GREAT PLANES

ElectriFly™

TRITON2™

Computerized Charger, Discharger, Cycler

INTRODUCTION

Triton2 is the sequel to ElectriFly's revolutionary Triton charger. In addition to all existing features found on the original, Triton2 includes several feature upgrades and improvements. Maximum charge current has been increased to 7A. The LCD now includes a blue backlight for easy viewing even in poorly lit areas. T2 can handle LiPo packs having up to 5 cells wired in series. The input lead has pre-installed banana plugs, and large alligator clips are included which can be mated directly to the banana plugs for easy connection to different types of supply terminals. The rotating dial has been modified for easier control. Plus, the instructions have been completely re-formatted for ease of use. All of this, while maintaining the same great quality and performance that made Triton famous.

QUICK REFERENCE GUIDE

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.

1. Connect Triton2 to a 12V DC power source. Observe proper polarity. (See page 3 for details)

2. Find the programming flowcharts included in the package.

3. At the default "Memory" screen, press BATT TYPE to find the screen which matches your battery type: NiCd, NiMH, LiPo/Li-Ion, or Pb (lead-acid). (See page 4 for details)

4. Connect the proper charge adapter to the output banana jacks (See page 4 for a list of adapters). Connect the battery to the charge lead, observing proper polarity.

5. To charge:
   a. For NiCd and NiMH batteries see page 6.
   b. For LiPo and Li-Ion batteries see page 9.
   c. For lead-acid (Pb) batteries see page 10.

6. To discharge:
   a. For NiCd and NiMH batteries see page 7.
   b. For LiPo and Li-Ion batteries see page 10.
   c. For lead-acid (Pb) batteries see page 11.

7. For cycling of NiCd and NiMH batteries see page 8.

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SPECIFICATIONS

Input voltage:	11.0–15.0V DC
Input connections:	banana plugs with mating gator clips
Number of outputs:	one
Battery types, # cells:	1-24 NiCd/MH (1.2 - 28.0V) 1-5 LiPo or Li-Ion (3.6, 3.7, 7.2, 7.4, 10.8, 11.1, 14.4, 14.8, 18.0, and 18.5V) 6, 12, 24V Pb (2V per cell)
Fast charge current:	0.1-7.0A linear NiCd/MH (0.1A step, 90W max.) 1C rating for LiPo/Li-Ion
Fast charge termination:	"zero deltaV" peak detection for NiCd/MH "cc/cv" for Pb and LiPo/Ion * optional thermal cutoff
Peak sensitivity:	NiCd 5-20mV, NiMH 3-15mV
Peak delay at start:	0-60 minutes (NiCd/MH only)
Trickle charge current:	0 - 300mA (NiCd/MH only)
Fast charge safety timer:	0-990 minutes
NiMH max. charge cap:	0-9900mAh
NiMH top off charge:	0-1000mA
Thermal cutoff:	* 50-150°F (10-65°C)
Discharge current:	0.1-3.0A (20W max.)
Discharge cutoff voltage:	NiCd/MH 0.5-1.20V per cell (0.9V/cell fixed during cycle) LiPo/Ion fixed at 3.0V per cell Pb fixed at 1.8V per cell
Cycle count:	1-10 cycles (NiCd/MH only)
Cycle time delay:	1-60 minutes
Battery memories:	10 memories
Programming controls:	modified jog dial, 2 pushbuttons
Display type:	2 x 16 LCD with blue backlight
Audible indicators:	10 melodies, on/off
Output connectors:	banana jacks
Case material:	extruded aluminum
Cooling system:	built-in fan
Current overload:	solid state
Case size:	6.2 x 4 x 2 in (157x102x51mm)
Weight:	16.4 oz. (466g)

* requires optional thermal probe – GPMM3151

SPECIAL FEATURES

- ***Updated control dial and re-formatted instructions for easier programming***
- ***Handles 1-5 lithium-polymer or lithium-ion cells in series***
- ***0.1 – 7.0A adjustable charge current***
- ***LCD includes a blue back-light***
- ***Banana plugs on input connector, and includes mating gator clips***
- Precision "zero deltaV" peak detection with adjustable sensitivity for NiCd and NiMH batteries
- "Constant current / constant voltage" charge method for Pb and LiPo/Ion batteries
- Fast charge thermal cutoff (GPMM3151 thermal probe available separately)
- Top-off charge feature fully charges NiMHs without overheating
- 0–250mA adjustable trickle charge current (NiCd and NiMH only)
- 0.1–3.0A adjustable discharge current
- Adjustable discharge cutoff voltages for NiCd/MH (pre-set voltages for Pb and LiPo/Ion).
- Perform 1 to 10 cycles (NiCd/MH only)
- Recall data for 10 full cycles
- Configure up to 10 batteries in memory for instant, easy re-call and charger setup
- Displays input and output volts, peak charge volts, average discharge volts, charge and discharge capacities, currents and time, error messages
- Audible sound cues aid in programming and notification of function changes.
- Warning messages for improper input voltage, poor connections, unsuitable battery condition, reverse polarity on output
- Safety features include cool-off time delay, maximum NiMH charge input, fast charge safety timer, current overload and reverse polarity protection
- Built-in cooling fan, for better charge efficiency and extends life of charger
- Small and lightweight, with a super-sturdy aluminum case for rugged durability

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 or fan 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, wood, plastic, paper, 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, a severe and dangerous short-circuit condition will result.

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). If a current value is below 1.0A, the display will still show the current in amps, not milli-amps. For example, a current of 800mA will be displayed as 0.8A. A current of 100mA will actually be shown as 0.1A, etc.

