

## \*\*\*\*\*WARNING\*\*\*\*\*

Use only high-rate rechargeable nickel cadmium batteries with the TURBOMATCHER 4. Any other type battery may burst during testing and cause personal injury.

The TURBOMATCHER 4 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 TURBOMATCHER 4 is designed to discharge at high currents. While the methods used in the TURBOMATCHER 4 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 TURBOMATCHER 4.

## CAUTION

Static electricity can damage sensitive electronic circuitry in the TURBOMATCHER 4. We recommend not operating the TURBOMATCHER 4 in a carpeted area, especially if it is nylon carpet. It is a good idea to get into the habit of grounding yourself first, before loading cells. This will dissipate any static charge buildup.

## GENERAL DESCRIPTION

The TURBOMATCHER 4 is designed to rate 4 individual cells at a time at actual racing current draw. It will provide a charge/repeak/discharge cycle that is completely automatic. It can also provide repeak/discharge or discharge only cycles. It has settable charge amp rates from 2 to 7 amps. The settable discharge amp rates are from 15 to 30 amps standard. It provides information such as discharge time, discharge average voltage, charge time, charge peak voltage, milliamp hours, Milliwatt hours, relative internal resistance and a discharge graph of each cell. It has a printer port to connect to a user provided printer that produce labels and graphs for each cell. The port can also connect to a computer with a parallel to serial converter. The TURBOMATCHER 4 has a 32 character display to display all the data on each cell and screens to set operating parameters. An 8-button keypad is provided for operation of the TURBOMATCHER 4. Four individual battery holders with separate current and voltage contacts are provided to give accurate results.

## SUPPLY VOLTS

The TURBOMATCHER 4 operates from a 13.8 volt DC supply at the maximum charge current required. (Suggested minimum of 5 amps). More than one TUR-

BOMATCHER 4 may be run off one supply providing that the power supply can furnish the required charge amps of all the TURBOMATCHER 4s. ie: two TURBOMATCHER 4s charging at a maximum of 3 amps each would require a 6-amp supply.

## LOADING THE CELLS

The cells must be positioned with the positive terminal towards the back of the case. The cells are numbered from left to right. After the cells are loaded, rotate the cells one quarter to one half turn to clean the contact area on the battery and on the battery holder.

## GENERAL OPERATION

There are 8 push buttons that control the TURBOMATCHER 4 and set the operating parameters. The left arrow push button advances the cursor from one screen to the next and from one settable digit to the next from right to left. The right arrow push button moves the cursor from the present screen to the previous one and from the present digit to the previous one from left to right. The CYCLE push button will initiate the charge/repeak/discharge cycle. The OFF/UP ARROW push button will force a stop to the charge/repeak/discharge cycle. The OFF/UP ARROW push button will also increment any settable digit the cursor is positioned under. The DOWN ARROW push button will decrement any settable digit the cursor is positioned under. To set any parameter, push the LEFT or RIGHT ARROW push button until the desired screen is reached and the cursor is positioned under the desired digit to be set. Push the OFF/UP ARROW push button or DOWN ARROW push button until the desired value is reached. The operating parameters selected can be saved in one of three power down memory locations (setups). The last used setup will automatically be recalled upon power up. To start a charge/peak/discharge cycle, simply push the CYCLE push button at any time. To start a peak/discharge only cycle, depress the REPK DISCHRG push button. To start a discharge only cycle, depress the DISCHG push button. Upon completion of any cycle, the beeper will sound if selected to. Also, the label or graph or computer data may automatically be outputted to the parallel port if selected. Pushing the LEFT or RIGHT arrow buttons will stop the beeper. The TURBOMATCHER 4 has 15 basic screens while it is in the idle mode and 3 of the 15 basic screens are available while it is in the run mode. The basic screens are as follows:

- \*All cell status
- \*Supply volts and actual charge amps
- \*Individual cell data (One screen for each of the 4 cells)
- \*Charge amps set (saves in setup)
- \*Discharge amps set (saves in setup)
- \*Discharge end volts set (saves in setup)
- \*Peak detect volts set (saves in setup)
- \*Flex level and on/off set (saves in setup)

- \*Discharge end time set (saves in setup)
- \*Set name on label (saves only 1 name)
- \*Type of data output on parallel port (saves in setup)
- \*Milliamp hour and Milliwatt hour and relative internal resistance display (One screen for each of the 4 cells)
- \*Sound horn on/off select (saves in setup)
- \*Store 1 of 3 setups
- \*Recall 1 of 3 setups

## **ALL CELL STATUS SCREEN**

This screen shows the cell number along with the individual status of each cell. The different statuses are ready (READY), off (OFF), charging (CHRG), reapeking (REPEK), discharging (DISCHG), delay (DELAY) and done (DONE). This screen is shown during idle and running.

