



TRITON Jr.™

ElectriFly™

Computerized Charger, Discharger, Cycler

INSTRUCTIONS

Based on the industry-leading original Triton™ charger from ElectriFly™, Triton Jr. offers most of the key specifications and features, plus the same great performance, reliability, and accuracy at a more economical price. The range of currents and cell counts make Triton Jr. great for smaller sized electric flight applications. But it can still be used in various other applications, such as for Tx and Rx batteries, field batteries, and more. Triton Jr. can charge, discharge, and cycle multiple types of rechargeable batteries with high output power and a customized LCD with easy-to-see blue backlighting. A Quick Reference Guide, plus state-of-the art programming and flowcharts make Triton Jr. easy to understand and use. Its very small size and light weight make Triton Jr. extremely easy to transport.

IT'S STRONGLY RECOMMENDED TO READ THIS MANUAL ENTIRELY, AS IT CONTAINS IMPORTANT PROGRAMMING AND SAFETY AND HANDLING INFORMATION. DAMAGE RESULTING FROM MISUSE OR MODIFICATION OF THIS CHARGER WILL VOID YOUR WARRANTY.

QUICK REFERENCE GUIDE

1. Connect Triton Jr. to a 12V DC power source. Observe proper polarity. (See page 5 for details)
2. Find the programming flowcharts included in the package.
3. Press BATT TYPE to find the screen which matches your battery type: NiCd, NiMH, LiPo/Li-Ion, or Pb (lead-acid). (See page 7 for details)
4. Connect the proper charge adapter to the "Output" jacks. Connect the battery to the charge lead, observing proper polarity.
5. To charge:
 - A. NiCd and NiMH batteries see page 9.
 - B. LiPo and Li-Ion batteries see page 15.
 - C. Lead-acid (Pb) batteries see page 17.
6. To discharge:
 - A. NiCd and NiMH batteries see page 11.
 - B. LiPo and Li-Ion batteries see page 16.
 - C. Lead-acid (Pb) batteries see page 18.
7. For cycling of NiCd and NiMH batteries see page 12.

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SPECIFICATIONS

Input voltage:	11.0 – 15.0V DC	Discharge cutoff voltage:	NiCd/MH 0.1-16.8V (0.1 step) Pb fixed at 1.8V per cell LiPo/Ion fixed at 3.0V per cell
Input connections:	large alligator clips	Cycle count:	1 to 5 times
Number of outputs:	one	Controls	membrane touchpad, 4 buttons
Battery types, # cells:	1-14 NiCd/MH 1-4 LiPo or Li-Ion (3.6 or 3.7V cells) 2, 4, 6, 8, 10, 12V Pb (2V per cell)	Display type:	2x16 LCD w/custom blue backlight
Fast charge current:	0.1-5.0A NiCd/MH (0.1A step, 63W max.) 1C rating LiPo/Li-Ion (63W max.)	Displayed info:	input and output volts, peak volts, ave dsch volts, chg and dsch capacity, currents and time, errors
Fast charge termination:	“zero deltaV” peak detection NiCd/MH “cc/cv” for Pb and LiPo/Li-Ion	Audible indicators:	beeper
Peak sensitivity:	8mV fixed NiCd, 5mV fixed NiMH	Output connectors:	banana jacks
Peak delay at start:	3 minutes fixed	Case material:	extruded aluminum
Trickle charge current:	charge current/20 (NiCd/MH only)	Current overload:	10A spade fuse
Fast charge safety timer:	NiCd/MH 1.5 hours, LiPo 2hour	Case size:	4.7 x 3.6 x 1.2 in (118 x 92 x 30mm)
Discharge current:	0.1-1.0A (0.01 step, 5W max)	Weight:	13.1 oz (371g)

SPECIAL FEATURES & FUNCTIONS

- Durable membrane touchpad input controls, and very simple programming menu.
- Handles 1- 14 nickel-cadmium (NiCd) or nickel-metal hydride (NiMH) cells, 1-4 lithium-polymer (LiPo) or lithium-ion cells (Li-Ion), or 2-12V lead-acid batteries (Pb).
- Precision “zero deltaV” peak detection for NiCd and NiMH batteries.
- “Constant current / constant voltage” charge method for Pb and LiPo/Li-Ion batteries.
- 0.1 – 5.0A adjustable charge current.
- Automatically sets trickle charge current (fast charge current divided by 20, NiCd/MH only).
- 0.1 – 1.0A adjustable discharge current.
- Adjustable discharge cutoff voltages for NiCd/MH (during discharge mode only)
- Cycle NiCd and NiMH batteries one to five times
- Easy to see, 32 character (2x16) LCD with blue back-lighting.
- Displays input and output volts, peak volts, ave dsch volts, chg and dsch capacity, currents and time, error messages.
- Status screen constantly updates capacity, battery voltage, current, and time during use.
- Audible beeper aids in programming and notifies of function changes.
- Safety features include fast charge safety timer, current overload and reverse polarity protection.
- Small and lightweight, with a rugged extruded aluminum case for long-lasting durability and excellent heat dissipation.

IMPORTANT WARNINGS

- **NEVER** attempt to charge incompatible types of rechargeable batteries as permanent damage to the battery and charger could result.
- **NEVER** use automotive type battery chargers to power the charger.
- **NEVER** allow water, moisture or foreign objects into the charger.
- **NEVER** block the air intake holes which could cause the charger to overheat.
- **NEVER** attempt to use batteries with more cells or total voltage than listed in the specifications
- **NEVER** leave the charger unattended while charging. **Disconnect the battery and remove input power from charger immediately if the charger becomes hot!!** Allow the charger or battery to cool down before reconnecting.

- **NEVER** place the charger or battery on a flammable surface or near a flammable object while in use. Keep away from carpets, cluttered workbenches, etc.
- **NEVER** overcharge batteries as permanent damage could result. Do not use a charge or discharge current rate which exceeds the safe level of the battery. Do not attempt to charge or discharge a battery if it is hot.
- **ALWAYS** disconnect from power source when not in use.
- **ALWAYS** keep out of reach of children.
- **ALWAYS** connect the charge lead to the charger before connecting the battery to the lead. And **ALWAYS** disconnect the battery from the charge lead BEFORE disconnecting the charge lead from the charger. Otherwise, if the ends of the charge lead touch each other while the battery is still connected it will cause a severe and dangerous short-circuit condition.