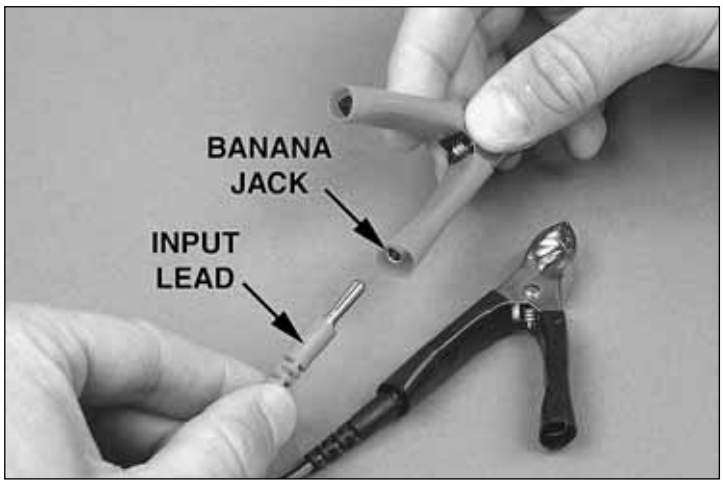
Capacity, milli-amp hours (mAh), and amp-hours (Ah): Charge energy stored by a battery is called **capacity**, which is defined as how much current a battery can supply constantly over one hour of time. Most hobby batteries are rated for capacity in **"mAh" or milli-amp hours**. A 650mAh battery can deliver 650mA of current for one hour (650mA x 1hr = 650mAh). A 3200mAh battery can deliver 3200mA (3.2A) of current for one hour (3200mA x 1hr = 3200mAh), etc. Very large batteries, such as lead-acid field batteries, are usually rated in **"Ah" or amp-hours**. A "12V 7Ah" field battery can deliver 7 amps of current for one hour (7A x 1hr = 7Ah).

"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 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), etc.

INPUT POWER - CONNECTION, PROTECTIONS & LIMITATIONS

Triton2 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 input power source must be capable of delivering at least 10 amps of current while maintaining 12 volts DC. If input power is below 11.0V or above 15.0V the display will show an "Input voltage" error, at which time you should re-check the input to ensure adequate power is present.

The input power lead is located on the left side of the charger. Note the unique set of alligator clip adapters that are included, and the female banana jack **built into the handle of each clip**. If your power source requires alligator clips, slide the banana plugs on the input lead into the female jacks on the alligator clips (matching colors of banana plugs and alligator clips). Securely connect the charger's red lead to the positive (+) terminal on the power source, and the black lead to the negative (-) terminal.

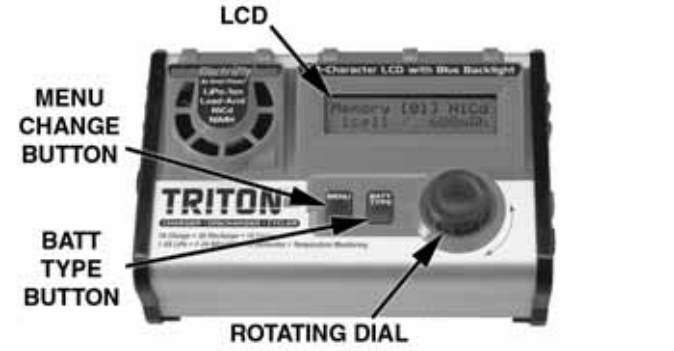


WARNING! NEVER allow the red and black input connections to touch each other while connected to 12V DC power. Failure to do so could result in permanent damage to the power source and the charger. It's recommended to disconnect the charger from input power when not in use.

Triton2 has a maximum overall power rating of 90 watts during charge, and 20 watts during discharge. If trying to charge or discharge a battery which has over 12 volts the charger might deliberately limit the output current so not to exceed its maximum rated output power. Refer to the "Maximum Power Chart" included for more details about current limitations for higher voltage batteries.

Triton2 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. T2's input is protected from reverse polarity and overcurrent by solid state protective circuits, and does not include a fuse. If you suspect an error occurred with the input power and T2 will not function properly after correcting the input power problem, refer to the Troubleshooting Guide for details.

CONTROLS & OUTPUT CONNECTIONS



- Custom 32-character LCD with blue back-light.
- The MENU CHANGE button jumps between the Main and Setup menus.
- The BATT TYPE button changes battery types in the Main Menu.
- Press BATT TYPE and MENU CHANGE simultaneously to find the Data View Menu.
- The dial is used for scrolling through menus and adjusting values on-screen; it acts like a pushbutton to confirm items on-screen.
- The THERMAL PROBE jack is ONLY used for connecting an optional thermal probe (GPMM3151). Do NOT connect batteries to this jack. Refer to the "Temperature Cut-off" section of the Setup Menu.
- Use pre-assembled charge leads to connect batteries to the banana jacks. See the following list of different ElectriFly and Hobbico® brand charge leads which can be purchased through many hobby retailers.

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

NUMBER	DESCRIPTION
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 1.2. A 6-cell pack will have a nominal voltage of 7.2 volts (6 x 1.2). An 8-cell pack will have a nominal voltage of 9.6 volts (8 x 1.2), etc.
   B. LiPo: multiply the total number of cells in the pack by 3.7. A 2-cell LiPo wired in series will have a nominal voltage of 7.4V (2 x 3.7). A 3-cell LiPo wired in series will have a nominal voltage of 11.1 volts (3 x 3.7), etc.
   C. Li-Ion: multiply the total number of cells in the pack by 3.6. A 2-cell Li-Ion wired in series will have a nominal voltage of 7.2 volts (2 x 3.6). A 3-cell Li-Ion wired in series will have a nominal voltage of 10.8 volts (3 x 3.6), etc.

MENU STRUCTURE

Triton2 contains three different menus. Refer to the included flowcharts when programming the charger.

Main Menu: For setting battery type, charge and discharge currents and voltages, and cycling currents. Starting charge, discharge, and cycles are done in this menu. Setting a battery memory is also done in the Main Menu.

Setup Menu: Various customizable features which support charge, discharge, and cycle are found in the Setup Menu, such as safety timers, time delays, thermal probe temperature settings, peak detection sensitivity, etc.

Data View Menu: Results of charge, discharge, and cycle functions are displayed here, as well as input, output, peak charge, and average discharge voltages and battery temperatures (See page 4).