## **SUPPLY VOLTS AND ACTUAL CHARGE AMPS SCREEN**

This screen shows the supply volts at the TURBOMATCHER 4. The voltage at the TURBOMATCHER 4 will be lower than at the supply due to the voltage drop across the power cord while charging. Also shown on the screen are the actual charge amps during charging. This type of screen is shown during idle and running.

## **INDIVIDUAL CELL DATA**

Each cell has its own data screen. On each screen is shown on the top line the charge time in seconds, present cell voltage, discharge time in seconds. On the bottom line is shown the cell status, cell number and discharge average voltage. This type of screen is shown during idle and running.

## **CHARGE AMPS SET SCREEN**

This screen shows the present charge amps setting. Positioning the cursor under the desired digit with the LEFT ARROW or the RIGHT ARROW push button and then depressing the OFF/UP ARROW push button or DOWN ARROW push button until the desired value is reached will set each digit. Default setting is 4.00 amps. This number is settable in each of the three available setups.

## **DISCHARGE AMPS SET SCREEN**

This screen shows the present discharge amps setting. It is set in the same manner as the charge amps. Default setting is 20.0 amps. This number is settable in each of the three available setups. The minimum setting is 15 and maximum is 30 amps.

## **DISCHARGE END VOLTS**

This screen shows the present voltage setting for all cells to stop the discharge time clock for each cell. Default setting is 0.90 volts DC. The TURBOMATCHER 4 will continue discharging until the battery voltage reaches .2 volts. This assures that the cell is completely discharged. This number is settable in each of the three available setups.

## **PEAK DETECT VOLTS SET**

This screen shows the present peak detect voltage. The peak detect voltage is settable from .01 to .09 volts. This number is settable in each of the three available setups.

## **TURBOFLEX LEVEL AND TURBOFLEX ON/OFF SET**

The TURBOMATCHER 4 employs our own version of reflex charging called TurboFlex. TurboFlex charging can recondition cells by lowering the internal resistance through breaking up of the crystalline structure formed by aging cells, It can also reduce heat buildup during charging by reducing gas build up in the cells. Before charging you may select one of 9 intensity levels. Intensity 1 is the lowest and 9 is the highest. Also, TurboFlex may be turned on or off. We recommend intensity 3 for RED SCR's and 6 for BLACK SCRC's, PURPLE P-170 or the 2000 cells. The intensity and ON/OFF is set in the same manner as previous values.

## **DISCHARGE AVERAGE END TIME**

The discharge average volts stops being averaged when the discharge average end time or the discharge cutoff voltage is reached whichever comes first. This is useful for finding the discharge average end volts for shorter run times than the full capacity of the cell. It is set in the same manner as the pre-

vious screens. The default time is 5000 seconds. This number is settable in each of the three available setups. 240 seconds represents a 4-minute race and therefore is a commonly used number. This may be advantageous to know the discharge average volts at 240 seconds for stock class where the batteries are not dumped completely. The discharge average end time is set in the same manner as previous values.

## SET NAME ON LABEL

The user may set a maximum of 9 characters that is printed out on the battery label. This is one name only. It is saved by itself and is NOT saved in the 3 setups. The name is set in the same manner as previous values.

## TYPE OF DATA OUTPUT ON PARALLEL PORT

Cell information is output to the parallel port (DB-25 connector) in 3 formats with automatic and manual print modes. This selection is settable in each of the three available setups.

1) LABELS-The first format is for a 15/16 by 1-inch pin feed pricing label. (Available from Competition Electronics, Inc.)