GLOSSARY OF TERMS

Amps (A): The unit of measure for charge or discharge 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 x 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, milli-amp hours (mAh), and amp-hours (Ah): Charge energy stored by a battery is called **capacity**, which is defined as how much current a battery can supply in 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. Very large batteries, such as lead-acid field batteries, are usually rated in “Ah” or **amp-hours**. A “12V 7A” field battery can deliver 7 amps of current for one hour ($7\text{A} \times 1\text{hr} = 7\text{Ah}$).

“C” rating: Capacity is also referred to as the “C” rating. Some battery suppliers recommend charge and discharge currents based on the battery’s “C” rating. A battery’s “1C” current value 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...a 3C current value of (3 x 600mA) 1800mA. The 1C current value for a 3200mAh battery would be 3200mA (3.2A), etc.

INPUT POWER - CONNECTION, PROTECTIONS & LIMITATIONS

Triton Jr. only accepts DC input power which could come from a 12V power supply or 12V automotive battery. It's best to use a clean DC power source whose output is filtered to remove unwanted electrical noise. Do NOT use an automobile battery charger as a power source. To achieve the absolute maximum output power, the power source must be capable of delivering at least 6.5 amps of current while maintaining 12 volts DC.

The input power lead is located on the left side of the charger. Securely connect the charger's red alligator clip to the positive (+) terminal on the power source, and the black alligator clip to the negative (-) terminal. **WARNING! NEVER allow the red and black input connections to touch each other while connected to 12V DC power. Failure to do so could result in permanent damage to the power source and the charger. It's recommended to disconnect the charger from input power when not in use.**

The charger is always on when connected to the power source (there isn't any ON/OFF power switch). Therefore, disconnect the charger from input power when not in use. If input power is below 11.0V or above 15.0V, the display will show an "Input voltage" error. If this occurs, re-check the input power supply to ensure adequate power is present.

A 10 amp auto, or spade type fuse is located on the left side of the charger, and is used to protect the charger's input. If you suspect the fuse has blown, be sure to **first** disconnect the charger from input power. Then, remove and inspect the element inside the fuse. If the element is burnt, replace the fuse with a new fuse of the exact same rating. Do **NOT** use a fuse with rating greater than 10A.

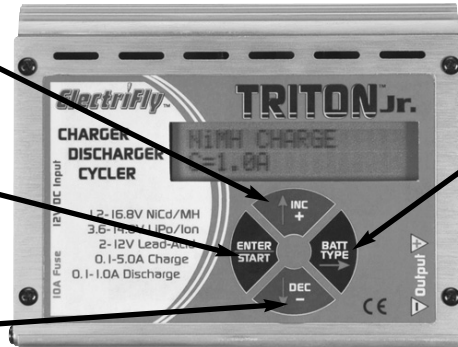
Triton Jr. has a maximum overall power rating of 63 watts. If trying to charge a high voltage battery at high current, the charger might deliberately reduce the output current to keep the output power under the maximum level. This is normal, and designed to protect the charger.

CHARGER CONTROLS & OUTPUT CONNECTION

“The “INC+” button is used to increase values in the programming, and navigate upwards through menus.

The “ENTER/START” button is used to confirm settings, and to start and manually stop functions.

“The “DEC-“ button is used to decrease values in the programming, and navigate downward through menus.



“The “BATT TYPE” button is used to change battery type, navigate to the right through all menus, and to find the Data View screens.

Banana Jacks

Use pre-assembled charge leads to connect batteries to the banana jacks. See below for a list of different ElectriFly and Hobbico brand charge leads which can be purchased through many hobby retailers.

Part Number

Description

GPMM3148	Charge Adapter - Banana plugs to Deans® Ultra Male
GPMM3149	Charge Adapter - Banana plugs to Deans® Micro
HCAP0101	Futaba J Tx and Rx charge leads, except 9VAP
HCAP0102	Futaba J Tx and Rx charge leads, 9VAP only
HCAP0104	Airtronics/Sanwa Tx and Rx charge leads
HCAP0105	JR Tx and Rx charge leads
HCAP0106	Hitec Tx and Rx charge leads
HCAP0108	Charge leads, banana plugs to alligator clips
HCAP0110	9V-style Tx connector, Futaba-J Rx charge lead
HCAP0310	Banana Plugs (3 pair)
HCAP0320	Heavy Duty Banana Plugs (2 pair)

DETERMINING BATTERY TYPE & SPECIFICATIONS

It is always CRUCIAL to know your battery's exact type, rated voltage and capacity!! Failure to know these points is one of the biggest reasons why batteries fail. A few short minutes learning the basics of battery care can easily prevent unnecessary crashes (and lost money!). Carefully read your battery's label and/or instruction sheet or consult your battery supplier and determine:

1. Is the battery **type** nickel-cadmium (NiCd), nickel-metal hydride (NiMH), lithium-polymer (LiPo), lithium-ion (Li-Ion), or lead-acid (Pb)?
2. What is the battery's **total rated capacity**? The mAh or Ah rating should be listed directly on the battery's label. If not, consult your battery supplier.
3. What is the battery's **nominal rated voltage**? **NEVER** guess the rated voltage of a LiPo or Li-Ion battery! If not printed on the battery's label, consult your battery supplier or determine pack voltage as follows:
 - A. NiCd and NiMH:** multiply the total number of cells in the pack by 1.20. A 6-cell pack will have a nominal voltage of 7.20 volts (6 x 1.20). An 8-cell pack will have a nominal voltage of 9.60 volts (8 x 1.20), etc.
 - B. LiPo:** multiply the total number of cells in the pack by 3.70. A 2-cell LiPo wired in series will have a nominal voltage of 7.4V (3.7 x 2). A 3-cell LiPo wired in series will have a nominal voltage of 11.1 volts (3 x 3.70), etc.
 - C. Li-Ion:** multiply the total number of cells in the pack by 3.60. A 2-cell Li-Ion wired in series will have a nominal voltage of 7.20 volts (2 x 3.60). A 3-cell Li-Ion wired in series will have a nominal voltage of 10.8 volts (3 x 3.60), etc.

