

at up to 30 amps, the very thought of which would have caused its predecessor to roll over gracefully and stick its legs up in the air.

One of the major advantages of a charger like this, is that there is a degree of longevity built in, as software upgrades should become available as the product is developed.

In addition to being able to charge, discharge and cycle battery packs of four, five, six and seven cells, it will also cope with single cells, and run-in motors for a pre-set period of time.

David Gale looks at the latest offering from Competition Electronics.



The excellent single cell battery holder.

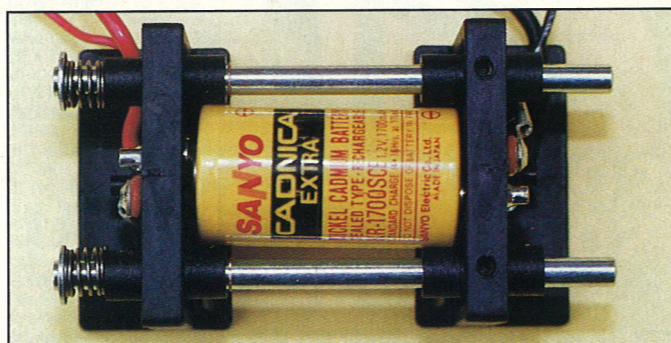
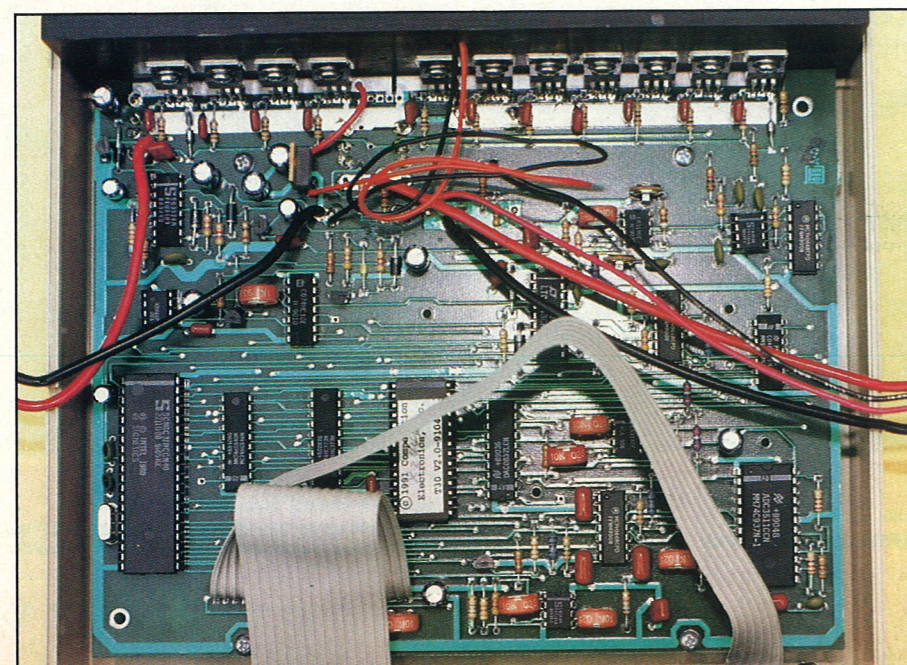
Over the past few years Nicad chargers have changed dramatically, from timed resistors, through peak, thermal, pulse, and so on into the current generation of "intelligent chargers".

Competition Electronics have been in the intelligent charger market for nearly two years now, and the original Turbo Charger has proven itself to be a reliable and useful piece of kit. Their new unit, the Turbo-Thirty, offers more functions and a significant increase in the charge and discharge current capability.

This means that it is now possible to charge at up to 12 amps and discharge

Competition Electronics

TURBO THIRTY CHARGER



Construction

The unit is packaged into a rather large ABS case, with the operating controls and status display on the front panel, and a large fan cooled heatsink mounted to the rear of the unit. This is fully shrouded by the case, which means that it is very safe from the operator's point of view, as there is no chance of getting burnt on the heatsink. Anyone who has inadvertently put their hand on the back of a hot capacity meter will know exactly what I mean! The aforementioned fan runs continuously and seems to bear more than a passing resemblance to a helicopter waiting to take off.

