

TURBO30 TURBOFLEX OPERATING INSTRUCTIONS

WARNING

It is dangerous to work in the vicinity of a lead-acid battery since they generate explosive gases during normal battery operation. To prevent an explosion when using a lead-acid battery, such as an automobile battery, you must disconnect the 6 fool leads from the Turbothirty before putting on or taking off the leads connecting to the lead-acid battery terminals. Operate the Turbothirty as far away from the lead-acid battery as possible. This will keep any sparks or arcing away from the lead-acid battery.

To reduce the risk of injury, use only high-rate rechargeable nickel cadmium or nickel metal hydride batteries with the Turbothirty. Any other type of battery may burst and cause personal injury.

DO NOT leave the Turbothirty unattended. The remote possibility of an electronic failure could cause an extreme overcharge. This could cause the battery to burst and cause a fire hazard.

The Turbothirty is designed to provide data about high-rate rechargeable nickel cadmium batteries used in R/C car racing. In order to simulate the discharge rates obtained during racing, The Turbothirty is designed to discharge at high currents. While the methods used in the Turbothirty are common in selecting cells, excessive cell heat generated during the process may cause damage to the cells or cause them to vent battery acids. To reduce the risk of injury, Always wear safety glasses when operating the Turbothirty.

Always made sure all the batteries in the pack are in the same state of discharge before charging a pack. Otherwise, the cells that are partially charged before charging will get extremely hot and may be damaged or vent battery acids.

Check your battery pack occasionally for overheating. If the cells are too hot to touch, there is something wrong and the pack must be disconnected from the charger.

Competition Electronics, Inc. shall not be liable for any property damage or personal injury which may result from the failure to follow these instructions or other improper use of this product.

GENERAL DESCRIPTION

The Turbothirty is a microprocessor based charger/discharger system for high-rate rechargeable batteries for use in R/C. It is a linear type and can fully charge 1 to 7 cells at a digitally presettable amperage up to a maximum of 12.0 amps using the peak detection method. It can automatically repeak up to 2 more times with different charge amp rates and peak detect drop-back volts for each peak. After a charge, the charge time, peak charge volts and time since the charge was done can be displayed. Turboflex charging (reflex) may also be selected with intensity being settable from 1 to 9 for every peak. The Turbothirty can discharge 1,4,6 or 7 cell packs and automatically turn off at a user settable cutoff voltage. The settable discharge amps can be between 5 to 30 amps for 1,4 and 6 cells and between 5 to 25 amps for 7 cells. After the discharge cycle, the discharge time and the discharge average cell voltage can be displayed. It can also automatically charge, repeak and discharge 1,4,6,7 cells using the parameters set for the charge and discharge functions. It can automatically cycle cells up to 9 times with up to a 16 hour wait between cycles. Upon completion of the last cycle, all the charge and discharge readings can be displayed along with the relative cell resistance. Another mode available on the Turbothirty is the buzz box mode. This mode is used to obtain higher initial voltage from SCR cells. The final mode available is the motor break-in mode. Here the motor voltage and run time may be set. The run current is displayed. Another screen will display the source supply voltage. All the settable values can be saved in one of three available power-down memories. Upon power up, on of the three setups may be selected and reloaded from memory.

SUPPLY VOTS

The Turbothirty will operate from a 12 volt automobile battery (see above warning notes) or any DC supply within the voltage range of 12 to 16 volts and 12 amp or more capacity. It will operate with less amperage, but the charge current will be limited to the maximum capacity of the supply. Do not use a 12 volt car battery charger. It is unfiltered DC and

will damage the Turbothirty.