GETTING STARTED - MAIN MENU

All main functions (charge, discharge, cycle) for all battery types are conveniently found in the Main Menu. Starting all functions is done within this menu as well. Refer to the included flowchart when using the Main Menu. Going left to right, this menu includes all functions for NiCd batteries, then NiMH, LiPo (and Li-Ion), and lead-acid batteries (Pb). More specific information about settings for each battery type is included in separate flowcharts for each battery type (which are still part of the Main Menu).

IMPORTANT: Different parameters exist for each battery types, so it's CRUCIAL to use functions in the menu which are marked for your exact battery type!!

When power is applied, Triton Jr. will automatically default to the "NiCd CHARGE" screen (top-left of Main Menu flowchart). To change battery types, press BATT TYPE until the proper battery type is found (moving right across the flowchart). Select from NiMH, LiPo (Li-Ion settings are found in this screen also), and Pb (lead-acid).

ALWAYS connect the charge lead to the charger FIRST, with the red positive (+) lead connected to the red jack, and the black negative (-) lead to the black jack. Then, connect the battery to the charge lead. See the ERROR INDICATIONS AND SAFETY FEATURES section at the rear of this manual if errors are indicated regarding the connection of the battery to the charger's output.

WARNING! NEVER allow the positive and negative output connections to touch while a battery is connected to the output. Failure to do so could result in permanent damage to the battery and/or the charger and void your warranty.

CARE & HANDLING INSTRUCTIONS FOR NiMH BATTERIES

- **NEVER** allow NiMH batteries to overheat, as this could adversely affect their performance. If this happens, disconnect the battery from the charger immediately and allow to cool!
- **NEVER** deep cycle NiMH batteries as permanent damage could result.
- **NEVER** attempt to use the NiCd, Pb, or lithium functions with NiMH batteries.
- Store NiMH packs with some voltage remaining on the cells (refer to battery supplier).

CHARGING NiCd OR NiMH BATTERIES

1. In the MAIN MENU, the default “NiCd CHARGE” screen should be showing if the charger was just connected to power. Use this screen to charge a NiCd battery and skip to step 3.
2. To charge a NiMH battery, press BATT TYPE twice to find the “NiMH CHARGE” screen. Press ENTER to confirm this battery type, or wait 5 seconds and Triton Jr. will automatically confirm this selection.
3. To change the charge current, press ENTER to cause the value to flash. Press INC+ or DEC- to find the desired charge current (0.1 – 5.0 amps). See the chart at right for recommended current settings. Note that “0.1A” is the same as 100mA... “0.8A” is the same as 800mA, etc. Press ENTER, or wait 5 seconds and Triton Jr. will automatically confirm this selection.
4. To **START PEAK CHARGE**, press and hold START for 2 seconds. The “BATTERY CHECK, PLEASE WAIT...” display will show briefly as Triton Jr. evaluates the condition of the battery. If the battery is ready, the charge process will start automatically at which time you’ll see a screen like shown below.

NiCd and NiMH CHARGE AND DISCHARGE CURRENT CHART

CHARGE TIPS:

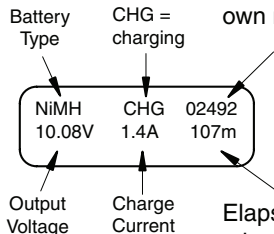
Using a current which could fully charge an empty pack in 1 to 2 hours should avoid overheating of the battery. This table shows recommended 1 and 2 hour charge current settings for batteries of different rated capacities.

DISCHARGE TIPS:

More accurate mAh measurements can be achieved when using a current which can discharge the pack in 1 or 2 hours, as shown in this table. Note: The maximum discharge current is 1 amp. And, the maximum power dissipation during discharge is 5 watts, which might cause discharge currents to automatically be limited for packs having high voltage.

Battery Capacity (mAh)	2 Hour Currents	1 Hour Currents
100-200	0.1A	0.2A
300-400	0.2A	0.4A
500-600	0.3A	0.6A
700-800	0.4A	0.8A
900-1000	0.5A	1.0A
1100-1200	0.6A	1.2A
1300-1400	0.7A	1.4A
1500-1600	0.8A	1.6A
1700-1800	0.9A	1.8A
1900-2000	1.0A	2.0A
2100-2200	1.1A	2.2A
2300-2400	1.2A	2.4A
2500-2600	1.3A	2.6A
2700-2800	1.4A	2.8A
2900-3000	1.5A	3.0A
3100-3300	1.7A	3.3A
3400-3600	1.8A	3.6A
3700-4000	1.9A	4.0A
4100-4300	2.1A	4.3A

Charge capacity: This is how much capacity (energy, in "mAh") has been delivered to the pack during charge. For a battery which previously had some charge, this number could be low. For a battery which previously had little or no charge, this number should be higher (ideally within 10% of the battery's own mAh rating).



Elapsed charge time: This is the number of minutes the battery has been on charge. For a battery which previously had some charge, this number could be low. For a battery which previously had little charge, this number should be larger.

- When peak charge is finished, the screen above will show "END" and tones will sound for 10 seconds. The charger will automatically go to trickle charge at this time (see the section at right for details), but the battery should now be ready for use. Other data measured during charge can be viewed in the DATA VIEW screens by pressing and holding BATT TYPE for two seconds, as shown on page 20.

WARNING! It is normal for NiCd and NiMH batteries to become warm during charge. Disconnect batteries IMMEDIATELY if they become hot at any time! If batteries become overheated, it may be necessary to use a lower charge current in the future. Never attempt to charge batteries at excessive rates, as permanent damage could result.

NOTES FOR CHARGING NiCd & NiMH BATTERIES

- A battery which is approaching- or has reached full charge should become warm to the touch, but never get **HOT**. If overheated, the battery has likely reached an overcharge condition and should be disconnected from the charger immediately!! Allow the battery to cool before use.
- Lower current means it takes longer to charge, but it's less stressful on the batteries, tends to result in more fully charged batteries, and helps to maximize the battery's lifespan.
- Larger "sub-C" size cells can handle peak charge currents up to 5.0 amps with little heat generation. Smaller "A" and "AA" cells overheat more easily and should be charged at much lower currents. Even smaller "AAA" and "N" cells should be charged at lower rates. Refer to the table above for recommended charge currents.
- For packs having more than 8 cells, the actual amount of current delivered to the battery might be limited due to the charger's maximum rated output **power**. This is normal.
- To keep NiCd batteries in good operating condition, it's a good idea to properly discharge them before charging on a regular basis.
- NiMH batteries have a self-discharge rate of about 20-25% (vs. 15% for NiCd). Always recharge NiMH batteries just prior to use.
- The "deltaV" peak detection method is used to charge NiCd and NiMH batteries up to 95-98% full charge. A trickle charge current will automatically be delivered to the battery after peak charge ends. This trickle charge is designed to help the battery safely reach 100% full charge. Trickle charge is applied **only** after an individual peak charge (not after discharge or cycle), and will remain on until the pack is disconnected. The trickle current value is fixed at a rate being the regular charge current setting divided by 20. A fast charge current of 1.0A will result in a trickle current setting of (1000mA / 20) 50mA. A fast charge current of 600mA will result in a trickle current of (600 / 20) 30mA, etc.
- Charge can be stopped manually by pressing ENTER, or disconnecting the pack.
- A backup safety timer will also stop charge if not completed after 1.5 hours.