GETTING STARTED - MAIN MENU & BATTERY MEMORIES

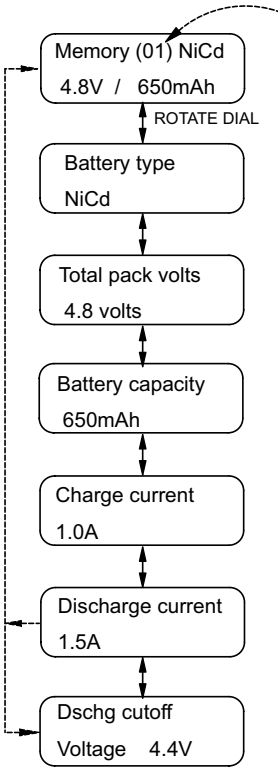
The Main Menu is where all main functions (charge, discharge, cycle) are located and started, as well as where to select the battery type, charge, discharge, and cycle currents and voltages. When power is applied the first time, Triton2 will automatically default to the “Memory (01) NiCd” screen shown on the left side of the Main Menu flowchart. **It is strongly recommended to have all flowcharts handy as it will greatly simplify and quicken the process of learning to use the charger.**

1. ALWAYS connect the battery adapter lead to the charger BEFORE connecting the battery to the adapter. Make sure to observe proper polarities for all connections, with the red positive (+) leads connected to each other, and the black negative (-) leads connected to each other. **WARNING! NEVER allow the positive and negative output connections to touch while a battery is connected. Failure to do so could result in permanent damage to the battery and/or the charger and void your warranty.**

2. Rotate the dial to move up and down a menu. To adjust values on-screen, press the dial and the adjustable feature will flash. Rotate the dial to find desired value, then re-press the dial to confirm the selection. If a screen shows two adjustable values, repeatedly press the dial to select the value to be adjusted.

3. BATTERY MEMORIES: If you don’t wish to use a battery memory, skip to step 4. Using the memories prevents you from having to manually change all settings each time you change batteries. Once set, simply select the memory number that matches the corresponding battery. You can customize any of the ten memories as you wish, as explained in the diagram at right. Or, you can use one of the ten factory programmed memories if the settings match your battery type. See the included BATTERY MEMORY CHARTS for the factory programmed memories, and a blank chart where you can record customized memory settings. All memory settings will hold even if power is removed, until they’re changed again manually.
Note: You cannot start any charge, discharge, or cycle function from the memory screens. You must press MENU CHANGE to confirm all memory settings and move to the appropriate “charge” screen for the selected battery type.

Memory Screens



Press the dial, then rotate to select a memory (1-10). Re-press dial to confirm memory selection.

IMPORTANT! Press, then rotate dial to find the **EXACT** battery type to match your battery. Press dial to confirm.

Press, then rotate dial to find the voltage which **EXACTLY** matches the nominal voltage shown on the battery pack. Press dial to confirm.

Press, then rotate dial to find the capacity value which **MOST CLOSELY** matches the capacity shown on the battery pack. Press dial to confirm.

Press, then rotate dial to find the desired charge current. Refer to the "NiCd and NiMH Charge and Discharge Current" chart for recommendations. Press dial to confirm. (Screen not shown for lithium batteries, as current will automatically be set to the battery's 1C value).

Press, then rotate dial to find the discharge current value. Refer to the NiCd and "NiMH Charge and Discharge Current" chart to determine the proper current. Press dial to confirm.

Press, then rotate dial to find the discharge cut-off voltage. Refer to the "Discharge Cutoff Settings - NiCd and NiMH" chart on page 7 to determine the proper voltage. Press dial to confirm. (Screen not shown for lithium or lead-acid batteries.)

Once all memory settings have been entered, press "MENU CHANGE" to confirm all settings. Triton2 will automatically jump to the appropriate "charge" screen for the selected battery type.

4. SETTING BATTERY TYPE: If not using a memory, press BATT TYPE to find the battery type which **EXACTLY** matches your battery. Referring to the Main Menu flowchart, select from NiCd, NiMH, LiPo (use this for Li-Ion batteries also – see the “Selecting LiPo or Li-Ion Battery Type” section for details), and Pb (lead-acid).

5. STARTING CHARGE, DISCHARGE, OR CYCLE: Read the sections below for how to set values for the selected battery type, and how to start charge, discharge, or a cycle.

CARE & HANDLING INSTRUCTIONS FOR NiMH BATTERIES

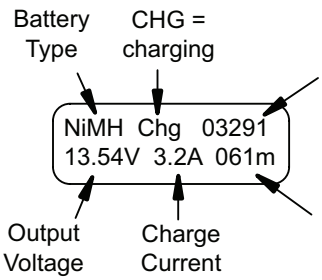
- **NEVER** allow NiMH batteries to overheat, as this could adversely affect their performance. If this happens, disconnect the battery from the charger immediately and allow to cool!
- **NEVER** deep cycle NiMH batteries as permanent damage could result.
- **NEVER** attempt to use the NiCd, Pb, or lithium 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 press BATT TYPE to find the “NiCd CHARGE” screen to charge a NiCd battery, or find the “NiMH CHARGE” screen to charge a NiMH battery.

2. To change the charge current, press the dial to cause the value to flash. Rotate the dial to find the desired charge current (0.1 – 7.0 amps). See the included NiCd AND NiMH CHARGE AND DISCHARGE CURRENT CHART for recommended current settings. Note that “0.2A” is the same as 200mA… “0.7A” is the same as 700mA, etc. Press the dial to confirm the selection. Note: Rotating the dial fully to either direction will cause “auto” to show. See the “Notes” section below for details on the auto function.

3. To **START PEAK CHARGE**, press and hold the dial for 2 seconds. “BATTERY CHECK” will show while T2 evaluates the condition of the battery. If the battery is ready, peak charge will start automatically at which time you’ll see a screen like shown at right.



Charge capacity: This is how much capacity (energy, in "mAh") that has been delivered to the pack during charge. When charge is finished, this number could be low if the battery previously had some charge. 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. When charge is finished, this number could be low if the battery previously had some charge. For a battery which previously had little charge, this number should be larger.

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.

4. When peak charge is finished, the screen will show “END” and tones will sound for 10 seconds. The charger will automatically go to trickle charge at this time (see the notes section below for details on trickle current). The battery is now ready for use. To see details about input, output, or peak battery voltage, press BATT TYPE and MENU CHANGE buttons simultaneously to see the DATA VIEW screens (see page 12).

Notes for charging NiCd and NiMH batteries:

- 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 NiCd AND NiMH CHARGE AND DISCHARGE CURRENTS table for recommended charge currents.
- A battery which is approaching or has reached full charge could 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. And lower the charge current setting for future charges.
- For packs having more than 12 volts, the actual amount of current delivered to the battery might automatically be limited so not to exceed the charger’s maximum rated charge ***power*** of 90 watts**.** See the included MAXIMUM POWER CHART for details.
- 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. When peak charge ends, a trickle charge current will automatically be delivered to the battery which 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. Trickle current is automatically set, based on the fast charge current setting as listed below:

Fast charge current	Trickle current	Fast charge current	Trickle current
0-0.9A	0	4.0-4.9A	200mA
1.0-1.9A	50mA	5.0-5.9A	250mA
2.0-2.9A	100mA	6.0-7.0A	300mA
3.0-3.9A	150mA		

* Peak charge can be stopped manually by pressing the dial, or disconnecting the pack.
* In the “auto” current setting, T2 will automatically set the appropriate charge current based on the condition of the battery. It is NOT recommended to use the “auto” function if charging smaller electric flight type NiCd / NiMH batteries (smaller than “AA” cells).