CONNECTIONS

The long 5 foot supply lead plugs into the connector on the left side of the Turbothirty (see warning notes above). You must connect to the supply first then the battery pack. Otherwise the Turbothirty will not work. The battery pack connector and the supply connector are the opposite type so they cannot be plugged in backwards. The red alligator clip on the 5 foot lead connects to the positive (+) on your DC supply. The black lead connects to the negative (-). The leads supplied for the battery pack hook-up are the alligator type. Be sure you observe polarity when connecting to your battery pack, positive to red and negative to black. Damage may result if polarity is not observed. The connector supplied may be hooked directly to your battery if it is compatible and the polarity is the same. Other adapters are available from various manufacturers. The small leads from the Turbothirty are voltage sensing leads. They are used mainly for the discharge or cycle modes to get an accurate voltage measurement. Connect them directly to the battery pack while observing correct polarity. Voltage sensing is also done thru the heavy current carrying leads but will give slight voltage errors especially with heavy charge or discharge current. The slight error, however, doesn't effect the charging of the battery.

OPTIONAL BATTERY BOX

To connect to the optional battery box, simply plug the battery box into the battery pack connector from the Turbothirty. Then connect the small red alligator clip to the small red lead on the battery box and the small black alligator clip to the small black lead. The small voltage sensing leads must be connected to get accurate discharge readings. Do not hook up any extra wire to the battery box high current leads. This can cause the discharge current to taper off at the end of the discharge.

Mount the end of the battery box with the springs to a flat surface with the holes provided. The other end of the box is left free to move. Do not tighten the screws all the way, otherwise the battery box will not move freely.

The battery box may be forced open by squeezing the spring end of the rods and the box between the thumb and forefingers. This is useful for placing the battery in the box. The positive terminal of the battery goes to the red lead end of the battery box. Rotating the battery in the box will ensure good connection between the contacts and the battery. To remove the battery, place your finger underneath the battery and push up.

The contacts used are tin plated brass contacts. The contacts can be cleaned using a model train track cleaner for brass tracks such as Rail Zip. They should be cleaned twice a day.

GENERAL OPERATION

To select the mode of operation, simply push the (CHG), (DISCHRG), (CYCLE) or (MOTR) button. To get to the rest of the modes, push the (LEFT ARROW) button. At that mode, you may be able to increment a settable value by pushing the (UP ARROW/OFF) button. A cursor line will appear under the digit of any settable values. After setting the desired value, push the start (START) button to begin the selected mode of operation. You can only start a mode of operation from a screen that has the top line displayed. To stop the Turbothirty at any time, push the (UP ARROW/OFF) button. The (RIGHT ARROW) button will scroll thru the modes backwards. The menu change button (MENU CHG) will toggle between the modes of operation and the default values (settable) menu. To go directly to Turboflex set screen for the first peak from any screen, push the (LEFT ARROW) button and hold it down, then push the (START) button. Use the same technique to go to the 'save setup' screen with the (LEFT ARROW)-(UP ARROW/OFF) push buttons. For the 'load setup' screen use the (LEFT ARROW)-(RIGHT ARROW) push buttons. Using the dual push buttons will enable you to quickly get to the desired screens. Continuously pushing the (LEFT ARROW) button will page from screen to screen. The selectable screens are as follows in order displayed.

MAIN MENU SCREENS

- v Charge mode
- v Display peak charge volts
- v Display supply volts
- v Discharge mode
- v Display discharge average pack volts
- v Display Milliamp hours
- v Display relative internal cell resistance
- v Automatic cycle mode
- v Motor run mode
- v Buzz box mode
- v Save setup values mode
- v Load setup values mode

DEFAULT VALUES MENU SCREENS

The screens are as follows in order displayed.