DISCHARGING NiCd & NiMH BATTERIES

1. At the default “NiCd CHARGE” screen, to discharge a NiCd battery press the down arrow to find the “NiCd DISCHARGE” screen and skip to step 3.
2. To discharge a NiMH battery, press BATT TYPE twice to find the “NiMH CHARGE” screen. Then press the down arrow to find the “NiMH DISCHARGE” screen.
3. Two values can be adjusted in the discharge screen. Press ENTER to cause the discharge current value to flash. Press INC+ or DEC- to change this value (0.1 – 1.0 amps). See the chart on page 9 for recommended discharge current settings. Note that “0.4A” is the same as 400mA...”0.9A” is the same as 900mA, etc. Press ENTER to cause the voltage value to flash, which is the voltage of the entire pack (not per cell) where discharge will end. Press INC+ or DEC- to adjust this value as desired. NiCd and NiMH cell manufacturers recommend discharging batteries down to 1.0-1.1V **per cell**. See the “Discharge Cutoff Settings” chart at right to determine the discharge cutoff point for your battery. Once set, press ENTER, or wait 5 seconds and Triton Jr. will automatically confirm both settings.
4. To **START DISCHARGE**, press and hold START for 2 seconds. The “BATTERY CHECK, PLEASE WAIT...” display will show briefly as Triton Jr. evaluates the condition of the battery. If the battery is ready, discharge will start automatically at which time you’ll see a screen like the one on the right.
5. When discharge is finished, the screen will show “END” and tones will sound for 10 seconds. The battery can now be re-charged, or disconnected from Triton Jr. Other data measured during discharge can be viewed in the DATA VIEW screens, as shown on page 20.

Discharge Cutoff Settings NiCd and NiMH		
# cells in the pack	Rated Pack Voltage	*Cutoff Voltage
1	1.2	1.1
2	2.4	2.2
3	3.6	3.3
4	4.8	4.4
5	6.0	5.5
6	7.2	6.6
7	8.4	7.7
8	9.6	8.8
9	10.8	9.9
10	12.0	11.0
11	13.2	12.1
12	14.4	13.2
13	15.6	14.3
14	16.8	15.4

* Cutoff volts based on 1.1V/cell for NiCd/MH

NOTES FOR DISCHARGING NiCd & NiMH BATTERIES

- Some transmitters might contain a diode in their charge circuit which could prevent the Tx battery from being discharged through the radio's charge jack. In such case, a “No battery” error will show. It's best to remove the battery from the Tx and connect it directly to Triton Jr. for discharging. (see page 6 for a list of adapters).
- For more accurate discharge readings, it's better to use a current which can discharge the pack in 1 or 2 hours.
- The maximum discharge current is 1 amp. Maximum power dissipation during discharge is 5 watts, which might cause discharge currents to automatically be limited for packs having high voltage.
- Sub-C and some “A” size cells are often used for high current/power applications such as driving electric motors (not for radio system uses). These applications typically result in cells being discharged to voltages below 1.1V per cell. To determine the condition of these cells, it may be desirable to set the discharge cutoff voltage to 0.9V per cell (multiply number of cells in the pack by 0.9). Do NOT attempt to discharge cells to voltages lower than recommended.
- To determine the condition of a battery, compare the final capacity measurement the battery delivered during discharge to the capacity rating listed on the battery's label. If a battery provides less than 70% of its rated capacity it may need to be replaced. Additional cycles can be attempted to try and revive the battery, but if capacity measurements fail to improve the battery should be replaced.
- Discharge can be stopped manually by pressing ENTER, or disconnecting the pack.

DISCHARGE CAPACITY: This how much energy (capacity in “mAh”) that has been taken from the battery during discharge. For a battery which previously had little charge, this number could be low. For a battery which previously had been fully charged, this number should be high (ideally within 10% of the battery's own mAh rating).

BATTERY TYPE DSCH = DISCHARGING

NiCd DSCH 760

8.1V 0.8A 057m

ELAPSED DISCHARGE TIME: This is the number of minutes the battery has been on discharge. For a battery which previously had little charge, this number should be low. For batteries which previously had been fully charged, this number should be larger.

OUTPUT VOLTAGE DISCHARGE CURRENT

CYCLING NiCd & NiMH BATTERIES

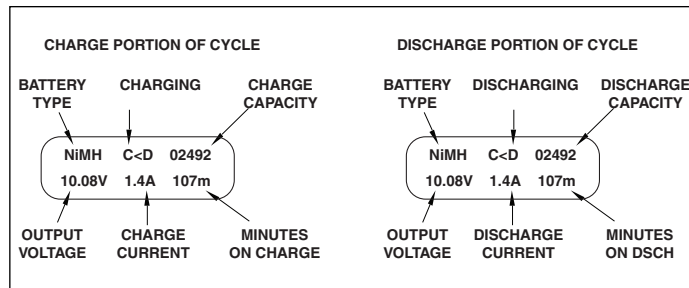
Battery “cycling” is the process of fully charging then discharging a battery to a pre-determined cutoff point (or vise-versa). Cycling is only recommended for NiCd and NiMH batteries, and never for lithium or lead-acid batteries. Triton Jr. can perform anywhere from one to five cycles consecutively.