The status display is a two-line 20 character display, similar to that used on the original PSION Organiser, and is used to display operating mode, voltages and currents. It is a shame that there are only two lines as a four-line display would have allowed more information to be displayed, thus making the information more readable. This does seem to be a failing in common with all chargers of this sort, as they seem to try and cram as much info as possible into the two lines. There are five push-buttons to navigate the unit through the operating modes and control functions. The operation of these keys is very consistent, so once you have had a little practice, changing modes and functions will become almost second nature. A very good feature is that it is possible to store your personal set-up information in non-volatile memory so that when you next power-up the unit retrieves these values from memory.

There is no internal transformer, and the unit is designed to operate from a

Internals.

12-16 volt DC source, namely a car battery or regulated DC power source. As an addition to a car battery I tried the unit with an unregulated supply and found that it behaved equally as well, even peak charging cells without any problems.

The instructions supplied with the unit are well written, concise, and simple enough to be read before switching on for the first time. However, whilst the operating modes are well explained, there is no real information given as to where you would normally expect to use these modes, which is left up to you, the user.

Functions

The Turbo-Thirty has four basic modes of operation:
 Charge mode
 Discharge mode
 Cycle mode
 Motor run mode

Charge Mode

The unit operates as a peak detect type of charger. This means that while charging at a pre-set constant current it continuously monitors the pack voltage until it senses the voltage starting to drop and then cuts off. The amount by which the voltage must drop before charging stops can be adjusted to cope with different cell types. For example, SCs and SCEs should not be allowed to continue charging for significantly longer.

The charge current can be adjusted up to 12 amps and there is the facility for having more than one "peak", up to a maximum of three. The rest delay between "peaks" can be varied as well as being able to decide whether or not to trickle charge during these periods. In addition, the charge current used for each peak may be set as required.

For example, a typical SCE charge sequence would be to start charging one hour before the start of the race at five amps until the pack peaks. Then wait 20 minutes before peaking the cells for the second time, which, if all goes well, should be finished just before the start of the race.

While the pack is charging the status display shows the following useful information: charge current, pack voltage, supply voltage (to check if car battery or supply is OK), and time elapsed since the start of charge. At any time you can halt charging without disconnecting the battery pack, which might be useful if there is a delay in the race meeting.

Discharge Mode

This mode is normally used for checking the useful capacity left in the cells at the end of a race. The discharge current can be set between four and 25 amps and the voltage at which discharge stops can be adjusted as required.

Typically you would set the current to the average discharge current

expected during a race, ie about 20 amps for a buggy/pro ten or 13 amps for a 1/12 car. Then, when you have finished a race with capacity left, simply connect to the Turbo-Thirty and measure what's left. When it has finished discharging the time displayed on the Turbo-Thirty gives an exact indication of how long you could have continued before going flat. If you have more than about 20 seconds, gear up one pinion, more than 40 seconds two pinions and so on. By giving a time in seconds this is probably more useful than other dischargers, which may give a reading as a percentage or in amp/seconds.

Cycle Mode

This is a combination of the charge and discharge modes described above. It is primarily used for checking the capacity of cells by giving them a controlled charge and discharge cycle. The number of cycles (up to nine), and the time between successive cycles can be preset



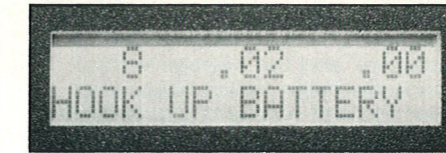
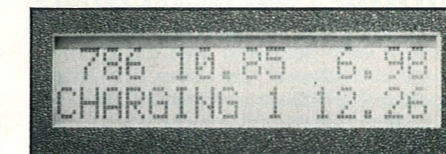
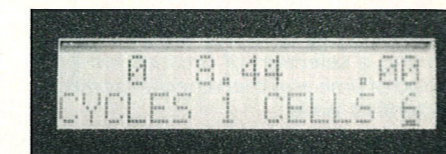
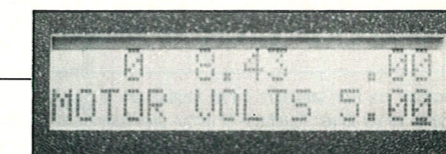
The unit is protected by fuses.

as required.

When charging and discharging during a cycle the Turbo-Thirty will use the same parameters set for these modes, so you have the option of setting the number of charge peaks, charge current and discharge current as required. This mode is also very useful for investigating the effect of various charging methods as you can play about with the many parameters, and by measuring the discharge capacity under controlled conditions you can get an idea of which method is best.

