

Graupner Ultra Duo Plus 50 charger.

I briefly introduced this unit last month (loaned to me by Gliders Distribution) and promised a more detailed review to follow, so this is it. You will remember that this is effectively two chargers in one case and although there are a number of other chargers with two outputs, this is the first unit I have found in which the dual outputs are truly equal and able to be used independently with full function. It is only when you begin to look at the specification in detail that you realise how versatile the unit is. As an example of the range of options available I will refer to the charging mode for Nickel cells where the options are automatic, normal, linear, GMVIS, impulse, reflex, re-peak, and staged. This is quite a list and I will cover these terms in a little more detail later.

I included details of the UDP50 features last month and you might like to refer back to that information, if only as a reminder of the versatility of the unit, and although I would like to cover each and every feature in depth, there is simply insufficient space to do so. I will therefore deal broadly with the operation of the charger, and during this I will select areas of particular interest to cover in more detail.

Setting Up.

Remember that this charger is a dual power unit and can be operated either directly from the mains or via a suitable 12V DC supply. Connection to either supply will switch on the unit and both screens will light-up with a starting display which includes the user's name once this has been entered. The screens will then begin to rotate on a one second interval through a set of 9/10 formats numbered 0 to 8/9. These are in sequence; memory, charge, discharge, cycle, (step charge), balance, data view, tyre heater, motor run-in, and finally configuration. The step charge format is only available when working with Nickel cells. The controls on the front of the unit allow you to select any of these formats and to work within them, but there is only one set of controls (see photo) which can be used on either output (and the appropriate screen) as required. Switching the controls from one output to the other is achieved simply by pressing the output select button. There is a red LED beneath each pair of output sockets and the one which is flashing indicates the output that the controls are allocated to at any time.

The procedure commences by waiting until the output screen you wish to set up is showing the sub-screen you wish to enter (in the order of rotation e.g. memory if you wish to store data, charge, discharge, etc.) and then pressing the central dial. This locks the screen and stops the rotation of formats. The dial is the main control and can be used in a combination of presses and both clockwise and anti-clockwise rotations to navigate through the many sub-menus. The handbooks contain a series of flow charts, which are invaluable in guiding the user through to the area he requires. As the user's familiarity increases, the need to make constant reference to these charts will decrease, but a system with the range and versatility of the UDP50 necessarily has a complex programming procedure.

Once you have entered the area where you wish to set the parameters, the page select buttons and the up/down scrolling buttons are used to locate and select the required parameter, at which point the dial is rotated to set the appropriate numerical value. Once the values in a particular area are adjusted the stop/escape button takes you back to the entry screen, from where you can navigate to other areas as required by use of the dial. One of the features which is a little disconcerting at first is that moving through the main formats using the dial the move requires 3 clicks of the knob for the first move and then 2 clicks for each subsequent move. One other feature which can be an irritation is that some parameters need to have the battery connected before they can be adjusted. I appreciate that this is actually a safety measure intended to avoid a set-up which does not match the battery to be processed, but it can be a nuisance if you are simply familiarising yourself with the unit and some areas are not immediately available.

A Typical Charging Set-up.

I am going to take you through a typical set-up for the charging of a new 3S 2200mAh LiPo. I want to record the data from this process so I start in the memory format (0).

- Connect the charger to the supply, wait until the screen has rotated to the memory format, and press the dial once to lock it there. Connect the battery and the balancer lead to output 1 and check that this LED is flashing.
- The screen shows memory 01 initially so you need to press the dial to highlight this number and then rotate the dial to reach your chosen number (up to 50 available).
- Press the page select → button which will take you to the Battery Type page and check that the highlighted type is LiPo. If not, rotate the dial until LiPo is shown.
- Press the down ↓ button to highlight volts and rotate the dial to get 3CL 11.1 volt.
- Press the ↓ button to highlight capacity and rotate the dial to 2200 mAh.
- Press the ↓ button to highlight New and use the dial to set the date of purchase of the battery.
- Use the → button to move to the next page and use the dial to input a name for the battery (add a label with this name to the pack itself!).
- Press the ← button twice to return to the main memory format page. The data you have entered will appear at the base of the screen.
- Rotate the dial clockwise until the format page moves to 1 – Charge format.
- Press the → button to move to page 1 of the charge set-up. Check all of the parameters here and adjust if needed.
- If you wish to check the initial balance of the pack press the ← button to return to the main charge format screen and then rotate the dial clockwise until you reach the Balance screen.
- Press the → button to move to page 1 of the balance set-up and you will see the balance data for this pack. Further moves to pages 2 and 3 will give cell voltages to 3 decimal places and a graphical display of these.