1. First, determine if you want the battery to be discharged first followed by a peak charge (this is sometimes preferred if the battery is used on a regular basis). Or, do you prefer to peak charge the battery first followed by a discharge (sometimes preferred if the battery is new or has not been used for some time).
2. At the default “NiCd CHARGE” screen, to cycle a NiMH battery skip to step 3. To cycle a NiCd battery press the down arrow to find either the “NiCd CHG TO DSCH” or “NiCd DSCH TO CHG” screen (depending if you want to charge or discharge first) and skip to step 4.
3. Press BATT TYPE twice to find the “NiMH CHARGE” screen. Press the down arrow to find the “NiMH CHG TO DSCH” or “NiMH DSCH TO CHG” screen (depending if you want to charge or discharge first).
4. Press ENTER to cause the first current value to flash. **It’s very important to note whether this is the charge (CHG) or discharge (DSCH) current!** Press INC+ or DEC- to adjust this current as desired. Press ENTER to select the next current value, and adjust it with the INC+ or DEC- buttons if desired. See the table on page 9 for recommended charge and discharge currents. Press ENTER, or wait 5 seconds and Triton Jr. will automatically confirm both settings.
5. Press ENTER until the cycle number “1X” starts to flash. This setting determines how many cycles will be performed consecutively. Press INC+ or DEC- to adjust this current as desired. Press ENTER, or wait 5 seconds and Triton Jr. will automatically confirm this setting.

NOTES FOR CYCLING NiCd & NiMH BATTERIES

- Periodic cycling of NiCd batteries (once every month or two) can be beneficial in keeping them in good operating condition. Excessive cycling (more than once monthly) will unnecessarily shorten the lifespan of the battery.
- A short time delay of 3 minutes will occur in-between the charge/discharge functions to allow the battery to cool. This is normal, and cannot be changed.
- During cycle mode, the discharge cutoff voltage for NiCd and NiMH batteries is FIXED (not adjustable) at 0.8V per cell.
- Cell manufacturers note three main benefits of cycling NiCd and NiMH batteries:
 1. Battery maintenance: NiCd batteries benefit the most from regular cycling to help keep them in good operating condition, and is recommended once monthly. NiMH batteries do not require as much cycling.
 2. Determining battery condition: NiCd and NiMH batteries are rated by how much charge energy or “capacity” they can store compared to their **rated** capacity. A battery that can supply only a small fraction of its rated capacity is likely reaching the end of its useful life and may need to be replaced.
 3. Breaking-in batteries: new NiCd and NiMH batteries may need to be broken-in before they will perform to their specifications. Older batteries which have been unused for an extended length of time may require to be broken-in again to regain their usefulness. Repeated cycling is the best way to revive such batteries.

6. To **START CYCLING**, press and hold START for 2 seconds. “BATTERY CHECK, PLEASE WAIT...” will show briefly, and Triton Jr. will start cycling if the battery is in suitable condition, at which time you’ll see a screen as shown to the right .
7. When all cycling is finished, “END” will show on-screen. Press BATT TYPE to see the DATA VIEW screens for final cycling information (go to page 20). Note that Triton Jr. will only show data for the last cycle (not all cycles). If set to cycle 4 times, only data for cycle 4 will be viewable (not for cycles 1, 2, or 3).



IMPORTANT CARE & HANDLING INSTRUCTIONS FOR LITHIUM-POLYMER BATTERIES

WARNING!! NEVER ATTEMPT TO CARE FOR LITHIUM-POLYMER (LiPo) OR LITHIUM-ION (Li-Ion) CELLS IN THE SAME WAY AS OTHER BATTERY TYPES! LiPo and Li-Ion cells are much more sensitive and volatile than NiCd, NiMH or lead-acid batteries. Misuse and overcharge can quickly result in LiPo/Ion cells getting hot and/or swelling, which could lead to **VIOLENT EXPLOSION AND/OR FIRE** and serious personal injury and property damage. Do not mistake LiPo cells for other lithium-based cell types (such as lithium-metal), as different lithium hybrids have different care and handling characteristics as well. All “lithium” based batteries types are NOT exactly the same.

- **NEVER** leave lithium batteries unattended during charge.
- **NEVER** place lithium batteries on combustible surfaces during charge.
- **NEVER** attempt to use the NiCd, NiMH, or Pb functions with lithium batteries.
- **NEVER** continue to charge or use LiPo/Ion cells if they start to swell, become overly warm to the touch, or if they do not charge within the specified charging time. Failure to follow this guideline could cause the battery to become hot, and explode or ignite!!
- **NEVER** discharge Li-Ion cells lower than 2.5V **per cell**.
- LiPo/Ion cells have an 8% self discharge rate, meaning they can hold charge very well. Thus, there is no need to trickle charge LiPo/Ion cells. No cycling of lithium batteries is needed.
- LiPo/Ion cells should be charged about once per year at a minimum to prevent over-discharge.
- LiPo/Ion batteries should be stored with about 30%-50% of capacity.
- If LiPo/Ion cells leak fluid, rinse the affected area well with water and seek immediate medical care.

SELECTING LiPo OR Li-Ion BATTERY TYPE

Triton Jr. can handle lithium-polymer (LiPo) and lithium-ion (Li-Ion) battery types. While similar in many ways, there are some slight differences in these two battery types. Setting Triton Jr. for the proper lithium type is necessary for safety, and will result in better performance for your packs. Refer to the Lithium Menu flowchart included.

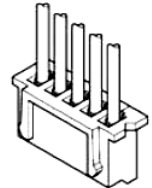
1. The default setting is for Triton Jr. to handle LiPo batteries. If you will be using LiPo batteries only, skip the remainder of this section.
2. To change Triton Jr. to handle Li-Ion batteries, at the default “NiCd CHARGE” screen press BATT TYPE three times to find the “LiPo CHARGE” screen. Press the down arrow twice to find the “Lithium type” screen.
3. Press ENTER, then either INC+ or DEC- to change from LiPo to Li-Ion.
4. Press ENTER, or wait 5 seconds and the new battery type will automatically be confirmed. All screens and settings relating to lithium batteries will now be for lithium-ion cells. Press the up arrow twice to find the “Li-Ion CHARGE” screen.

LiPo CONFIGURATIONS - BALANCED VS. NON-BALANCED

LiPo packs are commonly available in two different assembly/wiring configurations: wired for balancing, and for non-balancing. It is very important to know exactly which types of packs you have before proceeding. **Consult your battery supplier if you are unsure if your battery is or is not wired for balancing, and whether it has a built-in safety circuit.**

NON-BALANCED packs are wired so that all cells are charged at the same time, regardless of the condition of individual cells. These types of packs have a charge lead with two wires that are connected to the first and last cell in the pack. Sometimes these packs might have a built-in charge safety circuit, as do many ElectrIFly brand packs (with SafeCharge™), which prevents cells in the pack from being overcharged but this is NOT the same thing as “balancing”.