- v Trickle charge select (.3 amps)
- v Long lockout select (10 minutes)
- v Peak detect drop-back volts – number 1 peak
- v Turboflex for peak 1 select mode
- v Delay time – number 1 peak
- v Charge Amps – number 2 peak
- v Peak detect drop-back volts – number 2 peak
- v Turboflex for peak 2 select mode
- v Delay time – number 2 peak
- v Charge Amps – number 3 peak
- v Peak detect drop-back volts – number 3 peak
- v Turboflex for peak 3 select mode
- v Number of cell and cutoff volts for discharge
- v Cool down time between cycles
- v Motor run time

CHARGE MODE

Push the (CHRG) button to get to the charge screen directly. You may also push the (LEFT ARROW) button until you see the message 'CHARGE#PK1 3.0'. The cursor will be under the digit that is settable. To set any other digit, simply push the (LEFT ARROW) button or (RIGHT ARROW) button until the cursor is under the digit. To increment the digit setting, push the (UP ARROW/OFF) button until you reach the desired setting. The value can be set up to a maximum of 19.9 amps at this time, but the Turbothirty will only allow you to run a maximum of 12.0 amps when you push the (START) button. You can also set the number of peaks by setting the number next to the '#PK' part of the screen. Using 1 peak will charge your battery completely. Using peaks 2 and 3 will reapek your battery. The charge amps for peaks 2 and 3, delay between peaks, Turboflex intensity, Turboflex on/off and peak detect drop back voltages are settable in the default values menu. (see DEFAULT VALUES MENU)

To run the charge mode, you must have the message 'CHARGE #PK1 3.0' on the display. When you push the (START) button, the message 'CHARGE 1 XX.XX' will appear on the second line of the display. The 'XX.XX' is the actual supply voltage, under load, at the Turbothirty. The '1' after 'CHARGING' tells which peak the charge is on. During time delay, the upper left hand number is the amount of delay time that has been completed. The top line of the display, from left to right, will show the actual charge time in seconds, the pack volts, charge current and will be updated constantly. The actual charge current shown on the display will fluctuate slightly and will be within 0.1 of an amp of the value selected.

After a completed charge, the number in the upper left hand corner will be the time since the charge has been completed. To get the actual charge time, just push the (LEF ARROW) push button and the time will appear in the upper left hand

corner of the display. It is normal and desirable for the batteries to be slightly warm at the end of the charge cycle. If your battery false peaked, the cells will be cold and the charge time will be short. For maximum performance, never repeak your batteries more than twice.

The charge mode will only allow a maximum of 3000mah charge before automatically shutting off. This is to assure that batteries that tend not to peak will be shut off before they are overcharged excessively.

The charge mode has a peak detect drop-back voltage warning built into it. If the peak detect drop-back voltage exceeds .03 volt for a dingle cell or .09 for a multiple cell pack, the warning message 'PEAK DET TOO HI-BAT MAY NOT PEAK' will appear. If you still desire to continue, just press the (START) push button again. Otherwise, push the (UP ARROW/OFF) or the (LEFT ARROW) push button to go directly to the screen needed to change the value. We recommend a value of .03 volts for a single cell and .05 volts for packs. Generally, the larger the value the hotter the battery will become at the end of the charge. Any value over .03 volts for a single cell may cause the cell not to peak. A high value of charge current will also give hotter batteries.

The standard peak detect lockout time is 60 seconds. This means the charge will run 60 seconds even if the battery voltage is dropping. A long peak detect lockout of 10 minutes can be selected in the default menu. The long lockout will only last one charge and must be reselected if needs again. It will also be cleared if the (UP ARROW/OFF) button is pushed. The long peak detect lockout is meant to be used with packs that have a bad tendency to false peak.

PEAK CHARGE VOLTS DISPLAY MODE

To display the peak charge volts, push the (LEFT ARROW) button until you see the message 'PEAK CHG V XX.XX'. The 'XX.XX' digits show the supply volts. It is useful to detect a nearly dead automobile battery or a supply that is past the maximum of 18 volts allowable under the warranty. The supply volts are also displayed while running main modes of operation. This is useful for detecting a weak supply during charging.