- Press the ← button to return to the main balance format page and then rotate the dial anticlockwise to move back to the charge page.
- Press the dial to enter the start mode. The next screen will show the charge process highlighted and in this case there is a choice between the normal CC/CV LiPo pattern and a CV-link pattern (see later comments). There is a 5-second countdown to the start of charging so this selection needs to be fairly quick although the rotation of the dial to change the parameter re-sets the delay.
- After the countdown completes the next screen (also with a 5 second countdown) shows a parameter for an initial delay before charging begins which can be set as required, and an estimated charging time with start and finish times (times of day).
- The next screen involves a check of the connections to the pack followed by a confirmation of these (including the balancing connection cell count, which has to be confirmed by a press of the dial).
- The charge process then begins with the data being displayed on the screen in terms of time since commencement, input capacity, voltage, current, internal resistance, and (if a probe is fitted) the pack temperature.
- Completion of the charge is signalled by the charger and the data is stored automatically. The balance of the cells can be checked in the Balance format and the full charge data can be checked numerically and graphically in the Data View format. This information is permanently stored in the appropriate memory.

Note.

The list of charge modes available for the various cell types is very comprehensive as mentioned earlier but in the case of LiPo cells the options are normal constant current, constant voltage (CC/CV) and constant voltage/link. This latter mode is where identical packs are being used in series, i.e. two 7 cell packs to give a 14 cell total supply. The individual packs are connected to both outputs 1 and 2 and output 2 is slaved to output 1 so that the packs receive absolutely identical charges.

Other features.

The previous section will give you an idea of the depth of facilities available with this unit with regard to charging LiPos, but obviously there is much more available. Each of the basic formats are equally detailed and advanced but describing them in the same detail would take up many pages. I doubt that readers of my column would be very interested in the tyre heater feature or even the motor run-in one, but there is still an enormous range of features which I cannot cover in depth. I have not described the nature of the graphical data presented by the displays although this is limited by the size of the screens. Interfacing the unit with a PC and using the specially developed free LogView software produces a much more useful and detailed display (see photo). The use of this software and the interface greatly increases the ability of the unit to not only maintain a set of batteries in optimum condition and to store the data resulting from this process, but also to analyse the information involved in this. The ability to view the processes in fine detail in real time can be invaluable in using your batteries to their best ability. Comparison with similar packs and with previous results for the same pack allows careful control of your batteries and easy observation of trends such as power and capacity reduction.

I must admit to being extremely impressed by this unit. You would probably be unsurprised to find that it is not cheap, but then it depends on how each modeller assesses value. It is effectively two full-featured chargers in one case so dividing the price by two would allow you to compare it to other units more sensibly. If the use of this unit were to avoid the destruction of a set of large LiPo packs due to overloading in discharge it would have paid off most of its cost in that single event. There is always a price to pay for quality but that is an individual decision.

LiPo Safety Bags.

I only have room for one more section this time so I decided to describe a test to destruction I recently carried out. LiPo safety bags (sacks, safes, etc.) are intended to be used for the charging, bench discharging, and storing of LiPo batteries. We are all aware of the danger of fires when LiPos are abused and this applies even if the situation is accidental (my definition of which is based upon zero human error). The nature of this occurrence is a runaway thermal condition with the fire being totally self-sustaining (no atmospheric oxygen required) beyond a certain point, and this is almost impossible to prevent once the critical point has been exceeded.

All of these bags etc. are fire resistant material intended to operate on a single occurrence basis (no re-use), and to contain the fire in such a way as to prevent any spread to adjacent areas and minimise localised damage. They cannot prevent the total destruction of the battery once the critical point is passed.