Packs wired for BALANCING normally have a unique connector which has more than two wires going to the pack itself. Each wire is connected to individual cells inside the pack, by which a charger or discharger can monitor the voltage of every cell individually and control whether each cell should be charged or discharged. All ElectrIFly brand packs which are wired for balancing have a plug like shown at right. Packs wired for balancing MUST be charged with a LiPo charger that is capable of balancing, or by using a LiPo charger with a LiPo cell balancer such as the Equinox™ LiPo Cell Balancer (GPMM3160) from ElectrIFly. Triton Jr. is 100% compatible with the Equinox LiPo cell balancer.



Balancing connector

CHARGING LiPo OR Li-Ion BATTERIES

WARNING! Always follow the instructions below when charging LiPo/Ion batteries! LiPo/Ion batteries should **NEVER** get warm anytime during charge! Disconnect batteries **IMMEDIATELY** if they become excessively warm or hot at any time, and refer to the Troubleshooting Guide in the rear of this manual for details. LiPo/Ion cells are much more dangerous than NiCd or NiMH batteries, and pose a significant **FIRE HAZARD** which can result in causing bodily harm and/or permanent damage to the cells and the surrounding environment.

1. At the “NiCd CHARGE” screen, press BATT TYPE three times to find the “LiPo CHARGE” screen (or “Li-Ion CHARGE” screen if you selected that lithium type).
2. Two values **MUST** be properly set in this charge screen. Instead of showing a charge current value, Triton Jr. shows a battery **capacity** value (default is “350mAh”). Press ENTER to cause this value to flash. Then press INC+ or DEC- to find the capacity value that **most closely matches** the capacity rating marked on your lithium battery. Triton Jr. will then set the charge current for your battery **automatically** (see notes section for details).
3. Press ENTER to cause the voltage value to flash. Press INC+ or DEC- to set this voltage to the **exact** nominal voltage rating shown on your pack. Press ENTER, or wait 5 seconds and Triton Jr. will automatically confirm both settings.

WARNING!! NEVER enter a capacity or voltage number that is higher than the value specified for your battery! Failure to follow this warning can cause permanent damage to your battery, charger and surroundings in the form of FIRE!

4. To **START CHARGE**, press and hold START for 2 seconds. “BATTERY CHECK, PLEASE WAIT...” will show briefly, and Triton Jr. will start charging if the battery is in suitable condition.
5. When finished charging, the screen will show “END” and tones will sound for 10 seconds. The battery should now be ready for use. Triton Jr. will display details about the charge data for your battery, including charge capacity, elapsed charge time, etc. Other data measured during charge can be viewed in the DATA VIEW screens shown on page 20.

NOTES FOR CHARGING LiPo & Li-Ion BATTERIES

- Triton Jr. automatically sets the charge current based on the battery's 1C rating. Therefore, it is very important to enter the battery's exact rated capacity (in mAh) in the programming. For example, if a capacity of 600mAh is entered Triton Jr. will set the charge current at 0.6A (600mA). For a capacity setting of 2500mAh, the charge current will be set to 2.5A (2500mA). If you do not change the factory default battery capacity value, Triton Jr. will charge the battery as if it's rated at 350mA (0.35A).
- LiPo and Li-Ion batteries are charged using the “constant current / constant voltage” process (cc/cv). Constant current is delivered during the first part of fast charge. As the battery reaches a pre-set voltage, Triton Jr. shuts off constant current and starts to apply a constant voltage. As the battery's voltage equalizes to the output voltage of the charger, the charge current will drop to a value equal to the battery's rated capacity divided by 10, and then automatically stop charge as the battery is fully charged.
- During charge, it's possible that current to the battery might NOT reach the full value as set in the programming. This is because Triton Jr. constantly monitors the condition of the battery and makes sure not to deliver more current than the battery can handle at any given time. This is normal.
- LiPo/Ion batteries do not need trickle charge, and therefore no such function exists.
- For LiPo/Ion batteries rated at 11.1V or greater, the **actual** amount of current delivered to the battery might be limited due to the charger's maximum rated output **power**. This is normal, due to various possible circumstances such as the condition of the battery, limitations of the input power source, charge connector, etc.
- For safety reasons, fast charge of LiPo/Ion batteries will automatically stop if the actual amount of capacity delivered to the battery reaches 110% of the capacity setting entered in point 2.
- A backup safety timer will also stop charge if not completed after 2 hours.

DISCHARGING LiPo OR Li-Ion BATTERIES

1. At the “LiPo CHARGE” screen (or “Li-Ion CHARGE” screen if you selected that lithium type), press the down arrow once to find the “LiPo DISCHARGE” screen (or “Li-Ion DISCHARGE” screen if you selected that lithium type).
2. Two values can be adjusted on this discharge screen. Press ENTER to cause the discharge current value to flash. Press INC+ or DEC- to change this value (0.10 – 1.0 amps). Note: “0.1A” is the same as 100mA. “0.8” is the same as 800mA, etc.
3. Press ENTER to cause the discharge cutoff voltage value to flash. This is the voltage where Triton Jr. will stop discharging the battery, and is based on 3.0V **per cell**. So the cutoff voltages should be 3.0V for a 1-cell battery, 6.0V for 2-cell packs, 9.0V for 3-cell packs, and 12.0V for 4-cell packs. Press INC+ or DEC- to adjust this value as needed. Press ENTER, or wait 5 seconds and Triton Jr. will automatically confirm both settings.
4. To **START DISCHARGE**, press and hold START for 2 seconds. “BATTERY CHECK, PLEASE WAIT...” will show briefly, and Triton Jr. will start discharging if the battery is in suitable condition.
5. When discharge is finished, the screen will show “END” and tones will sound for 10 seconds. The battery can now be recharged, or disconnected from Triton Jr. Other data measured during discharge can be viewed in the DATA VIEW screens shown on page 20.