DISCHARGE MODE

To run the discharge mode, push the (DISCHRG) button. You may also push the (LEFT ARROW) button until you see the message 'DISCHG AMP XX XC'. The letters 'DISCHG' mean you are in the discharge mode. The 'XX' digits show the discharge rate selected in amps. Maximum discharge rate for 1,4 and 6 cell is 30 amps or 25 amps for 7 cells. Minimum setting is 5 amps. The 'XC' indicates the number of cells to be discharged. Set the amps and number of cells by using the (LEFT ARROW) button and the (UP ARROW/OFF) button. The cutoff volts for 1, 4, 6 and 7 cell packs can be set in the DEFAULT MENU. To get there, just press the (MENU CHNG) push button. Press the (MENU CHNG) push button again to get back.

To run the discharge mode, you must have the 'DISCHG AMP XX XC' message on the display and the voltage ON THE DISPLAY must be above the cutoff voltage and below a maximum of 1.5 volts per cell. You may have to wait a few seconds for the voltage to come up when connecting up a pack before you can push the (START) button. When you push the (START) button, the message 'DISCHGING XX.XX' will appear to indicate that you are actually discharging.. The 'XX.XX' digits show the supply volts. The actual discharge time in seconds, the pack volts and the discharge current will be displayed on the top line of the display and are updated constantly.

After your pack has reached the drop-out voltage, the message 'DISCHARGE DONE' will be displayed. To get to the 'DISCHG AMP XX XC' display, push either the (LEFT ARROW) or the set digit (UP ARROW/OFF) button. The discharge time for the pack is displayed in the upper left hand corner. The discharge time is useful to check the amount of time left tin your pack to determine gear sizes. A 20 amp discharge rate is useful to get approximate run time left for 1/0 scale cars.

DISCHARGE AVERAGE VOLTAGE DISPLAY

After the discharge or cycle mode has been run, the average voltage of the pack or cell during discharge can be displayed.

Just push the (LEFT ARROW) button until the message 'DISCHG AVE X.XX' is displayed.

RELATIVE INTERNAL CELL RESISTANCE DISPLAY

After the cycle mode has been run, the relative internal resistance of the cell can be displayed. Just push the (LEFT ARROW) button until the message 'INTERNAL RES XX' is displayed. The lower the relative internal resistance the more punch the cell will deliver. Another effect the oval racers find is that the lower resistance SCRC packs have more speed at the end of the run. The RED SCR's and the BLACK SCRC's will have a range from 25 to 40 for a single cell. The PURPLE P-170's will have a range from 35 to 75.

AUTOMATIC CYCLE MODE

To get to this mode, push the (CYCLE) button. You may also push the (LEFT ARROW) button until the message 'CYCLE X CELLS X' appears. The 'CELLS X' indicates the number of cycles to be run. Set the number of cycles and cells by using the (LEFT ARROW) button and the (UP ARROW/OFF) button. The cool down minutes between cycles for more than one cycle can be set in the DEFAULT MENU. To get there, just press the (MENU CHNG) push button then the (LEFT ARROW) to get to the message 'COOL DWN NIM XXX'. Press the (MENU CHNG) push button again to get back. The Turbothirty will use the charge amps, delay times, no. of peaks and peak detect drop-back volts set up in the charge mode. It will also use the cutoff volts and discharge amps set up in the discharge mode.

To start this mode, push the (START) button. The message 'CYCLX CHG XX.XX' will appear. The 'X' in 'CYCLX' indicates the cycle number being run now. 'CHGX' tells that the Turbothirty is charging and that it is working on the 1st, 2nd or 3rd peak. The 'XX.XX' is the supply volts. The first line on the display will show the actual charge time in seconds, the cell voltage and the charge current.

The display 'CYCLX DLYX XX.XX' indicates that it is in delay number 1,2 or 3 as designated in 'DLYX' by the 'X' digit. The delays are set up in the charge mode. There is a 15 second delay between the last charge peak and discharge.

The display 'CYCLX DSCG XX.XX' indicates that it is in the discharge mode.

The display 'COOL DOWN CYCLEX' indicates that it is in the cool down period between cycles. The 'X' in 'CYCLEX' designates the next cycle to be run. The number in the upper left hand corner is the time that has past in minutes for the cool down period.