DISCHARGING NiCd OR NiMH BATTERIES

1. To discharge a NiCd battery, press BATT TYPE to find the "NiCd CHARGE" screen, then rotate the dial to find the "NiCd DISCHARGE" screen, and skip to step 3.

2. To discharge a NiMH battery, press BATT TYPE to find the "NiMH CHARGE" screen, then rotate the dial to find the "NiMH DISCHARGE" screen.

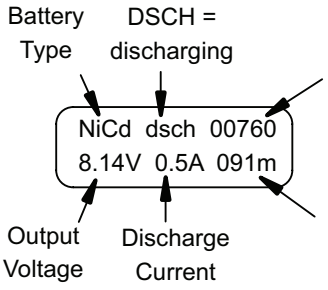
3. Discharge current and cutoff voltage can be adjusted in the discharge screens. Press the dial, then rotate to adjust the discharge current value as desired (0.1 – 3.0 amps). See the included NiCd AND NiMH CHARGE AND DISCHARGE CURRENTS chart for recommended discharge current settings. **Note**: Rotating the dial fully to either direction will cause "auto" to show. See the "Notes" section below for details on this auto function.

4. Press the dial to cause the discharge cutoff voltage to flash. This will be the voltage of the entire pack (not per cell) when discharge will end. Rotate the dial to find the desired value, then re-press the dial to confirm. See the DISCHARGE CUTOFF SETTINGS – NiCd & NiMH chart at right for recommended cutoff voltage settings. To measure how much TIME a battery can realistically, safely power a transmitter or receiver, it's recommended to use the "1.1V per cell" settings. Otherwise, to measure a battery's ability to hold its manufacturer's rated capacity, or to measure how much time a battery can realistically power an electric motor, use the "0.9V per cell" settings. **Note**: Rotating the dial fully to either direction will cause "auto" to show. See the "Notes" section below for details on this auto function.

5. To **START DISCHARGE**, press and hold the dial for 2 seconds. "BATTERY CHECK" will show briefly as T2 checks the condition of the battery. Discharge will start automatically if the battery is in suitable condition, at which time you'll see a screen like shown at right.

DISCHARGE CUTOFF SETTINGS - NiCd & NiMH

# cells in the pack	Rated pack voltage	Normal Cutoff Voltage (0.9V per cell)	Cutoff Voltage Tx and Rx batts (1.1V per cell)
1	1.2V	0.9V	-
2	2.4V	1.8V	-
3	3.6V	2.7V	-
4	4.8V	3.6V	4.4V
5	6.0V	4.5V	5.5V
6	7.2V	5.4V	-
7	8.4V	6.3V	-
8	9.6V	7.2V	8.8V
9	10.8V	8.1V	-
10	12.0V	9.0V	-
11	13.2V	9.9V	-
12	14.4V	10.8V	-
13	15.6V	11.7V	-
14	16.8V	12.6V	-
15	18.0V	13.5V	-
16	19.2V	14.4V	-
17	20.4V	15.3V	-
18	21.6V	16.2V	-
19	22.8V	17.1V	-
20	24.0V	18.0V	-
21	25.2V	18.9V	-
22	26.4V	19.8V	-
23	27.6V	20.7V	-
24	28.8V	21.6V	-



Discharge capacity: This is how much energy (capacity, in "mAh") the battery delivered during discharge. When discharge ends, this number could be low if the battery previously had little charge. For a battery which previously had been fully charged, this number should ideally be within 10% of the battery's own mAh rating.

Elapsed discharge time: This is the number of minutes the battery has been on discharge. When discharge is finished, if the battery previously had little charge, this number should be low. For batteries which previously had been fully charged this number should be larger.

6. 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 Triton2. To see details about input, output, or average discharge voltages, press BATT TYPE and MENU CHANGE buttons simultaneously to see the DATA VIEW screens (see page 12).

Notes about discharging NiCd and 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, causing a "No battery" error to show. It's best to remove the battery from the Tx and connect it directly to Triton2 for discharging (see page 4 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 3 amps. For packs having more than 6 volts, the actual amount of discharge current might automatically be limited so to not exceed the charger's maximum rated discharge ***power*** of 20 watts. See the included MAXIMUM POWER CHART for details.
- For batteries which are used in high current applications such as driving electric motors (not for Tx or Rx batteries), it's best to discharge down to 0.9V per cell in the pack as shown in the DISCHARGE CUTOFF SETTINGS – NiCd & NiMH table. When discharged at high current, a battery's voltage will drop more rapidly and this 0.9V discharge cutoff will allow Triton2 to more realistically simulate how long the battery will last during real use. Do NOT attempt to discharge cells to voltages lower than recommended.
- For transmitter and receiver batteries, it's best to discharge down to 1.1V per cell in the pack as shown in the DISCHARGE CUTOFF SETTINGS – NiCd & NiMH table. This will allow Triton2 to more accurately measure how many minutes a battery might SAFELY power a transmitter or receiver during actual use.
- After discharge, compare the final capacity measurement displayed 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 MENU CHANGE, or disconnecting the pack.
- In the "auto" current setting, T2 will automatically set the appropriate discharge current based on the condition of the battery. It is NOT recommended to use the "auto" function if charging smaller electric flight type NiCd / NiMH batteries (smaller than "AA" cells).
- There are two main reasons why someone would want to discharge a battery. First, to see if the battery is holding its rated capacity (see the CYCLING NiCd AND NIMH BATTERIES section). Or, to see how much capacity remains in the battery after a flying session. This can help you gauge how much energy your flight system is requiring from your battery.
- In the "auto" voltage setting T2 will automatically detect the number of cells in the battery, and then discharge the battery to 0.9V per cell in the pack. Discharge current may vary when in auto mode, which is normal.