Cycle mode use with SCE and SC type cells

For SCEs, and to a lesser degree SCs, cycling the cells should be avoided where possible as this type of cell has a relatively short lifetime and each charge/discharge cycle will reduce their capacity slightly. This is less noticeable with well matched cells which is one reason why cell matching is so important. I would recommend that you check the capacity of SCEs no more than once every ten runs, and even less if you can manage it. Another problem with SCEs is that they are susceptible to damage by heat so if and when you cycle the cells make sure they are kept as cool as possible, preferably by fan cooling.



Some of the easy-to-read screens.

Cycle mode use with SCR type cells

If you run SCRs then this mode will be very useful, firstly to get them into peak condition and then to maintain them in that state. Getting the most out of SCRs is quite an art but there are some recommendations, and how the Turbo-Thirty can help:

Before you race them competitively SCRs need to be cycled about ten times. The best way to do this is to run them in the car one day and then cycle them the next. Repeat this process for ten days so they have five runs in the car and five cycles. During this period the capacity will increase by about 10% from their original value. (This will easily be seen on the Turbo-Thirty.) Now the cells are ready to run competitively and to keep them in top condition they should be given a cycle within one day of running them and then not used for at least a week, ie if you regularly race on a Sunday, cycle them on Monday evening so that they will be ready for the next Sunday. The Turbo-Thirty is ideal for this job as it's best to discharge the cells at a minimum of 12 amps during the discharge part of the cycle.

Motor Run Mode

This mode is ideal for breaking in new motors, or bedding in new brushes after a motor rebuild, as it allows the motor to be run at a low speed for a preset period. Normally I would run a rebuilt

motor in for about one hour at 1.5–2 volts and the Turbo-Thirty performed this simple task admirably. In the short period I had the Turbo-Thirty I found it was also very useful for evaluating different types of motor brushes by running a selection of brushes for a set period of time and then checking on the amount of wear.

Single Cell Matching

There is the facility for cell matching using a very neat and well designed single cell adapter. By using the cycle mode it is possible to measure the discharge capacity of your cells and from the results match cells with similar characteristics. (In single cell mode the Turbo-Thirty calculates two additional parameters, namely relative internal resistance, and the average voltage during discharge which helps when matching and sorting out good from bad.) Realistically this could only be applied to very small numbers of cells but would be ideal for picking out good cells from packs which no longer perform properly because a few of the cells are no good.

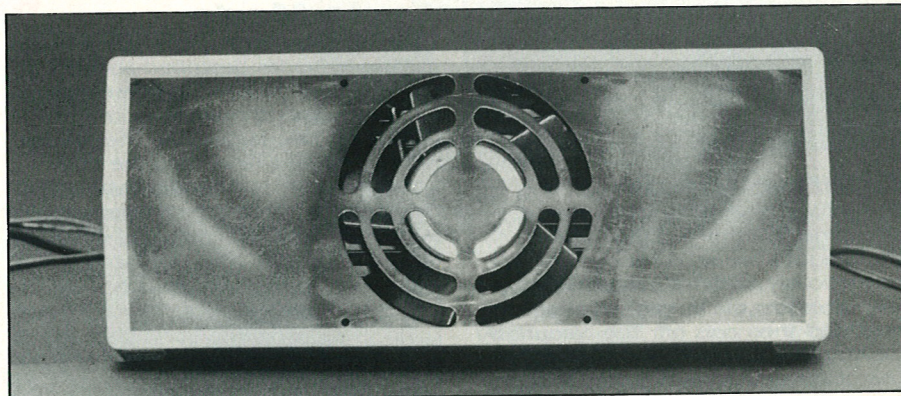
The Bottom Line

Competition Electronics have produced yet another neat and well designed charger capable of being programmed

to do almost all the things you could ever want to do when it comes to dealing with Nicad battery packs. When I first started the review I thought that it was a little over the top but now that I am used to its features and functions I can safely say that it will be like losing an old friend when I have to return it.

In terms of features and performance it is an excellent product but you are paying a premium for the ability to charge and discharge at the high rates available, and I wonder whether the additional cost over the original Turbo-Charger is justified for the majority of prospective users. Certainly

Q Fan at the rear keeps the Turbo Thirty cool.



if you want to do any cycling which corresponds to the currents typical in a five minute race the Turbo-Thirty is an ideal candidate for the job.

I think that it would have benefited with the addition of a temperature probe, not necessarily because temperature charging is better/worse, but because I think that the cell temperature gives a very good indication of how close the cells are to being charged. The only other drawback I can think of corresponds to the physical size of the beastie, as without doubt few people are going to have a pit box large enough to contain it although, as one person commented, you could always use it as a pit table in an emergency! ●



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