The cycle mode follows the sequence below.

- v Charge battery – using charge mode setup
- v Delay 15 seconds between charge and discharge
- v Discharge battery – using the discharge mode setup
- v Cool-down or completed depending on number of cycles set

MOTOR RUN FEATURE

To get to this mode, push the (MOTR) button. You may also push the (LEFT ARROW) button until the message 'MOTOR VOLTS X.XX' appears. The 'X.XX' INDICATES THE VOLTS YOU WISH TO RUN THE MOTOR AT. Set the volts desired by using the (LEFT ARROW) button and the (UP ARROW/OFF) button. The motor run time in seconds can be set in the DEFAULT MENU. To get there, just press the (MENU CHNG) push button. Press the (MENU CHNG) push button again to get back.

To start the motor run mode, you must have the 'MOTOR VOLTS X.XX' message on the display. Push the (START) button and the message 'MOTOR ON XX.XX' will appear to indicate that you are actually running. The 'XX.XX' digits show the supply volts. The current run time in seconds, the motor volts and the motor run current will be displayed on the top line of the display and are updated constantly. It takes a few seconds for the voltage reading to respond.

The Turbothirty checks to make sure there is no voltage on the leads before it will start the motor. This will prevent you from starting this function if there is a battery hooked up to the leads. If you start the motor and then turn it off with the (UP ARROW/OFF) push button, a voltage will remain shown on the screen for a few seconds. This will prevent you from starting the motor again until the voltage reading goes close to zero.

The motor will take about 3 seconds to wind-up to speed. This is due to the soft start mode used by the Turbothirty. This keeps the power supply from going into current limiting caused by the start-up current of the motor.

BUZZ BOX MODE

To get to this mode, push the (LEFT ARROW) button until the message 'BUZ BOX SEC XX' appears. You may also push the (LEFT ARROW) button and the (UP ARROW/OFF) button. The maximum allowable seconds is 19.

To set the number of amps to charge, push the (LEFT ARROW) button until the message 'BUZ BOX AMPXX' appears. The 'XX' indicates the number of amps to be charged. Set the amps by using the (LEFT ARROW) button and the (UP ARROW/OFF) button. The maximum amps allowable in this mode is 18 amps.

DO NOT use this mode more than once per charge as it could cause the batteries to vent. Use of this mode at high charge amps can degrade your batteries. DO NOT use on PURPLE P-170 cells or BLACK SCRC cells as they will degrade quickly at high charge amps. Use only on SCR cells.

SAVE SETUP SETTABLE VALUES

To get to this mode, push the (LEFT ARROW) button until the message 'SAVE SETUP X' appears. You may also push the (LEFT ARROW) button and hold it down while then pressing the (UP ARROW/OFF) button to get to there directly. Pushing the (START) button will store all the settable values in one of the three selectable power down memories for use the next time you power up the Turbothirty.

LOAD SETUP SETTABLE VALUES

To get to this mode push the (LEFT ARROW) button until the message 'LOAD SETUP X' appears. You may also push the (LEFT ARROW) button and hold it down while then pressing the (MENU) button to get to there directly. Pushing the (START) button will load all the settable values from one of the three selectable power down memories.

TURBOFLEX

The Turbothirty employs our own version of reflex charging called TurboFlex. Turboflex charging can recondition cells by lowering the internal resistance thru breaking up of the crystalline structure formed by aging cells, it can also reduce heat buildup during charging by reducing gas build up the cells. Before charging you may select one of 9 intensities for each of the three peaks in the default menu. Also TurboFlex may be turned on or off for each of the three peaks. Intensity 1 is the lowest and 9 is the highest. We recommend intensity 3 for RED SCR's and 6 for BLACK SCRC's or PURPLE P-170 cells. You can jump directly to the Turboflex screen for the first peak by pushing and holding down the (LEFT ARROW) button and then pushing the (START) button.