CYCLING NiCd OR NiMH BATTERIES

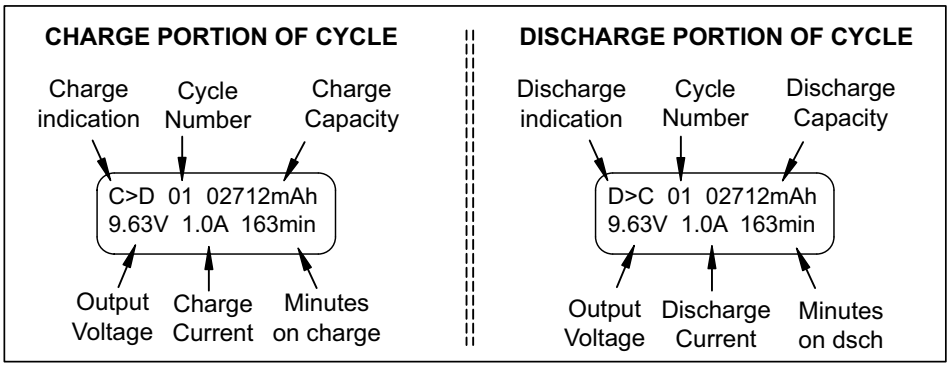
Battery "cycling" is the process of fully charging and then discharging a battery to a pre-determined cutoff point (or vice-versa). Cycling is recommended only for NiCd and NiMH batteries (never for lithium or lead-acid batteries). Triton2 can perform anywhere from one to ten cycles consecutively, as follows:

1. Decide if you want the battery to be discharged first (preferred if the battery is used often), or charged first (sometimes preferred if the battery is new or has not been used for some time). Refer to the main menu flowchart and proceed.

2. To cycle a NiCd battery, press BATT TYPE to find the "NiCd CHARGE" screen. Rotate the dial 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. To cycle a NiMH battery, press BATT TYPE to find the "NiMH CHARGE" screen. Rotate the dial to find the "NiMH CHG TO DSCH" or "NiMH DSCH TO CHG" screen (depending if you want to charge or discharge first).

4. Two current values will show – one for charge (Chg), and one for discharge (Dsch). Press the dial to cause the first current value to flash. **It's very important to note whether this is the charge (Chg) or discharge (Dsch) current!** Rotate the dial to find the current you want. Press, then rotate the dial to select the other current value, and press the dial again to confirm both settings. See the NiCd AND NiMH CHARGE AND DISCHARGE CURRENT CHART for recommended charge and discharge currents.



5. To set the number of times the battery will be cycled, press the dial until "1X" starts to flash. Rotate the dial to adjust the cycle count as desired ("1X" to cycle one time, "10X" to cycle ten times, etc.). Press the dial to confirm the cycle count.

6. To **START CYCLING**, press and hold the dial for 2 seconds. "BATTERY CHECK" will show briefly, and cycling will start if the battery is in suitable condition, at which time you'll see a screen like shown at right.

7. When all cycling is finished, "END" will show on-screen. To see details about input, output, peak charge, average discharge voltages, and capacity values for all cycles performed, press BATT TYPE and MENU CHANGE buttons simultaneously to see the DATA VIEW screens (see page 12).

Notes for cycling NiCd and 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 can be set to occur in-between the charge/discharge functions to allow the battery to cool. This delay period can be adjusted from 1-60 minutes in the Setup Menu (see page 12).
- During cycle mode, the discharge cutoff voltage for NiCd and NiMH batteries is FIXED (not adjustable) at 0.9V per cell.
- See the notes sections for NiCd/NiMH charge and NiCd/NiMH discharge for detailed information regarding charges and discharges.
- 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.

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, such as wooden or plastic workbenches, paper, carpet, cluttered areas, etc.
- **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

Triton2 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 Triton2 for the proper lithium type is necessary for safety, and will result in better performance for your packs.

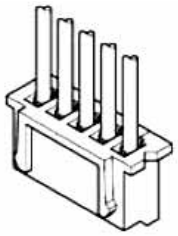
1. The default setting is for Triton2 to handle LiPo batteries (based on 3.7V per cell, with a maximum charge voltage of 4.2V per cell). If you will be using LiPo batteries only, skip the remainder of this section.
2. To change T2 to handle Li-Ion batteries, press BATT TYPE to find the "LiPo CHARGE" screen as shown on the main menu flowchart. Rotate the dial to find the "Lithium type" screen.
3. Press, then rotate the dial to find the "Li-Ion" option.
4. Press the dial to confirm the new selection. All screens and settings relating to lithium batteries will now be set for lithium-ion cells (based on 3.6V per cell, and a maximum charge voltage of 4.10V per cell). Rotate the dial 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 cells inside. 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.



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. It is **STRONGLY RECOMMENDED** to use T2's temperature cutoff function when charging lithium batteries! When used with the optional Thermal Probe (GPMM3151), this feature adds a high level of safety to the entire charging process. Refer to the "Temperature Cut-Off" section in the Setup Menu for details on how to use this feature.

1. Press BATT TYPE 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. One value is the battery's rated ***capacity*** (default is "350mAh"). Press, then rotate the dial to find the capacity value that **most closely matches** the capacity rating marked on your battery. You will not set the actual charge current value for lithium batteries. Instead, Triton2 will automatically set the charge current level based on this capacity setting (see notes section below for details).
3. Press the dial to cause the voltage value to flash. This is the nominal rated voltage for the entire pack. Rotate the dial to set this voltage to the **EXACT** nominal voltage rating shown on your pack. Press the dial to confirm both settings.

WARNING!! LiPo and Li-Ion batteries are very sensitive and volatile!! 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 the dial for 2 seconds. "BATTERY CHECK" will show briefly, and Triton2 will start charging if the battery is in suitable condition.

Notes about charging LiPo and Li-Ion batteries:

- Triton2 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 Triton2 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, Triton2 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 (4.0V for Li-Ion, 4.1V for LiPo), Triton2 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 approx. 1/10 of the charge current setting, at which time all charging will stop automatically 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 Triton2 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 90 watt max. **power** rating. 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.
- Charge can be stopped manually by pressing MENU CHANGE or disconnecting the pack.

5. When finished charging, the screen will show “END” and tones will sound for 10 seconds. The battery should now be ready for use. Triton2 will display details about the charge data for your battery, including charge capacity, elapsed charge time, etc. To see details about input, output, maximum battery voltage and temperature, press BATT TYPE and MENU CHANGE buttons simultaneously to see the DATA VIEW screens (see page 12).

