low and may no longer be suitable for use. Contact Hobby Services for further details. Confirm the settings of the charger match that of the battery specifications.  Confirm the settings of the charger match that of the battery specifications.

Other possible problems:

**PROBLEM** - LCD does not work when unit is connected to input power: Check power supply for improper power. Check input connections for solid contact. DC input power might be connected backwards...reverse input connection. Contact Hobby Services for further details.

**PROBLEM** - Battery voltage low after charge (below 1.2V per cell for NiCd/MH, 3.3V for LiFe, 3.6V for Lilon, or 3.7V for LiPo batteries): The capacity setting, charge current setting, and/or backup safety timer settings are too low. NiCd/MH peak sensitivity setting might be too low or too high...re-adjust setting. Perhaps poor quality charge leads...replace with new.

## 5-YEAR LIMITED WARRANTY - \*U.S.A. and CANADA ONLY

Duratrax warrants this product to be free from defects in materials and workmanship for a period of five (5) years from the date of purchase. During that period, Duratrax will, at its option, repair or replace without service charge any product deemed defective due to those causes. You will be required to provide proof of purchase (invoice or receipt). This warranty does not cover damage caused by abuse, misuse, alteration or accident. If there is damage stemming from these causes within the stated warranty period, Duratrax will, at its option, repair or replace it for a service charge not greater than 50% of its then current retail list price. Be sure to include your daytime telephone number in case we need to contact you about your repair. This warranty gives you specific rights. You may also have other rights, which vary from state to state.

For service on your Duratrax product, warranty or non-warranty, send it post-paid and insured to:

**HOBBY SERVICES**  
3002 N. Apollo Drive Suite 1  
Champaign, IL 61822

(217) 398-0007

[www.hobbyservices@hobbico.com](mailto:www.hobbyservices@hobbico.com)

\*For warranty and service information if purchased outside the USA or Canada, see the additional warranty information insert (if applicable) or ask your retailer for more information.



The logo for Duratrax features a stylized, italicized letter 'D' on the left, composed of several overlapping, curved lines that create a sense of motion and depth. To the right of this symbol, the word 'Duratrax' is written in a bold, italicized, sans-serif typeface. The entire logo is rendered in a light gray color.

*Duratrax*