DEFAULT MENU

The default menu can be selected by pushing the (MENU CHNG) push button. Pushing the (LEFT ARROW) or (RIGHT ARROW) will position the cursor under the desired value to change. A listing of the screens in this menu is shown in the GENERAL OPERATION section. The main menu can be returned to by pushing the (MENU CHNG) push button again.

FLASE PEAKS

False peaks can be caused by several things, Batteries that have been full discharged can false peak for several minutes. Use the long lockout to alleviate this problem. Another cause is using alligator clips on solid leads. This can produce a poor connection that can't handle the charge current. It is best to clip onto braided wire or multi-strand wire where more area is contacted by the alligator clips. Using connectors that are worn or dirty can also produce false peaks because of poor connections. Turboflexing can also cause batteries that haven't been flex charged before to false peak. Either continue to restart the Turbo thirty until the batteries continue to charge or use the long lockout so the batteries will charge 10 minutes before the peak detecting occurs.

DISCHARGING FOR PERFORMANCE

To get maximum performance from your batteries, discharge them first using the discharge function then fully discharge them using a .1 ohm 10 watt or a 1 ohm 5 watt resistor across each cell until the pack is cool. Any longer than that is not necessary and may cause them to false peak at the beginning of a charge. By putting a resistor across each cell, all cells will be fully discharged.

FUSES

Sooner or later you will blow a fuse by hooking up the supply backwards. It is best to go out and buy extra 15 amp fuses in parallel. It is almost certain if one of these fuses are blown, they both are blown. They will fatigue after a while and finally blow. How long they last will depend on the discharge current. The higher the normal discharge current used, the shorter the life. They are the fuses that are in series with the battery pack. The single fuse in its own opening is for the power supply.

TEMPERATURE RANGE 32 TO 100 degrees Fahrenheit.

WHEN IT DOESN'T

Make sure that you have connected the supply leads first and then the battery leads. Check the fuses to make sure that they are not blown. See section on FUSES.

Please call us before you send the unit back. We may be able to tell you if the unit is malfunctioning or if there is some operating consideration that needs further explanation. Phone no. (815) 874-8001.

REPAIR POLICY

All repairs are completed within 5 working days. Total charges will include parts cost, labor and return shipping. Include your return address, a daytime phone number and an explanation of the problem.

SUGGESTED BATTERY MATCHING SETUP

A 20 amp discharge rate is recommended for matching Sanyo SCR's, SCRC's and PURPLE P-170'S. SCR discharge times can run between 230 to 300 seconds, SCRC's and P-170's run between 300 and 360 seconds. SCRC batteries are less stable and less rugged than SCR's. We recommend a charge rate of 3 to 5 amps for RED SCR's, BLACK SCRC's and PURPLE P-170. Set the cutoff volts at 0.9 volts per cell. I.e: 6 cell at 5.4 volts. This is the default value from the factory. Set the peak detect drop-back volts at 0.03 for a single cell and 0.05 for packs. Set delay times at 120 seconds. Use a 2 peak charge (#PK2) set on the charge screen.

BATTERY MATCHING TECHNIQUES

The primary number used for matching batteries is the discharge time. Group cells in a pack as close as you can. The discharge average voltage is an important number for matching RED SCR's or BLACK SCRC's for stock class. You want as high a discharge average voltage as you can get. Use the discharge time first as the primary number, then the discharge average voltage to grade with. The higher the discharge average voltage the more punch the motor will have. Use the

relative internal resistance also as a grading factor for punch. The lower the resistance the better the punch. This combination will give you the most speed and punch. For SCRC or P-170 packs with modified motors, the relative internal resistance should be the second number to grade by. The discharge average voltage is not as important because you can always go to a lower wind motor to compensate for the voltage. To obtain the best possible matching, cycle new batteries 3 or 4 times. This will insure the maximum performance from each cell.

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