DISCHARGING LiPo OR Li-Ion BATTERIES

1. At the “LiPo CHARGE” screen (or “Li-Ion CHARGE” screen if you selected that lithium type), rotate the dial to find the “LiPo DISCHARGE” screen (or “Li-Ion DISCHARGE screen).

2. Two values can be adjusted on this discharge screen. Press the dial to cause the discharge current value to flash. Rotate the dial to change this value (0.1 – 3.0 amps). To determine if a LiPo or Li-Ion battery can deliver its rated capacity, set this current to the C÷ 5 value. For example, for a battery rated at 2100mAh, set this current to (2100 ÷ 5) = 420mA, or “0.4A”.

3. Press the dial to cause the discharge cutoff voltage value to flash. This is the total pack voltage where Triton2 will stop discharging, and is based on 3.0V **per cell**. The cutoff voltage should be set to 3.0V for a 1-cell battery, 6.0V for 2-cell packs, 9.0V for 3-cell packs, 12.0V for 4-cell packs, and 15.0V for 5-cell packs. Rotate the dial to adjust this value as needed, then press the dial to confirm both settings.

4. To **START DISCHARGE**, press the dial for 2 seconds. “BATTERY CHECK” will show briefly, and Triton2 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 Triton2. To see details about input, output, and average discharge voltages and capacity, press BATT TYPE and MENU CHANGE buttons simultaneously to see the DATA VIEW screens (see page 12).

Notes about discharging LiPo and Li-Ion batteries:
- The maximum discharge current is 3 amps. For batteries having more than 6 volts, the actual amount of discharge current might automatically be limited so to not exceed the charger's maximum rated discharge ***power*** of 20 watts. See the included MAXIMUM POWER CHART for details.
- Discharge can be stopped manually by pressing MENU CHANGE, or disconnecting the pack.

CARE & HANDLING INSTRUCTIONS 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 LEAD-ACID BATTERIES (Pb)

1. Press BATT TYPE to find the “Pb CHARGE” screen.

2. Two values can be adjusted on the Pb charge screen. Press the dial to cause the charge current value to flash. Rotate the dial to change this value (0.1 – 7.0 amps). For 12V 7Ah (7000mAh) lead-acid field batteries, a slow charge current value of C÷10 is recommended, which would be (7000 ÷ 10) = 700mA or “0.7A”. A faster charge current value of C÷3 can be used, which would be (7000 ÷ 3) = 2333mA or “2.3A”.

3. Press the dial to cause the voltage value to flash. This is the nominal rated voltage of the entire battery. Set this voltage to the voltage printed on your battery. Most hobby field batteries have a nominal rated voltage of 12.0V. Rotate the dial to find the voltage value which matches that listed on your battery. Press the dial to confirm both settings.

4. To **START CHARGE**, press the dial for 2 seconds. “BATTERY CHECK” will show briefly, and Triton2 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. To see details about input, output, and maximum battery voltage, press BATT TYPE and MENU CHANGE buttons simultaneously to see the DATA VIEW screens (see page 12).

Notes about charging Pb batteries:
- Lead-acid (Pb) batteries are charged using the “constant current / constant voltage” process (cc/cv) as explained in the section for lithium batteries. However, the charger will determine the battery is full when output current drops to approximately 90mA and will automatically stop charging at that time. The cutoff voltage for Pb batteries is also different from lithium 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 90 watt max. charge **power** rating. 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 LEAD-ACID BATTERIES (Pb)

1. At the "Pb CHARGE" screen, rotate the dial to find the "Pb DISCHARGE" screen.

2. Two values can be adjusted on this discharge screen. Press the dial to cause the discharge current value to flash, then rotate the dial to change this value (0.1 – 3.0 amps). To determine if the battery can deliver its rated capacity, set this value to the battery's capacity (in mAh) divided by 20. So, for a 7Ah battery, set this current to (7000mAh ÷ 20) = 350mA or "0.4A".

3. Press the dial 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 12.0V (6 cells), the proper discharge cutoff voltage would be (1.8V x 6) 10.8V. Rotate the dial to adjust this value if necessary. Refer to the "notes" section below for a list of discharge cutoff voltages for lead-acid batteries of other voltages. Press the dial to confirm both settings.

4. To **START DISCHARGE**, press the dial for 2 seconds. "BATTERY CHECK" will show briefly, and Triton2 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 Triton2. To see details about input, output, and average discharge voltages, press BATT TYPE and MENU CHANGE buttons simultaneously to see the DATA VIEW screens (see page 12).

Notes about discharging Pb batteries:

- The maximum discharge current is 3 amps. Maximum **power** dissipation during discharge is 20 watts which might cause discharge currents to automatically be limited for packs having a voltage of over 6 volts. This is normal.
- The proper discharge cutoff voltage for batteries with a nominal rated voltage of 6V is 5.4V, and 24V batteries should be discharged to 21.6V.

SETUP MENU

Several customizable features which support the charge, discharge, and cycle functions are found in the Setup Menu, such as safety timers, time delays, thermal probe temperature settings, peak detection sensitivity, and others. **IT IS NOT NECESSARY TO CHANGE ANYTHING IN THE SETUP MENU.** All factory default settings in the Setup Menu allow Triton2 to be safe to operate without making any adjustments. If you do not wish to customize features in the Setup Menu, skip to the next section.

Refer to the Setup Menu flowchart included. Note that this menu is divided into four sections, for NiCd, NiMH, LiPo (or Li-Ion) and Pb batteries. Press the MENU CHANGE button to find the "Buzzer" screen, which is the first screen at the top of the Setup Menu. Rotate the dial to move up/down through all screens. To adjust any function, press the dial, rotate to the desired setting, and press the dial to confirm the selection.

1. BUZZER: Tones can sound to indicate functions have started or ended. Ten different melodies can be selected, from "Melody 1" to "Melody 10". "Buzzer Off" will turn the tones off.

2. SAFETY TIMER: IF for some reason the charger does not recognize a battery has reached full charge, a backup safety timer is built-in to automatically stop charge after a certain time. This protects a battery from reaching a dangerous overcharge condition. Set a safety time in minutes, which ranges from "No time limit" to "990 minutes". See the "Safety Timer Calculations" section at right for how to calculate a safety time limit. The "Time limit over" error message will show if this timer activates during charge. Do NOT assume the battery has reached full charge if this occurs – especially if the battery is not even slightly warm to the touch. If the battery is not reaching full charge, in the future it may be necessary to increase the safety timer minutes so the battery can reach full charge.