LABEL MANUAL PRINT-The buzzer will sound if selected to turn on when the TURBOMATCHER 4 has completed any of the three types of modes of operation. The PRINT button must then be pushed to print the labels. If the buzzer is turned off, the all cell status screen will show when all cells are done.

LABEL AUTOMATIC PRINT-When the TURBOMATCHER 4 has completed any of the three types of modes of operation, the labels will be automatically printed. The buzzer will then sound if selected to turn on. You may reprint the labels by pushing the PRINT button.

2) GRAPHS-The second format is for a graph of the discharge curve for each cell.

GRAPH MANUAL PRINT-The buzzer will still sound if selected to turn on when the TURBOMATCHER 4 has completed any of the three types of modes of operation. You MUST then go to the individual cell data screen desired and press the PRINT button to print that cell's curve.

GRAPH AUTOMATIC PRINT-The graph's of all four cells will print when the TURBOMATCHER 4 has completed any of the three types of modes of operation. The buzzer will then sound if selected to turn on. You may reprint the graphs by pushing the PRINT button.

3) COMPUTER-The computer data can be used for an optional label-printing program using your computer. You may see the format by connecting your parallel printer to the data port (DB-25 connector) and then push the PRINT button. You may have to push the PRINT button the second time to see the tail end of the data.

COMPUTER DATA MANUAL DOWNLOAD- The buzzer will sound if selected to turn on when the TURBOMATCHER 4 has completed any of the three types

of modes of operation. You may then output the computer-formatted data when the PRINT button is pushed.

COMPUTER DATA AUTOMATIC DOWNLOAD-This will output computer-formatted data when the TURBOMATCHER 4 has completed any of the three types of modes of operation. The buzzer will then sound if selected to turn on. You may download the data to the computer again by pushing the PRINT button.

## **MILLIAMP HOUR, MILLIWATT HOUR AND RELATIVE INTERNAL RESISTANCE DISPLAY**

An individual cell's milliamp hour, Milliwatt hour readings along with the calculated relative internal resistance are displayed on the lower line of the display with the cell number and description of the data displayed on the top line. Each cell has its own screen.

## **SOUND HORN ON/OFF SELECT**

This screen allows you to select whether or not you want the horn to sound at the end of the cycle mode or repeak discharge mode or discharge only mode of operation. This selection is available in each of the three setups.

## **STORE 1 OF 3 SETUPS**

This screen allows you to store the operating parameters you have set in one of 3 setups. Simply set the setup number to the desired value and then press the CYCLE button. The message SETUP STORED will appear showing that the operation is complete.

## **RECALL 1 OF 3 SETUPS**

This screen allows you to recall the operating parameters you have set in one of 3 setups. Simply set the setup number to the desired value and operating parameters will automatically be recalled.

## **CONTACTS**

If the contacts become dirty and won't conduct, the message 'BAD CONTACT' will be displayed along with the sound of a pulsing beep.

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". This cleans the contacts without wearing them and leaves a film to retard oxidation of the contacts. If sandpaper is used, the contacts will wear down quick-

ly and oxidize immediately providing a poor contact.

The TURBOMATCHER 4 employs two contacts on each end of the battery. The large contacts carry the current while the smaller contact is used to measure the voltage. By using a separate set of contacts for voltage measurements, the voltage drop across current carrying contacts is eliminated. The voltage measured in this manner is always accurate.

## PRINTERS

The printers supplied by the user must be a dot matrix Centronics parallel compatible type. It is connected directly to the parallel port on the side of the TURBOMATCHER 4. If the printer is not turned on or not connected, the TURBOMATCHER 4 will give the error message "PRINTER OFF LINE" when a print push button is depressed. There shouldn't be any switches that need to be set on the printer for normal operation. If you desire to use a different kind of printer, we suggest looking at our Turbolabel™ program. (See OPTIONAL LABEL PROGRAM FOR PERSONAL COMPUTERS)

## LABELS

The labels used by the TURBOMATCHER 4 are available from Competition Electronics. The labels come in white, pink, yellow or blue. Since they are set up for the older TURBOMATCHER at six across, 2 of the six labels in a row will be wasted.