I set out to test a LiPo Safe which originated from OverTec. I had an old and poorly performing (low capacity) 3S 1800mAh pack which I was willing to sacrifice and set it up with an extended charging lead. I wanted to take it past the critical point by overcharging but not excessively so, and used a DC power supply to charge the pack at 4.5 amps and 13.5 volts (2.5C and 4.5 volts per cell). The pack was initially at 3.4 volts per cell and I also put a wattmeter into the charge cables to record the capacity input. The charge process was commenced and I stood by with my digital camera to record the event (for a much longer period than I had imagined would be the case). In spite of the high charge rate the battery appeared unchanged for well over an hour (the long charging leads will have reduced the load on the pack), and it was not until the wattmeter indicated an input of over 2800mAh that visible swelling occurred.

Things then happened very quickly (about a minute to completion), the pack polymer case split open with quite a crack, the pack began to roar somewhat and the LiPo Safe began to emit great quantities of dense smoke (guess who was standing downwind and unable to photograph the worst moments!). Within a further 30 seconds the process reduced to completion and I deemed the area safe to investigate. The LiPo Safe showed signs of the internal combustion of the pack with much shrivelling and bubbling on the outside, but the Velcro seal on the flap had survived

OK and there was no flame external to the bag at any time. I cut open the bag to reveal the total destruction of the pack and you will see details of this in the photos.

My conclusions resulting from the test are as follows. The LiPo Safe did all that it was claimed to do. Since no flame escaped the bag there was no chance of the fire spreading to the surrounding area, especially since it was placed on a non-flammable surface (in the case of the test this was a layer of bricks). There would be some local damage if the surface was susceptible to heat, but this would be fairly limited. The biggest danger would be from the large volume of smoke emitted, smoke which I am sure is chemically very active and probably highly corrosive, but I see no way of avoiding the effects of this unless, as in the case of the test, the incident occurs outdoors. I have no doubts that the use of such containment leads to a significant reduction in the severity of any LiPo fire, and these units are to be recommended. I should also add that no modellers using these bags should allow themselves to become complacent. I believe that almost all LiPo fire incidents involve an element of human error, and the only real prevention of such incidents comes from correct procedures with continuous concern over the risks involved.

Footnote.

Just a quick word of additional explanation regarding the Neodym Wattmeter which I covered in QEFI 79 (September). The unit has been on sale with a number of upgraded instructions, and at least one of these gives the indication that it could also be used as a servo driver/tester. The misunderstanding arises partly from the technical aspects of the unit, and partly from the term "Servo" printed on the case above one of the sockets. This particular socket is where you connect the "Servo Cable" of the ESC in normal use and should NOT be used to connect a servo. If you do so the unit will not be able to drive the servo, and there is a risk that you might damage the wattmeter and/or the servo. The advice, therefore, is to use it ONLY as a wattmeter/ESC driver when testing a power train and in this format it works perfectly.

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Photographs.

- QEFI82-1 Typical format starting screen for a charging programme.**
- QEFI82-2 Typical start screen for a cycling programme.**
- QEFI82-3 Typical starting screen for the tyre-heating programme.**
- QEFI82-4 Typical screen for configuration adjustments.**
- QEFI82-5 Programming controls set to operate on Output 1 (note LED).**
- QEFI82-6 Example of LogView plot for a NiMh pack charge.**
- QEFI82-7 Example of LogView plot for a NiMH pack discharge.**
- QEFI82-8 The OverTec LiPo Safe and LiPo pack.**
- QEFI82-9 The pack inserted into the safe at start of test.**
- QEFI82-10 Maximum swelling of the pack at the critical point of ignition.**
- QEFI82-11 The pack fire contained by the LiPo Safe producing much smoke but no flames.**
- QEFI82-12 The fire dying back.**
- QEFI82-13 The fire extinguished leaving a much shrivelled LiPo Safe and smoke stains.**

QEF182-14 The inside of the LiPo Safe after the event.

QEF182-15 The remains of the destroyed LiPo pack.



MONITOR OUTPUT 1

1...18 NiMH/NiCd cells, 1...7 LiPo/LiIo/LiMn/LiFe cells,
1...6, 12 Pb cells / Charge current: 0.1A...10A / discharge current: 0.1A...10A



MONITOR OUTPUT 2

1...18 NiMH/NiCd cells, 1...7 LiPo/LiIo/LiMn/LiFe cells,
1...6, 12 Pb cells / Charge current: 0.1A...10A / discharge current: 0.1A...10A



MONITOR OUTPUT 1

1...18 NiMH/NiCd cells, 1...7 LiPo/LiIo/LiMn/LiFe cells,
1...6, 12 Pb cells / Charge current: 0.1A...10A / discharge current: 0.1A...10A