3. TEMPERATURE SCALE: When using the optional Thermal Probe, temperatures can be measured and displayed in degrees Fahrenheit (°F) or Celsius (°C). To change the setting, press the dial, rotate, then press the dial again to confirm the setting.

Safety Timer Calculations

For NiCd and NiMH batteries, divide the battery's rated capacity (mAh) by the fast charge current setting (A). Take that result, and **DIVIDE BY 11.1**. Set this number of minutes in the safety timer screen. If the charger stops charge at this time limit, approximately 150% of the battery's rated capacity will have been delivered to the battery. For example:

NiCd battery's rated capacity	Fast charge current setting	Safety timer calculated setting
1500mAh	2.5A	(1500 divided by 2.5) = 600, **divided by 11.1** = 54 minutes
3800mAh	2.3A	(3800 divided by 2.3) = 1652, **divided by 11.1** = 149 minutes
1000mAh	0.9A	(1000 divided by 0.9) = 1111, **divided by 11.1** = 100 minutes

For LiPo, Li-Ion, and Pb batteries, divide the battery's rated capacity (mAh) by the fast charge current setting (A). Take that result, and **DIVIDE BY 15.1**. Set this number of minutes in the safety timer screen. If the charger stops charge at this time limit, approximately 110% of the battery's rated capacity will have been delivered to the battery. For example:

LiPo battery's rated capacity	Fast charge current setting	Safety timer calculated setting
2100mAh	1.8A	(2100 divided by 1.8) = 1166.67, **divided by 15.1** = 77 minutes
900mAh	0.6A	(900 divided by 0.6) = 1500, **divided by 15.1** = 99 minutes
3200mAh	3.0A	(3200 divided by 3.0) = 1066.67, **divided by 15.1** = 70 minutes

4. TEMPERATURE CUT-OFF: This optional safety feature is **highly recommended when using LiPo/Ion batteries** and requires the use of an optional Thermal Probe (GPMM3151)**.** Set the maximum temperature the battery should be allowed to reach during charge or discharge. The temperature range is 50-150^{O} F (10-65^{O} C). No battery should ever get **HOT** during charge. A maximum setting of 100^{O}F (37^{O}C) is recommended for LiPo/Ion batteries. Connect the probe to the charger (see page 4) and the battery. Start charge or discharge. If the battery reaches the set temperature, charge or discharge will automatically stop and the "Batt.T too high" error will show. Discharge will automatically resume when battery temperature reduces to a safe level. Do not connect a temperature sensor to the charger if temperature monitoring will not be used.

The following features apply to NiCd and NiMH batteries only:

5. PEAK DELAY AT START: At the beginning of charge the voltage of NiCd and NiMH batteries can be somewhat unstable. This could cause the peak detection circuitry to accidentally stop charge far too early, which would cause the battery to NOT become fully charged. This peak delay function will temporarily turn off the peak detection circuit only during the very early stages of charge to prevent this from happening. Select the number of minutes to temporarily shut off the peak detector at the beginning of charge. A 3 to 5 minute delay is usually enough. Setting a delay time of 0 minutes turns this function off.
Note: Charge current will likely be lower than the setting during this time, which is normal.

6. DELAY BETWEEN CHARGE/DISCHARGE: This is a time delay designed to allow a battery to cool between charge and discharge portions of a cycle. Select from 1 to 60 minutes. If the battery becomes too warm during a cycle, increase the number of minutes on this screen to a higher value.

7. PEAK SENSITIVITY: When peak charging NiCd/MH batteries, Triton2 should see the battery's voltage increase to a maximum level – or "peak". Then, the battery's voltage should actually **drop** very slightly. When the charger sees this, it should stop charge completely. You can customize how closely Triton2 will try to detect this peak, which is called "peak sensitivity". This value is set in milli-volts **per cell** in the pack. A **higher** mV number can result in **less** precise peak detections. A **lower** mV number can result in **more** precise peak detections, but very low values (under 5mV) can sometimes result in erratic operation (depending on the quality of the input power source, input and output connections, battery, etc.). Recommended settings are 8-10mV for NiCd batteries, and 5-8mV for NiMH batteries.

The following features apply only to NiMH batteries:

8. NiMH MAX. CHARGE INPUT: This is another backup safety feature to protect NiMH packs. During charge, IF peak voltage is not detected and the safety timer has not expired, this function will automatically stop charge when the amount of capacity delivered to the battery matches the value set in this screen. Setting this number to 110% of the rated capacity of your battery is recommended. For a 650mAh battery, 110% would be (650 x 1.1) 715mAh. The 110% value of a battery rated at 1800mAh would be (1800 x 1.1) 1980mAh, etc. Setting a value of 9900mAh will effectively turn this feature off.

9. TOP-OFF CHARGE: When peak charge ends, delivering another short burst of charge will help to quickly maximize a NiMH battery's voltage before trickle charge starts. T2 will deliver the amount of current set in this screen **for 20 minutes only** before trickle charge starts. Set this screen to somewhere near 7% of the current set in the "NiMH CHARGE" screen. For example: if the "NiMH CHARGE" current is set at 3.5 amps, set this screen to (3.5A x 0.07 = 0.245A) 200mA or 300mA. If the "NiMH CHARGE" current is set to 850mA, set this screen to (850mA x 0.07 = 59mA) 100mA, etc. It's not critical to set this value with extreme accuracy. This feature can be turned off by setting this screen to "None". "Top-off" will show on the display during top-off charge, and "END" will show when complete (now in trickle charge).