NOTES FOR DISCHARGING LiPo AND Li-Ion BATTERIES

- For more accurate discharge readings, it's better to use a current which can discharge the pack in 1 or 2 hours.
- The maximum discharge current is 1 amp. Maximum power dissipation during discharge is 5 watts, which might cause discharge currents to automatically be limited for packs having high voltage.

CARE & HANDLING FOR LEAD-ACID BATTERIES (Pb)

Never attempt to care for lead-acid (Pb) batteries in the same way as other battery types! Lead-acid batteries commonly used in R/C hobby field boxes require unique care and handling methods as they contain different characteristics than other battery types.

- Do not attempt to use the NiCd, NiMH, or lithium functions on Pb batteries.
- Do not exceed 14.7V maximum charge voltage for batteries rated at 12V.
- Pb batteries have a self-discharge rate of 5-10%, meaning they hold charge very well. Thus, there is no need to trickle charge Pb batteries. No cycling of Pb batteries is needed.
- Do not leave Pb batteries in the full discharge condition, which could cause the battery to lose its ability to regain full charge.

CHARGING Pb (LEAD-ACID) BATTERIES

1. At the default “NiCd CHARGE” screen, press BATT TYPE four times to find the “Pb CHARGE” screen.
2. Two values can be adjusted on the Pb charge screen. Press ENTER to cause the charge current value to flash. Press INC+ or DEC- to change this value (0.1 – 5.0 amps). Note: “0.1A” is the same as 100mA. “0.8” is the same as 800mA, etc. For 12V 7Ah lead-acid field batteries, a charge current of 0.5A to 1.0A should safely, fully charge a battery in 7 to 14 hours.
3. Press ENTER to cause the voltage value to flash. Most hobby field batteries have a nominal rated voltage of 12V. Make sure the voltage marked on the battery matches the voltage setting on-screen. To change this value, press INC+ or DEC-. Press ENTER, or wait 5 seconds and Triton Jr. will automatically confirm both settings.
4. To **START CHARGE**, press and hold START for 2 seconds. “BATTERY CHECK, PLEASE WAIT...” will show briefly, and Triton Jr. will start charging if the battery is in suitable condition.
5. When finished charging, the screen will show “END” and tones will sound for 10 seconds. The battery should now be ready for use. Triton Jr. will display details about the charge data for your battery, including charge capacity, elapsed charge time, etc. Other data measured during charge can be viewed in the DATA VIEW screens shown on page 20.

NOTES FOR CHARGING Pb BATTERIES

- Lead-acid batteries use the “constant current / constant voltage” method (cc/cv) as explained in the section for lithium batteries. However, different voltage levels are used for evaluating the condition of Pb batteries.
- Lead-acid batteries do not need trickle charge, and therefore no such feature exists.
- Lead-acid batteries have a nominal voltage of 2.0V **per cell**. For most field batteries, even though you cannot see any individual “cells”, there are 6 cells internally. At 2.0V per cell, this makes a total field battery voltage of 12V.
- For lead-acid batteries rated at 12V or greater, the **actual** amount of current delivered to the battery might be limited due to the charger’s maximum rated output **power**. This is normal, due to various possible circumstances such as the condition of the battery, limitations of the input power source, charge connector/connection, etc.

DISCHARGING Pb BATTERIES

1. At the “Pb CHARGE” screen, press the down arrow once to find the “Pb DISCHARGE” screen.
2. Two values can be adjusted on this discharge screen. Press ENTER to cause the discharge current value to flash. Press INC+ or DEC- to change this value (0.10 – 1.0 amps).
3. Press ENTER to cause the voltage value to flash. This is the battery’s minimum discharge cutoff voltage, based on 1.8V **per cell**. Since most hobby batteries have a nominal voltage of 12V (6 cells), the proper discharge cutoff voltage would be (1.8V x 6) 10.8V. Press INC+ or DEC- to adjust this value if necessary. Press ENTER, or wait 5 seconds and Triton Jr. will automatically confirm both settings.
4. To **START DISCHARGE**, press and hold START for 2 seconds. “BATTERY CHECK, PLEASE WAIT..” will show briefly, and Triton jr. will start discharging if the battery is in suitable condition.
5. When discharge is finished, the screen will show “END” and tones will sound for 10 seconds. The battery can now be re-charged, or disconnected from Triton Jr. Other data measured during discharge can be viewed in the DATA VIEW screens shown on page 20.

NOTES FOR DISCHARGING Pb BATTERIES

- For more accurate discharge readings, it’s better to use a current which can discharge the pack in 1 or 2 hours.
- The maximum discharge current is 1 amp. Maximum power dissipation during discharge is 5 watts, which might cause discharge currents to automatically be limited for packs having high voltage.
- The proper discharge cutoff voltage for batteries with a nominal rated voltage of 2V is 1.8V, 4V batteries should be discharged to 3.6V, 6V batteries should be discharged to 5.4V, 8V batteries should be discharged to 7.2V, and 10V batteries should be discharged to 9V.

MISCELLANEOUS FUNCTIONS

An audible **BUZZER** identifies when a function has started or stopped. The buzzer also alerts the user when an error has occurred. The buzzer will also sound once for each push of a button to aid in setting up the charger. This buzzer cannot be adjusted or turned off.

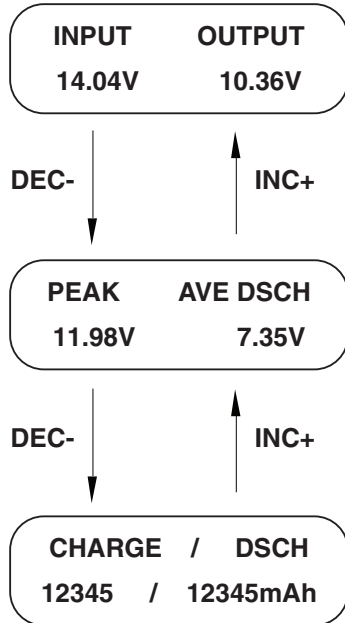
When settings are adjusted in the programming, Triton Jr. will memorize these settings until changed again manually. This single **MEMORY** should retain all settings even when power is removed from the charger (but all test data will be lost when power is removed).

A backup **SAFETY TIMER** feature is designed to protect the charger, battery, and surrounding environment during charge. If for some reason Triton Jr. does not properly identify a battery having reached full charge (peak for NiCd/MH batteries) the backup safety timer should automatically shut off charger to prevent any damage from occurring due to overcharge. The safety timer settings are 1.5 hours (90 minutes) for NiCd and NiMH batteries, and 2 hours (120 minutes) for LiPo and Li-Ion batteries.