The information printed on the labels is:

- \* First line: discharge time and discharge average volts
- \* Second line: charge amps, discharge amps, and relative internal resistance
- \* Third line: Milliwatt hours
- \* Fourth line: discharge time cutoff volts and discharge average end time
- \* Fifth line: name

## OPTIONAL LABEL PROGRAM FOR PERSONAL COMPUTERS (Turbolabel™)

An optional label-printing program is available for your computer that will allow you to format any size label up to 2 3/4 by 1 1/2 inches. You can choose the data you wish to have on the label along with text and graphics. It will operate with a parallel to serial converter to convert the output from the parallel port on the TURBOMATCHER 4 to a serial port input into the computer. A trial version will be available on our website at [www.competitionelectronics.com](http://www.competitionelectronics.com).

## RELATIVE INTERNAL RESISTANCE

Relative resistance number (now standard) was developed by Jeff Pack of the Pack Shoppe and is printed out on the label and shows up on the Milliwatt hour/milliamp hour/relative internal resistance screens.

## GRAPHS

The TURBOMATCHER 4 will graph the discharge curve of any of the four cells. This will be a graph of the cell voltage from .8 to 1.5 volts versus the discharge time in seconds. Connect your printer onto the parallel port and load continuous paper. Next, push either the LEFT ARROW or the RIGHT ARROW button until the desired cell data screen is on the display. Then push the PRINT button for a printout. If you are on any other type of screen, nothing will be printed. If the data output selected is GRAPH AUTOMATIC PRINT, all four graphs will print without having to select the cell data screen when the PRINT button is pushed.

## WHEN IT DOESN'T WORK

1. Check the supply volts to make sure that it is at least 11.5 volts and not over 15 volts. A supply volts of 13.8 is ideal.
2. 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. is (815) 874-8001.
3. The turn around time for repairs is usually 5 working days. We will send the repaired unit back UPS blue COD (2-day air CASH ONLY) or you can pay with a VISA/MASTERCARD. Be sure to include a copy of your credit card for accurate processing of the charges. See the Limited Warranty for the TURBOMATCHER 4 for warranty repairs.

## REPAIR RETURN ADDRESS

COMPETITION ELECTRONICS, INC.  
3469 PRECISION DRIVE  
ROCKFORD, IL 61109



**\*\*\*\*\*LIMITED WARRANTY\*\*\*\*\***

COMPETITION ELECTRONICS, INC., warrants the product manufactured by it to be free from defects in material and workmanship for a period of 90 days from date of purchase by the original purchaser for use. COMPETITION ELECTRONICS, at its option, will repair or replace without charge, or refund the purchase price of, any product which fails during the warranty period by reason of a defect in material or workmanship found upon examination by COMPETITION ELECTRONICS, INC., to have been the cause of the failure. This warranty does not cover any failures attributable to abuse, mishandling, failure to follow operating instructions, alteration or accident.

To make claim under this warranty, the purchaser must return the product to COMPETITION ELECTRONICS, INC., at the address shown below, properly packed and with shipping charges prepaid. All claims must be made in thirty (30) days after the product failure and, in any event, within thirty (30) days after the expiration of the 90-day warranty. All claims must be accompanied by a sales slip or other written proof of date of purchase.

TO THE EXTENT PERMITTED BY LAW, ANY AND ALL IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, ARE EXCLUDED; ANY IMPLIED WARRANTIES NOT EXCLUDED ARE LIMITED IN DURATION TO 90 DAYS FROM DATE OF PURCHASE. INCIDENTAL AND CONSEQUENTIAL DAMAGES ARE EXPRESSLY EXCLUDED FROM THE REMEDIES AVAILABLE TO PURCHASER, AND THE REMEDIES PROVIDED IN THIS WARRANTY SHALL BE EXCLUSIVE TO THE EXTENT PERMITTED BY LAW.

(Note: Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the foregoing limitations and exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary, from state to state.)

If any product returned by the purchaser is found by COMPETITION ELECTRONICS, INC., to require service not covered by warranty, COMPETITION ELECTRONICS, INC., will so advise the purchaser and request further instructions. COMPETITION ELECTRONICS, INC., will recondition to working order any product returned to it regardless of condition upon the purchaser's remittance of payment of 1/2 current retail price, if it is still manufactured by COMPETITION ELECTRONICS, INC.