DATA VIEW SCREENS - CHARGE, DISCHARGE & CYCLE DATA

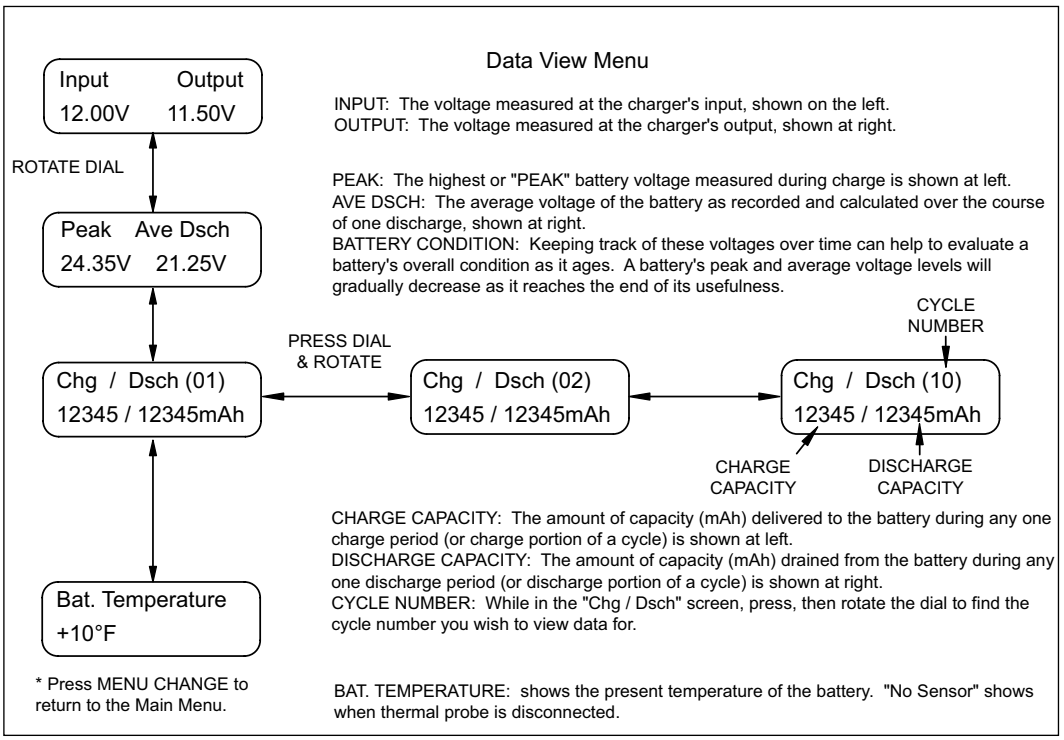
Triton2 keeps track of various type of data in the Data View Menu as shown below, which can be viewed at any time.

WHILE a charge, discharge, or cycle is occurring, press BATT TYPE to find the Data View screens. Press MENU CHANGE to return to the Main Menu.

BEFORE OR AFTER a charge, discharge, or cycle, press BATT TYPE and MENU CHANGE simultaneously to find the Data View screens. Press MENU CHANGE to return to the Main Menu.

To view capacity data for more than one cycle, rotate the dial to find the "Chg / Dsch" screen. The number on the top line is the cycle number. To view data for any cycle, press the dial, then rotate to find the cycle number you wish to view. On the bottom line, capacity measurements in mAh are shown on the left for the charge portion of the cycle, and on the right for the discharge portion of the cycle.

Press MENU CHANGE anytime to return to the Main Menu.



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 does NOT function at all times. The fan functions (1) during discharge, (2) during charge, if the temperature inside the charger exceeds 122°F, if the charge output power exceeds 30 watts, or the charge current exceeds 2.5A, or if charging batteries which have 1-3 cells, (3) if the internal temperature of the charger exceeds 212°F it will stop all charge or discharge functions until the temperature drops below 158°F – but the fan should continue to run until the temperature drops below 113°F. **CAUTION: Do not block the vent holes for the cooling fan. Failure to do so could cause the charger to overheat and possibly cause permanent damage.**

ERROR INDICATIONS & SAFETY FEATURES

Triton2 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 Triton2's input, the screen might turn black and no other operation will occur, but the charger 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 MENU CHANGE to clear the warning.

ERROR	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.
Overheating	All functions will pause when the temperature inside the charger exceeds 212°F (100°C). Functions will automatically resume after the charger has cooled to 158°F (70°C).
Time limit	When the time in the charge "Safety timer" screen has expired.

ERROR	PROBLEM AND SOLUTION
Batt.V too high	When the battery's voltage setting in the charger is too low. It may take up to 5 minutes for this error to show.
Batt.V too low	When the battery's voltage setting in the charger is too high. It may take up to 5 minutes for this error to show.
Batt.T too high	When the temperature of the battery exceeds the setting in the "Temp. cut-off" screen.
Reverse polarity	When a battery is connected to the output in reverse.
Communication	When an internal error occurs with the charger's calibration logic.

TROUBLESHOOTING GUIDE

PROBLEM: Display does not work or turns black when connected to power. Check power supply for proper power. Check input connections for proper contact, making sure it's not connected backwards.

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 a reasonable amount of time. Charge current too low. Safety timer not short enough. 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. Contact Hobby Services for further details.

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) year 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

TRITON 2

MAXIMUM POWER CHART

MAXIMUM CHARGE POWER = 90 Watts
At 12V input, current set to 7A, charge current automatically limited as follows:

Voltage (V)	Current (A)	Watt (W)
1.00-12.00	7.00	90
13.00	6.92	90
14.00	6.43	90
15.00	6.00	90
16.00	5.63	90
17.00	5.29	90
18.00	5.00	90
19.00	4.74	90
20.00	4.50	90
21.00	4.29	90
22.00	4.09	90
23.00	3.91	90
24.00	3.75	90
25.00	3.60	90
26.00	3.46	90
27.00	3.33	90
28.00	3.21	90
29.00	3.10	90
30.00	3.00	90
31.00	2.90	90
32.00	2.81	90
33.00	2.73	90
34.00	2.65	90
35.00	2.57	90
36.00	2.50	90
37.00	2.43	90
38.00	2.37	90
39.00	2.31	90
40.00	2.25	90

MAXIMUM DISCHARGE POWER = 20 Watts
At 12V input, current set to 3A, discharge current automatically limited as follows:

Voltage (V)	Current (A)	Watt (W)
1.00-6.00	3.00	20
7.00	2.86	20
8.00	2.50	20
9.00	2.22	20
10.00	2.00	20
11.00	1.82	20
12.00	1.67	20
13.00	1.54	20
14.00	1.43	20
15.00	1.33	20
16.00	1.25	20
17.00	1.18	20
18.00	1.11	20
19.00	1.05	20
20.00	1.00	20
21.00	0.95	20
22.00	0.91	20
23.00	0.87	20
24.00	0.83	20
25.00	0.80	20
26.00	0.77	20
27.00	0.74	20
28.00	0.71	20
29.00	0.69	20
30.00	0.67	20
31.00	0.65	20
32.00	0.63	20
33.00	0.61	20
34.00-40.00	<0.60	20

The Triton 2 may not deliver full charge current on batteries which are greater than 12.0V or LiPo, Li-Ion or Pb batteries during the constant-voltage portion of charge mode. This normal.