At the beginning of charge the voltage for NiCd and NiMH batteries can be somewhat unstable. This instability could possibly cause the peak detection circuitry to accidentally trip and stop charge, which would cause the battery to NOT become properly charged. To avoid this, Triton Jr. uses a **PEAK DELAY AT START** function whereby the peak detection circuit is automatically turned off during the first 3 minutes of charge. After 3 minutes, the peak detection circuitry will automatically turn on and allow Triton Jr. to properly, accurately detect peak when it actually occurs. The “peak detection” circuit automatically stops delivering charge to NiCd and NiMH batteries when Triton Jr. actually sees that the battery’s voltage actually **drops** very slightly just after full charge has been reached. The charger’s ability to identify this very tiny voltage is called **PEAK SENSITIVITY**. Triton Jr. is set to have a 8mV per cell peak sensitivity for NiCd batteries, and 5mV per cell for NiMH batteries. These sensitivity settings are not adjustable.

DATA VIEW SCREENS - CHARGE, DISCHARGE & CYCLE DATA

Triton Jr. keeps track of data which can be accessed for viewing after any charge, discharge, or cycle function has ended. While a charge, discharge, or cycle function is in progress, or after any such function has ended, press BATT TYPE to find these DATA VIEW screens shown below. Re-press BATT TYPE to return to the previous screen.



Press BATT TYPE to return to previous screen

INPUT: The voltage measured at the charger's input, shown on the left.

OUTPUT: The voltage measured at the charger's output, shown at right.

PEAK: The highest or "PEAK" battery voltage measured during charge is shown at left.

AVE DSCH: The battery's voltage is continually recorded during discharge and this average discharge voltage is calculated and shown at right.

BATTERY CONDITION: Keeping track of these voltages over time can help to evaluate a battery's overall condition as it ages. A battery's peak and average voltage levels will gradually decrease as it reaches the end of its usefulness.

CHARGE: The amount of capacity (mAh) the charger delivered to the battery during any one charge period (or charge portion of a cycle) is shown at left. For cycles, only data from the LAST cycle will be shown.

DSCH: The amount of capacity (mAh) which was drained from the battery during any one discharge period (or discharge portion of a cycle) is shown at right. For cycles, only data from the LAST cycle will be shown.

HEAT VENTILATION

Holes are designed in the case to allow hot air to escape to help keep the electronic circuitry cool. This helps to maintain accurate operation and maximize the lifespan of the charger itself. **CAUTION: Do not block the vent holes during operation, as it could cause the charger to overheat and possibly cause permanent damage.**

ERROR INDICATIONS & SAFETY FEATURES

Triton Jr. uses solid-state circuitry to protect against potential damage which could be caused by short-circuit or reverse polarity conditions. If power is connected backwards to Triton Jr.'s input, the screen may turn black and no other operation will occur, but it will be protected from damage. Re-check all input connections to make sure it is connected properly.

The following warning / error messages are designed to show on-screen to protect the charger and battery from damage due to improper connection, input voltage, etc. These messages will be accompanied by loud tones on the buzzer. When any message appears, refer to the corresponding problem and solution explanation. Press ENTER to clear the warning.

ERROR DISPLAYED	PROBLEM AND SOLUTION
"Input voltage"	When input voltage is under 11.0V or over 15V.
"No battery"	When a battery is not detected at the charger's output.
"Open circuit"	When a battery becomes disconnected while a function is in progress.
"Reverse polarity"	When a battery is connected to the output in reverse.
"Overheating"	The temperature inside the charger's case is too high. Triton Jr. will pause the current function and show this message. The function will resume automatically after the charger has cooled to an acceptable level.
"Time limit over"	When the charge safety timer has expired (1.5 hours for NiCd/MH, and 2 hours for LiPo/Ion batteries).
"Internal error"	When a problem exists within the control circuitry of the charger.
"Batt volts too high"	When the voltage setting in the charger is too low. It may take up to 5 minutes for this error to show.
"Batt volts too low"	When the voltage setting in the charger is too high. It may take up to 5 minutes for this error to show.

TROUBLESHOOTING GUIDE

PROBLEM: Display does not work when unit. Check power supply for proper power. Check input connections for proper contact.

PROBLEM: Charger doesn't recognize battery. Make sure battery is not connected backwards. Check for faulty connection or wiring. Perhaps there is a defective cell in the pack, in which case the pack should be replaced.

PROBLEM: Does not automatically stop charge after 1.5 hours for NiCd/MH batteries, or 2 hours for LiPo/Ion batteries. Internal problem might exist. Disconnect battery IMMEDIATELY and contact Hobby Services.

PROBLEM: Battery voltage low after charge is completed. Make sure charge current setting isn't too low. Battery might be defective and require replacement. Check to see if the backup safety timer expired before full charge was reached. For lithium batteries, make sure the battery capacity value entered in the programming matches the rated capacity of the battery.

PROBLEM: Will not lock into discharge mode. An improper discharge voltage was entered for the battery. Adjust the battery voltage in the discharge screen to match the number of cells in the pack. Tx might have a diode in charge circuit, in which case it's best to connect the battery to the charger directly (outside of the Tx). Battery might be defective and require replacement. Battery might already be discharged.

PROBLEM: Low mAh readings after discharge. Batteries might not have been fully charged prior to discharge. Batteries might have been old or unused for an extended period of time, which may require additional cycles to see if capacity improves. Battery might be defective and require replacement. Discharge current setting might be too high, and should be lowered. An improper discharge voltage was entered for the battery. Adjust the battery voltage to the proper value for the battery. Battery might already be discharged.

PROBLEM: LCD and/ or controls do not function properly. Input power might be connected backwards, and require re-connection. Input fuse might be blown and require replacement.

1-YEAR LIMITED WARRANTY - *U.S.A. & CANADA ONLY

Great Planes warrants this product to be free from defects in materials and workmanship for a period of one (1) years from the date of purchase. During that period, Great Planes 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, Great Planes 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 Great Planes product, warranty or non-warranty, send it post-paid and insured to:

HOBBY SERVICES
3002 N. Apollo Drive, Suite #1
Champaign, Illinois 61822

*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.



www.greatplanes.com
www.electrifly.com