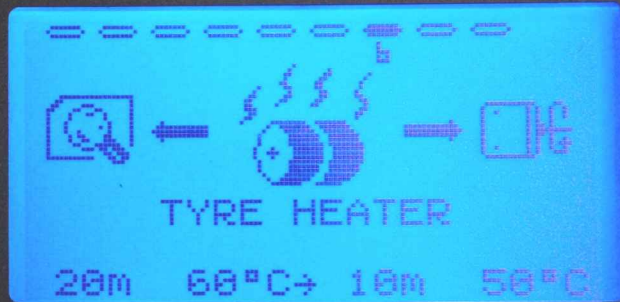
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MONITOR OUTPUT 2

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- OUTPUT 1 +

Two circular terminals for Output 1, one black and one red, with a small red LED indicator below them.

OUTPUT SELECT **PAGE SELECT**

A row of three circular buttons with red icons: a double-headed arrow, a left arrow, and a right arrow.

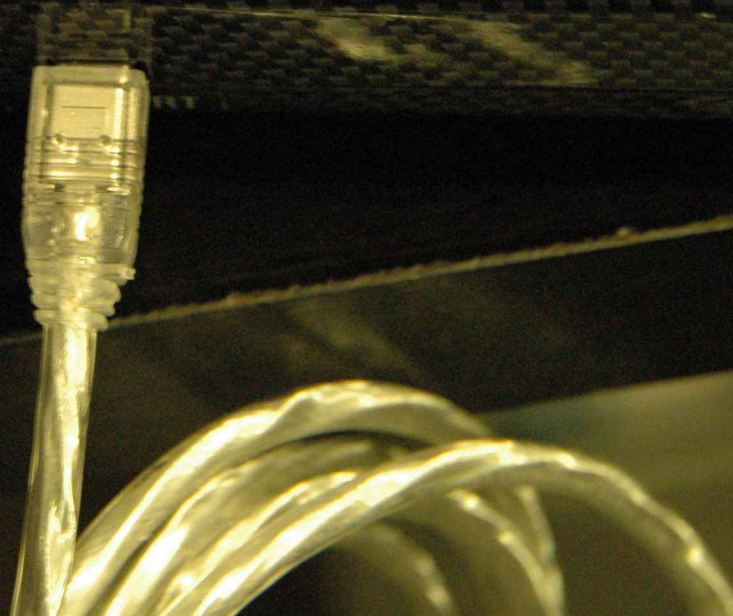
DIAL

A red, ribbed rotary dial with a small ring on top.

UP **DOWN** **STOP ESC**

A row of three circular buttons with red icons: an upward arrow, a downward arrow, and a circular arrow.

-

A single circular terminal for Output 2, with a minus sign to its left.

TEMP 2



MainChart





 **Overlander
Technologies**
LIPO-SAFE

WARNING!

- Never leave charging battery unattended.
- Always ensure the battery is on a non-flammable surface.
- Ensure flap is sealed while charging.
- The LIPO SAFE is intended to reduce the chances of damage in the event of a lipo fire.

Overlander
Technologies
LIPO-SAFE

WARNING!

- Never leave charging battery unattended
- Always ensure the battery is on a non-flammable surface.
- Ensure charging cables are disconnected while charging.
- The LIPO-SAFE is intended to reduce the chances of damage in the event of a fire fire.

Overlander
Technologies
LIPO-SAFE

WARNING!

- Never leave charging battery unattended
- Always ensure the battery is on a non-flammable surface
- Ensure there is no short circuit during charging
- The LIPO-SAFE is guaranteed to reduce the chances of damage to the event of a lipolite fire





Overlander
Technologies
LIPO-SAFE

WARNING!
Do not use this blanket to cover a fire or other heat source.
Always use this blanket to cover a person who is unconscious or injured.
This is not a fire blanket. It is a space blanket.
It is not a fire blanket. It is a space blanket.

 **Overlander Technologies**
LIPO-SAFE

WARNING!
This bag is designed to contain a lithium battery in the event of a fire. It is not a fireproof container and should not be used to store other items. It is not a fireproof container and should not be used to store other items.

- Never charge a lithium battery in this bag.
- Always use the correct charging method.
- Ensure the bag is used on a non-flammable surface.
- The bag is not a fireproof container and should not be used to store other items.



